NAT SPG/54

INTERNATIONAL CIVIL AVIATION ORGANIZATION

FINAL

SUMMARY OF DISCUSSIONS AND CONCLUSIONS OF

THE FIFTY-FOURTH MEETING OF

THE NORTH ATLANTIC SYSTEMS PLANNING GROUP

Paris, 25 to 28 June 2018

PREPARED BY THE EUROPEAN AND NORTH ATLANTIC OFFICE OF ICAO JUNE 2018

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INTRODUCTION

PLACE AND DURATION

0.1 The Fifty-Fourth Meeting of the North Atlantic Systems Planning Group (NAT SPG) was held in the European and North Atlantic (EUR/NAT) Office of ICAO from 25 to 28 June 2018.

OFFICERS AND SECRETARIAT

0.2 The Meeting was chaired by Mr Ásgeir Pálsson, the Representative from Iceland. Mr Luis Fonseca de Almeida, ICAO Regional Director, Europe and North Atlantic, was the Secretary of the Meeting and he was assisted by Mr Elkhan Nahmadov (Deputy Regional Director), Messrs Jacques Vanier, Arnaud Desjardin, Christopher Keohan, Sven Halle, Ms Blandine Ferrier, Ms Cornelia Ludorf, Ms Leyla Suleymanova, Ms Mihaela Brunette and Ms Patricia Cuff from the same Office. Mr Erwin Lassooij, chief of PCI, provided support from ICAO Headquarters.

ATTENDANCE

0.3 The Meeting was attended by 32 participants from 9 States and 6 international organisations. Lists of participants and contacts are provided at **Appendix A**. Apologies were received from the International Federation of Aeronautical Information Management Association (IFAIMA). The Meeting noted that a representative from EUROCONTROL was also in attendance as a guest with the purpose of assessing the need and modalities of future potential participation of EUROCONTROL in the NAT working arrangements as an observer.

0.4 At the opening of the meeting, the NAT SPG was informed that Mr Gerald (Gerry) Richard had passed away on 7 February 2018 at his home in Warrenton VA (Washington DC area). Gerry, who was one of the founding members of the North Atlantic Implementation Management Group (NAT IMG) and a stalwart supporter of the NAT SPG, was instrumental in the planning process for many North Atlantic (NAT) system improvements and in particular the implementation of Reduced Vertical Separation Minimum (RVSM) and the development of the NAT System Concept. Gerry will be interred in Arlington National Cemetery on 12 July 2018. The Representative for the United States agreed to pass on the Group’s condolences to Gerry’s wife My and to his family.

AGENDA

0.5 The NAT SPG agreed to the following agenda for organising the work of the Meeting and the structure of the report:

Agenda Item 1: Review of significant international aviation developments

Agenda Item 2: NAT planning and implementation programmes

Agenda Item 3: NAT safety performance and oversight issues

Agenda Item 4: NAT economic, financial and forecast issues

Agenda Item 5: NAT Documentation updates

Agenda Item 6: Work programme, including sub-groups

Agenda Item 7: Any Other Business

1. REVIEW OF SIGNIFICANT INTERNATIONAL AVIATION DEVELOPMENTS

1.1 ICAO UPDATE

1.1.1 The NAT SPG was informed about recent significant international aviation developments and took note of the latest adopted amendments and proposals for amendment to a number of ICAO Annexes, the publication of new ICAO Documents and forthcoming ICAO global and NAT Region-related meetings. Special mention was made of the 13th Air Navigation Conference (AN-Conf/13) to be held at ICAO Headquarters in Montreal, Canada, from 9 to 19 October 2018.

1.1.2 The ICAO Regional Director, Europe and North Atlantic, Mr Fonseca de Almeida, addressed the Meeting with information on the latest developments in ICAO at the global and regional levels. In particular, he highlighted the ongoing work on preparation of the ICAO business plan and EUR/NAT operational plan for the next triennium (2020-2022) and the commitment of ICAO to continue providing high-quality Secretariat support to the NAT Region. The importance of the NAT and its pioneering role in many innovative implementations was also emphasised.

1.1.3 The NAT SPG noted information on the ICAO global symposium (Montreal, 26-28 March 2019) and regional seminars that were being arranged in support of the implementation of the new Global Reporting Format (GRF) for the assessment and reporting of runway surface conditions. The ICAO EUR/NAT Secretariat informed the meeting that they were considering organising 2 (two) EUR/NAT seminars, one in Paris and one in the eastern part of the European (EUR) Region. The NAT SPG member States were encouraged to actively participate in the Global GRF Symposium and regional seminars. The United States provided information about their national programme and they were invited to share their experience in the upcoming regional seminars.

1.1.4 The NAT SPG was informed about the ICAO Standard Instrument Departure (SID)/Standard Terminal Arrival Route (STAR) procedures, which became applicable on 10 November 2016, and their slower than expected rate of implementation. The information on the ICAO activities to support a more rapid and cohesive global implementation was noted. The NAT SPG noted that this issue concerned just a handful of aerodromes that were in the *Regional Air Navigation Plan – North Atlantic* (NAT eANP, Doc 9634). It was noted that those States that had difficulties with the implementation of the procedures could bring this information to the attention of the ICAO EUR/NAT Office in order to discuss possible further steps.

1.1.5 The NAT SPG noted the ICAO work on enhancing support for the implementation of effective safety management subsequent to the adoption of Amendment 1 to Annex 19 (Safety Management). The NAT SPG member States were invited to share practical examples and tools which supported the implementation of effective safety management to be considered for posting on the Safety Management Implementation (SMI) website.

1.2 STATUS OF NAT SPG CONCLUSIONS

1.2.1 The NAT SPG reviewed the status of the NAT SPG Conclusions. It was noted that 21 of the 24 NAT SPG/53 Conclusions had been closed and the remaining 3 (three) Conclusions (5, 9, 18) were addressed and documented in the current meeting report. Updates on the status of extant NAT SPG Conclusions, namely 50/07, 51/22 and 52/17 were also provided.

1.3 REVIEW BY THE AIR NAVIGATION COMMISSION OF THE NAT SPG/53 REPORT

1.3.1 The NAT SPG was provided with the outcome of the review of the Report of the 53rd NAT SPG meeting (NAT SPG/53) by the Air Navigation Commission (ANC) Working Group of the Whole for Strategic Review and Planning (AN-WP/9169) and the Minutes of the ANC Meeting which addressed the Review of the NAT SPG/53 Report (AN Min. 206-6).

1.4 VOLCANIC ASH EXERCISES

1.4.1 The NAT SPG was provided with information on volcanic ash exercises VOLCEX17 and VOLKAM18 and planned exercise VOLCEX18. It was recalled that the European Air Navigation Planning Group (EANPG) Programme Coordinating Group (COG) and North Atlantic Implementation Management Group (NAT IMG) established the Volcanic Ash Exercises Steering Group for the EUR and NAT Regions (VOLCEX/SG) and the Volcanic Ash Exercises Steering Group for the (far) Eastern part of the EUR Region (EUR (EAST) VOLCEX/SG) in order to initiate and maintain a programme of regular volcanic ash exercises in the EUR/NAT Regions. One of the main goals of these exercises was to exercise the Volcanic Ash Contingency Plan (VACP) for the EUR and NAT Regions (EUR Doc 019, NAT Doc 006, Part II).

1.4.2 In particular, the NAT SPG noted that VOLCEX18 to exercise a simulated eruption of a volcano in Iceland called Öræfajökull would take place on 28 November 2018 and was expected to impact a significant part of the NAT Region as well as continental Europe. To assist in implementing the current provisions (e.g. Notification for Airmen (NOTAM), Danger Areas and SIGMET (SIGnificant METeorological Information)) of the EUR/NAT Volcanic Ash Contingency Plan, the NAT IMG and the combined meeting of the EANPG COG and European Regional Aviation Safety Group (RASG) Coordination Group (RCOG) endorsed the VOLCEX17 debrief meeting proposal to conduct the ICAO EUR/NAT VOLCEX18 Preparatory Workshop from 6 to 7 September 2018 (NAT IMG Decision 52/6 and COG71 RCOG08 Decision 05 refer).

1.4.3 The NAT SPG also noted that States had been invited (EUR/NAT State Letter ref.: 18-0068 dated 5 February 2018 refers) to provide their Points of Contact for their Air Navigation Service Provider (ANSP), Meteorological Watch Office (MWO), NOTAM Office and Regulator. The NAT SPG member States that had not replied to this letter were encouraged to provide this information as soon as possible.

1.5 NORTH ATLANTIC (NAT)/SOUTH ATLANTIC (SAT) COORDINATION COORDINATION

1.5.1 The NAT SPG was informed about the results and the relevant decisions from the plenary session of the 23rd Meeting on the improvement of Air Traffic Services over the South Atlantic (SAT/23) meeting, which was organised jointly with the CAFSAT VSAT Network Management Committee (CNMC/8) and South Atlantic Future Air Navigation System (FANS) 1/A Interoperability Team (SAT/FIT/13) meetings in Durban, South Africa from 4 to 8 June 2018. The NAT SPG also recalled the importance of its continuing coordination with the SAT Meeting, not only for ensuring inter-regional harmonization and interoperability, but also for avoiding duplication of efforts, and that this inter-regional coordination aspect had also been fully supported by the GREPECAS/18 meeting in April 2018.

1.5.2 The NAT SPG also noted the study from the ICAO Secretariat to propose an optimum way forward to increase the efficiency and effectiveness of the informal SAT Meeting and enhance necessary coordination/collaboration with all the concerned Planning and Implementation Regional Groups (PIRG). The study further recommended that the key work programme tasks of the SAT Meeting, in particular, those that could benefit from the experience and expertise well vested in a specific PIRG, such as the NAT SPG, could be advanced more efficiently through the establishment of an inter-regional coordination group. This formal coordination mechanism between the NAT SPG and the informal SAT Meeting would be called "Atlantic Coordination Group (ACG)".

1.5.3 During the discussion, Portugal, the United Kingdom and the United States expressed their appreciation/support for this initiative and pointed out that the seamless operation across boundaries would become more crucial in the future with the expected increase of traffic. The NAT SPG noted the importance of coordination with ASECNA (Agence pour la sécurité de la navigation aérienne en Afrique et à Madagascar) in preparation of the ACG to ensure its success and welcomed France's participation in this respect. The representative for the International Air Transport Association (IATA) pointed out that there was a need to continue the coordination/collaboration with the SAT Meeting so that the safety and efficiency of air navigation services over the South Atlantic could be further improved. IATA also proposed a closer coherence to the *Global Air Navigation Plan* (GANP, Doc 9750) so that any future implementation plan/activity in the South Atlantic would be accompanied by a business case.

1.5.4 The NAT SPG welcomed the SAT/23 initiative and their Decision 23/18 on the establishment of the ACG and supported the proposal that the inaugural meeting of the ACG be organised in coordination between ICAO Headquarters and all involved Regional Offices (East African (ESAF), Western and Central African (WACAF), Europe and North Atlantic (EUR/NAT), South American (SAM) and North American, Central American and Caribbean (NACC)) at the ICAO EUR/NAT Office in Paris during the week of 19 November 2018 (or 28 January 2019, in conjunction with the NAT 2030 Vision Workshop). The NAT SPG also confirmed the need to develop the necessary working arrangements for the ACG so that the participation of key aviation stakeholders (e.g. SAT Meeting members, international organisations, airspace users, NAT SPG members) could be assured.

1.5.5 Finally, the NAT SPG thanked ICAO, including all Regional Offices involved, the United States and IATA for their continuous efforts to improve coordination between the informal SAT Meeting and the NAT SPG.

1.5.6 Therefore, the following was agreed:

NAT SPG Conclusion 54/5 – First Atlantic Coordination Group (ACG) Meeting

> That ICAO, in coordination with the ICAO East African (ESAF), Western and Central African (WACAF), Europe and North Atlantic (EUR/NAT), South American (SAM) and North American and Central American and Caribbean (NACC) Regional Offices, be invited to consider organising the first ACG meeting in the week of 19 November 2018 (or during the week of 28 January 2019, back to back with the NAT 2030 Vision Workshop) in the ICAO EUR/NAT Office in Paris, France.

2. NAT PLANNING AND IMPLEMENTATION PROGRAMMES

2.1 PBCS IMPLEMENTATION

2.1.1 The NAT SPG was provided a brief overview of the activities of all stakeholders leading up to the implementation of Performance Based Communications and Surveillance (PBCS)-based separation minima and details of some of the lessons learnt. The briefing included updates from Gander, New York Oceanic East, Reykjavik and Shanwick Control Areas (CTA).

2.1.2 It was noted that in general the implementation of PBCS on 29 March 2018 went smoother than anticipated, given the expectation that initial approval levels could have been very low. Increasing the collective approval rate of the NAT fleet from the 40-45% range into numbers more aligned to the FANS 1/A equipage numbers, typically over 90%, remained a concern, particularly since traffic would increase as the summer months approached. In this regard, it was observed that ANSPs would benefit from having increased awareness of expected operator/State readiness.

2.1.3 IATA recalled that they raised concerns in the past that the PBCS implementation process was not sufficiently robust because aircraft eligibility guidance and regulatory requirements had not been adequately addressed and that the implementation of the PBCS lacked some essential components. It was also emphasised that the transition arrangements for PBCS-based separation minima to the NAT Organized Track System (OTS) would need to be further discussed and clarified.

2.1.4 The NAT SPG commented that the highlighted difficulties were typical for any implementation, especially for a large and complex one as the implementation of PBCS-based separation minima in the NAT. The NAT SPG considered that planning and implementation activities had been conducted in a transparent and coordinated manner and had provided sufficient advance notice to airspace users. Nevertheless, the NAT SPG also acknowledged the need for continuous improvement and from this perspective, identification of lessons learnt would be very important.

2.1.5 The NAT SPG also recalled that NAT SPG/53 had agreed that a 6-month post-implementation review be carried out. Although, it was recognised that the initial purpose of the 6-month period review was somewhat different, the NAT SPG agreed that from a post-implementation monitoring perspective, such a review should take place within the NAT IMG and North Atlantic Safety Oversight Group (NAT SOG). The scope of the review could include sharing of post-implementation monitoring information by implementing States and ANSPs, aircraft and airspace users PBCS authorisation levels, safety occurences, etc. Should anything untoward be identified, the NAT IMG and NAT SOG would develop corrective action and inform the NAT SPG.

2.1.6 With the above in mind, the following was agreed:

NAT SPG Conclusion 54/6 – Investigate and Evaluate the lessons learnt as a result of the implementation of Performance Based Communications and Surveillance (PBCS) in the NAT Region

That the NAT IMG, in cooperation with the NAT SOG, carry out a review of the NAT planning process, using the implementation of PBCS in the NAT Region as a case study, in order to identify potential improvements.

NAT SPG Conclusion 54/7 – Application of PBCS-based separation minima on the NAT Organised Track System (OTS)

That the NAT IMG review the transition arrangements for Performance Based Communications and Surveillance (PBCS) based separation minima on the NAT OTS, taking into account, *inter alia*, the following:

a) criteria for cessation of transition;

b) lessons learnt from a regulatory approval perspective; and

c) the impact on service provision, the NAT OTS capacity and performance and the air traffic control workload.

2.1.7 In addition, the NAT SPG was informed by the NAT Central Monitoring Agency (NAT CMA) about the lack of information from States on the status of PBCS authorisations issued for their aircraft operators. This prevented the maintenance of a complete database of PBCS authorised aircraft. In order to assist the NAT CMA in this task and address the above-mentioned issue, the NAT SPG agreed the following:

NAT SPG Conclusion 54/8 – Providing Performance Based Communications and Surveillance (PBCS) authorisations information to the appropriate Regional Monitoring Agencies (RMA)

That the ICAO Regional Director, Europe and North Atlantic, take appropriate action to invite all NAT user States to provide information on PBCS authorisations to their appropriate Regional Monitoring Agencies (RMA).

2.2 SPACE-BASED AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B) (SB ADS-B)

2.2.1 The NAT SPG was presented with a status of implementations of actions agreed by NAT SPG Conclusion 53/5 (*Prerequisites for SB ADS-B Operational Trial* refers).

2.2.2 With regards to a) of the foregoing conclusion, the NAT SPG was informed that the Second meeting of the ICAO Separation and Airspace Safety Panel (SASP/2) (Montreal, Canada, 7-18 May 2018) agreed on an Advanced Surveillance Enhanced Procedural Separation (ASEPS) Proposal for Amendment (PfA) to the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444). The proposed changes to the PANS-ATM should become effective on 5 November 2020. The NAT SPG noted that the proposal for Doc 4444 amendment would be normally expected during the spring of 2019 and a State letter informing about the approval of the amendment would be circulated in the first half of 2020. Should any developments at these stages suggest that there might be any changes to the current SASP agreed wording, the Secretariat would take appropriate actions to inform the NAT SPG to discuss possible follow up actions with regards to the NAT trial.

2.2.3 Concerning sub-item g) of NAT SPG Conclusion 53/5, the NAT SPG was provided with the latest draft Implementation Plan and Task list (**Appendix B** refers) in support of an operational trial of ASEPS using Space-based Automatic Dependent Surveillance-Broadcast (SB ADS-B). The first draft of the Implementation Plan and Task List had been reviewed by NAT IMG/52, and presented to the NAT SOG/18. Subsequently, an implementation collaboration workshop was hosted by IATA in Montreal from 12 to 13 June 2018. It was noted that the Implementation Plan and Task List were intended to cover both longitudinal and lateral separation applications, with the application of lateral separation proposed to commence no earlier than 6 (six) months after commencement of the longitudinal separation application. As per NAT SPG Conclusion 53/5, the Implementation Plan and Task List integrated and described in detail the prerequisites for the Operational Trial of ASEPS using SB ADS-B.

2.2.4 In conjunction with the above, the NAT SPG was also provided with the provisional version of the NAT SB ADS-B Concept of Operations (CONOPS) (**Appendix C** refers), developed by the SB ADS-B Project Team, that would be further updated by the North Atlantic Procedures and Operations Group (NAT POG) taking the SASP outcomes into account.

2.2.5 The NAT SPG agreed that the foregoing documents would be further reviewed by the NAT IMG and NAT SOG contributory bodies culminating in the NAT IMG/53 and NAT SOG/19 meetings to ascertain whether all prerequisites of NAT SPG Conclusion 53/5 had been appropriately addressed so that the decision on the commencement of the NAT ASEPS trial using SB ADS-B could be taken.

2.2.6 When making the decision about the approval, the Group was aware that to meet the 28 March 2019 implementation date, 2 (two) AIRAC cycles were required by the operators and that, for the Aeronautical Information Services (AIS) authorities to meet that deadline, at least 1 (one) other AIRAC cycle was required. Therefore, for a 28 March 2019 implementation, AIS must be provided with approved material no later than 3 January 2019 so as to publish by 31 January 2019.

2.2.7 Based on the above, the NAT SPG agreed to the following:

NAT SPG Conclusion 54/9 – Operational Trial of Advanced Surveillance Enhanced Procedural Separation (ASEPS) using Space-Based Automatic Dependent Surveillance-Broadcast (SB ADS-B)

That:

a) the Implementation Plan and Task List for an operational trial of Advanced Surveillance-Enhanced Procedural Separation (ASEPS) using Space-Based Automatic Dependent Surveillance-Broadcast (SB ADS-B) be approved by the NAT IMG/53 and the NAT SOG/19 meetings, provided that the NAT IMG and NAT SOG have ascertained that all prerequisites of NAT SPG Conclusion 53/5 have been satisfied; and

b) subject to the NAT IMG and NAT SOG approval, the operational trial be planned to:

   i) commence on 28 March 2019 provided all prerequisites of NAT SPG Conclusion 53/5 have been satisfied; and

   ii) continue until 5 November 2020 or the effective date of ASEPS provisions in the *Procedures for Air Navigation Services - Air Traffic Management* (PANS-ATM, Doc 4444), whichever is later.

2.2.8 Concerning the safety management activities referred to in NAT SPG Conclusion 53/5, the NAT SPG recalled NAT SPG Conclusion 53/16 - *Definition and Components of safety cases in support of changes to the NAT air navigation system requiring NAT SPG approval* and noted that some initial safety management work had been completed and presented to NAT SOG/18. Further updates would be provided to the next NAT SOG meeting.

2.3 NAT Uplink Latency Timer Project Team (ULT PT)

2.3.1 The NAT SPG was presented with the interim report of the NAT Uplink Latency Timer Project Team (ULT PT) that had been established in follow up to NAT SPG Conclusion 54/03 (approved by correspondence. State letter Ref.: EUR/NAT 17-0674.TEC of 5 December 2017 refers).

NAT SPG Conclusion 54/3 – Establishment of the NAT Uplink Latency Timer Project Team

> That the ICAO Regional Director, Europe and North Atlantic, take appropriate measures to establish a NAT Project Team on the uplink message latency timer with the project definition as provided in **Appendix D**.

2.3.2 It was noted that the ULT PT interim report and recommendations therein had been presented to and agreed by the NAT IMG, NAT SOG and NAT SPG via correspondence. Consequently, the NAT OPS Bulletin 2018_002 had been published on the ICAO EUR/NAT website. The NAT OPS Bulletin was subsequently revised to address a discrepancy that was discovered between the *Global Operational Data Link Manual* (GOLD, Doc 10037) and industry interoperability specifications ED-100A/DO-258A regarding the wording of the latency timer uplink message.

2.3.3 The ULT PT was working on the second task per its Terms of Reference: “Consider the viability of implementing a network uplink message expiration timer” that was expected to be completed before NAT IMG/53.

2.3.4 In conjunction with this paper, the NAT SPG was presented information about a problem that was discovered when Isavia implemented the Controller Pilot Data Link Communications (CPDLC) uplink latency monitor functionality. It was discovered that Airbus aircraft were rejecting uplink messages that had not exceeded the 300 second limit. In coordination with Airbus, it was determined that the messages were being rejected for the opposite reason; namely, the avionics were concluding that the receipt time-of-day preceded that indicated by the transmission time stamp and that the messages therefore had to be almost 24 hours (or indeed multiples of 24 hours) old. The root cause of this misperception was that, as CPDLC time stamps only contained hours, minutes and seconds, there was no way to distinguish between new messages and messages from the preceding day (or days).

2.3.5 In order to address the issue, Isavia implemented a short-term solution which involved subtracting 2 (two) seconds from the time stamp embedded in CPDLC messages. This time stamp was not used in performance measurements (the system separately logs the time of transmission and receipt of air/ground messages) so would not have any effect on measuring Actual Communication Performance (ACP) or Actual Communication Technical Performance (ACTP). Since the implementation of the two second "apparent delay" in CPDLC uplink messages there had been no occurrences and the problem appeared to have been solved.

2.3.6 The NAT SPG also noted that Airbus intended to implement a small window around the time of receipt to eliminate this problem and they had already planned some test flights.

2.3.7 In addition, the NAT SPG was presented a paper informing about recent discussions by NAT ANSPs about publishing the Message Latency Monitor maximum delay value in the AIP or by NOTAM, versus developing the necessary steps for uplinking the value as concluded by the NAT ULT PT. In this respect it was recalled that the approved ULT PT recommendation was that “*The SET MAX UPLINK DELAY VALUE TO [seconds] SEC should be uplinked to all CPDLC connected aircraft*”.

2.4 DATA LINK PERFORMANCE AND EQUIPAGE DATA

2.4.1 The NAT SPG noted the information concerning the data link performance as observed in the NAT Region that had been provided for Gander, New York Oceanic East, Reykjavik, Santa Maria, and Shanwick CTAs. The summary of the PBCS monitoring results which had been submitted by individual ANSPs during the period July to December 2017 showed the following:

a) The aggregated performance within the NAT Region, combining the Satellite (SAT), Very High Frequency (VHF), High Frequency (HF) and transition area performance together, had remained stable for several years. The majority of the data came via SAT.

b) During the 2 (two) most recent 6-month reporting periods:

   i. the 95% criteria were met for Required Surveillance Performance (RSP) 180 and Required Communication Performance (RCP) 240 for the aggregate NAT Region and for the individual NAT Flight Information Regions (FIR); and

   ii. the 99.9% criteria were met for RSP 180 and RCP 240 at the then accepted level of 99.0% for the aggregate NAT Region and for the individual NAT CTAs.

2.4.2 The NAT SPG was informed that the data link performance report for 2017 had been published by the ICAO EUR/NAT Office and posted on the ICAO EUR/NAT web site.

2.5 NAT CPDLC ROUTE CLEARANCE UPLINK IMPLEMENTATION PLAN

2.5.1 The NAT SPG was informed that work was ongoing to develop the CPDLC route clearance uplink functionality and that a proposal to revise the language of the CPDLC Route Clearance Uplink Implementation Plan was being studied. However, it was not clear if all ANSPs would be able to perform CPDLC route clearance uplinks prior to the oceanic boundary due to Current Data Authority (CDA) concerns. Instead work would focus on discontinuing the Oceanic Clearance. The representatives for IATA and the International Federation of Air Line Pilots Association (IFALPA) supported this solution as it contributed to the goal of global harmonization of flight crew procedures. Discontinuing the oceanic clearance would be further progressed and developments reported to the NAT SPG.

2.6 VOICE COMMUNICATIONS SYSTEM PERFORMANCE REPORT

2.6.1 It was noted that the consolidated analysis of the voice message volume of the NAT Aeronautical Radio Stations had shown that the use of voice communications was diminishing. Since it was expected that this trend would most likely continue, there may come a time when the capacity of the voice communications infrastructure would be dictated by the need for a fall-back to data link rather than actual usage. This may need to be addressed in the future. The NAT SPG noted that the NAT Aeronautical Radio Stations Network Data Consolidation Report 2017 was published on the ICAO EUR/NAT website.

2.7 DETECTION AND REPORTING OF OUTAGES AND FANS 1/A END-TO-END MONITORING AND REPORTING

2.7.1 The NAT SPG was informed that the availability of the data link network had been identified as one of the more significant concerns impacting the application of performance-based separation standards. One major technical challenge regarding this work had been how to measure the actual availability against the requirements defined for RCP 240 and RSP 180.

2.7.2 In this connection, it was noted that the timing, content, and format of the notifications from the communication service providers had shown that the level of detection and reporting of deficiencies could be insufficient to support the PBCS environment going forward. In order to get a clear understanding of the scope of this issue, the NAT IMG had established an outage detection and reporting (NODAR) Project Team which would be responsible for working through the identified challenges regarding detection and reporting of network outages. In agreeing to the foregoing, the NAT IMG had been cognisant of the importance of the participation of the various service providers in the Project Team and therefore agreed to request that the ICAO Regional Director, EUR/NAT, urge Communications Service Providers (CSP) and Satellite Service Providers (SSP) to take part in the work of the NODAR Project Team in order to urgently address challenges that have been identified in the detection and reporting of network outages.

2.7.3 It was acknowledged that to monitor the system end-to-end and to fully understand its existing situation, an expanded visibility of the health of the components of the system and what problems could be expected was needed. To that end, the full cooperation of the communications community was required. In this regard, the NAT SPG supported that the participation of all stakeholders was important if a robust monitoring and reporting system, which is needed to sustain the new reduced separation minima, was to be put in place. Having noted that the level of participation from some CSPs and SSPs had recently decreased, the NAT SPG agreed to solicit at the highest level the participation of the communications service providers.

2.7.4 Based on the foregoing, the following was agreed:

NAT SPG Conclusion 54/10 – Establishment of a robust monitoring and reporting system for the FANS 1/A end-to-end communications

That, in order to sustain the establishment of a robust monitoring and reporting system for the Future Air Navigation Systems (FANS)1/A end-to-end communication system to support the implementation of new reduced separation minima, the ICAO Regional Director, Europe and North Atlantic, on behalf of the NAT SPG, be requested to urge all stakeholders, including NAT Air Navigation Service Providers, IATA, IBAC, ARINC, Inmarsat, Iridium and SITA, to actively support this NAT SPG monitoring task.

2.8 FORMIDABLE SHIELD EXERCISES

2.8.1 The NAT SPG was presented information by the United Kingdom (on behalf of QinetiQ Ltd) concerning the Formidable Shield exercises, their potential impact on NAT operations and the need for improved coordination between the NAT SPG working structure and the exercise organisers with regard to the danger area airspace dimensions, airspace safety buffers, NOTAM publications and other potential operational issues.

2.8.2 The NAT SPG noted that similar discussions had also taken place in follow up to the previous exercises at the NAM/EUR (North American/European Air Traffic Flow Management Task Force) meetings where some lessons learnt were discussed.

2.8.3 In this regard, the NAT SPG invited the Formidable Shield Exercise organisers to attend the next NAT POG meeting to initiate further discussion on the above-mentioned topics.

3. NAT SAFETY PERFORMANCE AND OVERSIGHT ISSUES

3.1 NAT SCRUTINY GROUP (NAT SG)

3.1.1 The NAT SPG noted the outcomes of the eighteenth meeting of the North Atlantic Scrutiny Group (NAT SG/18)) held in Santa Maria, Portugal from 12 to 16 March 2018. In particular, the NAT SPG noted the NAT SOG decision to discontinue the NAT Safety Performance Reports (SPR). It was recalled that the SPR was an extract from the Deviations and Error Monitoring Application (DEMA) system and was produced by the NAT SG as tasked by NAT SOG. However, the usability of the SPR by the NAT SOG was questioned as the same information could be found in the NAT Annual Safety Report (ASR), NAT SG and NAT Mathematicians' Working Group (NAT MWG) reports and any additional information could be extracted on demand from the DEMA.

3.1.2 The NAT SPG also noted the discussions on the current format of the NAT DEMA and the process to initiate any changes to it. The NAT SPG was informed that the format and process made it difficult for the NAT CMA to update the processes used to record NAT occurrence events, provide information to the States and operators and to avoid duplicating work. It was also noted that new, improved data collection tools were available and that there was uncertainty over the long-term support of the Microsoft Access software used for the NAT DEMA. Hence the need was identified for developing a new tool to replace DEMA in the nearest future.

3.1.3 Based on the above, the following was agreed:

NAT SPG Conclusion 54/11 - Establishment of a NAT DEMA Replacement Project Team (NAT DEMA RPT)

That the NAT SPG:

a) establish a project team in accordance with the NAT Deviations and Error Monitoring Application (DEM) Replacement PT definition provided at **Appendix E**; and

b) agree to support and review the outcomes of the NAT DEMA RPT via correspondence to facilitate deployment of the new tool in 2019.

3.2 NAT MATHEMATICIANS' WORKING GROUP (MWG)

3.2.1 The NAT SPG noted the outcomes of the 54th meeting of the NAT MWG that took place from 9 to 13 April 2018 in London, United Kingdom. In particular, the NAT SPG was provided with a proposal to amend the *NAT SPG Handbook* regarding the NAT MWG Terms of Reference (ToRs). Therefore the following was agreed:

NAT SPG Conclusion 54/12 - Updates to the NAT Mathematicians' Working Group (MWG) Terms of Reference (ToRs)

That the ICAO Regional Director, Europe and North Atlantic, take appropriate action to amend the NAT MWG's ToRs in the *NAT SPG Handbook* (NAT Doc 001) as shown in **Appendix Q.**

3.3 NAT ANNUAL SAFETY REPORT (NAT ASR) FOR 2017

3.3.1 The NAT SPG was provided with the NAT Annual Safety Report (ASR) for 2017. It was noted that the 2017 ASR did not include the results of the monitoring of performance against the target level of safety (TLS) for the lateral and vertical domains (NAT SPG Conclusion 53/15 refers). The historical estimates of combined technical and operational vertical collision were above the TLS for the vertical dimension since 2001. The 2017 estimate of vertical collision risk was 46.1×10^{-9} fatal accidents per flight hour (fapfh). When the Strategic Lateral Offset Procedure (SLOP) was incorporated, the 2017 estimate was 10.5×10^{-9} fapfh. This represented a 77% safety improvement.

3.3.2 It was recalled that NAT SOG Decision 14/04 agreed some changes to the methodology and definition of the risk-bearing Gross Navigation Errors (GNE) for the lateral collision risk model. The new methodology included all risk-bearing lateral deviations regardless of the means of reporting. The 2017 lateral collision risk estimate was 12.8×10^{-9} fapfh which was lower than the 2016 lateral collision risk estimate of 17.3×10^{-9} fapfh.

3.3.3 It was also recalled that NAT SPG/53 agreed some changes to the definition of safety targets, whereby 9 (nine) of the Safety Key Performance Indicators (SKPI) now relied on the previous three years' rolling average. Performance measured as of the beginning of the current year would be measured from the baseline of the average performance of 2015, 2016 and 2017. This meant that for 2017 performance measurements, there were only defined targets for 3 (three) out of the 12 reported SKPIs. For those 3 (three), the safety targets were met in 2017.

3.3.4 The NAT SPG noted that there were discrepancies in various NAT sources concerning what should be the lateral TLS and that this issue would be further investigated by the Secretariat and a working paper be prepared for the next NAT SOG meeting.

3.3.5 Therefore, the following was agreed:

NAT SPG Conclusion 54/13 - Publication of the 2017 NAT Annual Safety Report (ASR)

That the ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish the NAT SPG-endorsed NAT ASR 2017 as provided at **Appendix F**.

4. NAT ECONOMIC, FINANCIAL AND FORECAST ISSUES

4.1 GLOBAL OUTLOOK AND TRENDS

4.1.1 The NAT SPG noted that the global outlook highlighted the following economic and performance trends:

a) Economic Outlook - global economic growth in 2017 was the fastest since 2011, reaching 3.8%;
   i. Projected Gross Domestic Product (GDP) growth for 2018 and 2019 was 3.9%;
   ii. GDP was a key driver of passenger demand;

b) Industry Outlook
   i. Profit margins for operators remained high – 6.8% in the first quarter of 2018;
   ii. Oil prices moved higher early in 2018 but were expected to decrease;
   iii. Safety and maintenance remained paramount to industry success;

c) Operational Outlook
   i. Scheduled traffic grew by 5.5% in the first six months of 2018 compared to the same period last year, between the United States and Europe;
   ii. Global Passenger and Freight year to date (January - March) demand increased by 7.2% and 5.4%, respectively;

d) Risks to continued growth
   i. Tightening monetary policies, trade disputes and other geopolitical tensions.

4.1.2 The NAT SPG was informed that as part of the established practice, the information on the North Atlantic Performance Trends (*NAT EFFG/34 Summary of Discussions*, Appendix F refers) was made available on the ICAO EUR/NAT website.

4.2 NAT TRAFFIC FORECAST

4.2.1 The NAT SPG was informed that the five-year outlook update projected NAT traffic to increase at an average annual rate of 3.9% between 2017 and 2022, which was a decrease of the initial 2016-2021 short term growth rate of 4.9% reported at the previous NAT Economic, Financial and Forecast Group (NAT EFFG) meeting (NAT EFFG/33). The decrease was due to an earlier than expected delivery of aircraft and the disappearance of Air Berlin from the scene of carriers. However, growth would continue but may lessen on a year-over-year (yr-yr) basis. The long-term forecast growth beyond 2022 also decreased since the preliminary forecast presented at NAT EFFG/33. The long-term NAT Region traffic growth rate was 3.1%.

4.2.2 The NAT SPG noted that the updated traffic forecast for the NAT Region would be made available on the EUR/NAT public website. The supporting traffic data used to create the overall NAT traffic forecast was restricted to the NAT EFFG members, and so was the detailed traffic forecasts (by FIR, by type of airframe, etc.). The NAT EFFG members acted as focal points to reply to requests from their respective States about information pertinent to their FIR.

4.2.3 The NAT SPG noted that the NAT EFFG process for updating the NAT traffic forecast was as follows:

a) all ANSPs to provide current traffic data for their respective FIR in advance of the next publication date:
   i) end of August for publication on 1 October; or
   ii) end of February for publication on 1 April;
b) this current traffic data would then be processed by the United States forecasting team to update the NAT traffic forecast;
c) the updated NAT traffic forecast would then:
   i) be reviewed at the autumn NAT EFFG meeting, for publication on 1 October; or
   ii) be reviewed by correspondence by the NAT EFFG members, with a deadline in mid-March, for a publication on 1 April; and;
d) once reviewed and endorsed by the NAT EFFG, the updated overall NAT traffic forecast would be promulgated to replace the previous one.

4.2.4 Based on the foregoing, the following was agreed:

NAT SPG Conclusion 54/14 – Approval of the NAT Traffic Forecast

That, the ICAO Regional Director, Europe and North Atlantic, take the appropriate measures to publish the NAT traffic forecast as provided in **Appendix G**, and ensure that annual updates are made based on the inputs from the spring NAT EFFG meetings.

4.3 NAT Economic Impact Report

4.3.1 The NAT SPG was presented an update regarding the economic impact of civil aviation activity in the NAT Region. It was noted that global civil aviation contributed USD $2.7 trillion to the world economy and 63 million jobs. The NAT Region contributed about 14% to the world economy and accounts for nearly 7% of global aviation jobs.

4.3.2 The NAT Region was the busiest oceanic airspace in the world. In 2017, just over 712,000 passenger flights and nearly 11,000 cargo flights traversed the NAT Region. These flights were gateways for commerce and tourism. More than 130 million passengers and 37 billion revenue ton miles of freight were transported in the NAT Region during 2017 by civilian aircraft.

4.3.3 The NAT Region economic impact for 2017 was estimated to be USD $670 billion and accounted for 4.6 million jobs.

4.4 NAT Business Case Analysis Guidelines

4.4.1 The NAT SPG noted the NAT EFFG discussions concerning the challenges and lessons learned deriving from the development of Business Case Assessments (BCA) in order to develop relevant guidelines on how to assess similar requests in the future, including planned implementations proposed under the NAT SPG work programme. The NAT SPG noted that the EFFG would continue this work in order to be able to propose a consistent decision-making tool for NAT SPG/55.

5. NAT DOCUMENTATION UPDATES

5.1 NAT OPS BULLETINS ON NAT COMMON DLM AIC AND NAT DATA LINK SPECIAL EMPHASIS ITEMS

5.1.1 The NAT SPG recalled that the NAT OPS Bulletins related to the NAT Common DLM Aeronautical Information Circular (AIC) (Serial no: 2017_001_Revision 03) and the NAT Data Link Special Emphasis Items (SEI) (Serial no: 2017_004) were submitted for NAT SPG approval by correspondence (State letter Ref.: EUR/NAT 17-0671.TEC of 4 December 2017 refers).

5.1.2 The OPS Bulletin on the NAT Common DLM AIC (Serial no: 2017_001_Revision 03) was approved without comment.

NAT SPG Conclusion 54/1 – NAT OPS Bulletin on NAT common Data Link Mandate (DLM) Aeronautical Information Circular (AIC)

That the ICAO Regional Director, Europe and North Atlantic, take appropriate measures to publish the approved revised *NAT OPS Bulletin - NAT common DLM AIC* (Serial no: 2017_001_Revision 03) as provided at the **Appendix H**.

5.1.3 However, extensive comments had been received to the OPS Bulletin on NAT Data Link Special Emphasis Items (SEI) (Serial no: 2017_004), which necessitated additional review by the relevant NAT SPG working groups. Therefore, the finalised Bulletin on NAT Data Link SEI (Serial no: 2017_004) was approved:

NAT SPG Conclusion 54/15 – NAT OPS Bulletin – NAT Data Link Special Emphasis Items

That the ICAO Regional Director, Europe and North Atlantic take appropriate actions to publish the approved *NAT OPS Bulletin – NAT Data Link Special Emphasis Items* (Serial no: 2017_004) as provided at **Appendix I**.

5.2 NAT OPS BULLETINS RELATED TO RLATSM PHASE 2 AIC, RLATSM SPECIAL EMPHASIS ITEMS (SEI) AND NAT RLATSM TASK LIST V2017_2

5.2.1 The NAT SPG was also reminded that the *NAT OPS Bulletin - RLatSM Phase 2 AIC* (Serial no: 2017_003), the *NAT OPS Bulletin - RLatSM Special Emphasis Items (SEI)* (Serial no: 2015_003_ Revision 5) and the updated *NAT Task List supporting a trial application of RLatSM in the NAT Region* (v2017_2) had been approved by the NAT SPG by correspondence (State letter Ref.: EUR/NAT 17-0672.TEC of 4 December 2017 refers).

NAT SPG Conclusion 54/2 – NAT OPS Bulletins on RLatSM Phase 2 AIC and RLatSM Special Emphasis Items (SEI) and NAT RLatSM Task List v2017_2

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

a) approved *NAT OPS Bulletin - RLatSM Phase 2 AIC* (Serial no: 2017_003) and *NAT OPS Bulletin - RLatSM Special Emphasis Items (SEI)* (Serial no: 2015_003_ Revision 5) as provided in **Appendix J** and **Appendix K**; and

b) updated *NAT Task List supporting a trial application of RLatSM in the NAT* (v2017_2) as provided in **Appendix L**.

5.2.2 In this regard, it was noted that NAT IMG/52 agreed that the OPS Bulletin on RLatSM SEI had become obsolete in view of PBCS implementation and it would be reviewed to identify any relevant material that remained extant in order to transfer it to other ICAO NAT documentation before the OPS Bulletin removal.

5.3 PfA to NAT SUPPs (Doc 7030) on separation minima applied in Santa Maria Oceanic FIR

5.3.1 The NAT SPG was presented with a proposal for amendment to the NAT *Regional Supplementary Procedures* (SUPPs, Doc 7030) to correct information regarding the application of the separation minima in Santa Maria Oceanic FIR, which had been introduced with the previous approved amendment (Serial No.: EUR/NAT-S 17/07-NAT 2, 3, 4, 5, 6, 7).

5.3.2 In this regard, the NAT SPG noted that the NAT IMG contributory bodies were tasked to review the NAT SUPPS to identify any obsolete or duplicated information that might be considered for update or removal.

5.3.3 The NAT SPG therefore agreed the following:

NAT SPG Conclusion 54/16 – Proposal for Amendment to NAT SUPPs, concerning Implementation Plans for Application of 42.6 km (23 NM) Lateral Separation minimum and for Application of 5 minute Longitudinal Separation minimum between PBCS compliant ADS-C equipped aircraft in the Santa Maria Oceanic FIR

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 provided in **Appendix M** in accordance with the formal procedures.

5.4 PfA to NAT SUPPs (Doc 7030) on Radio Communication Failure

5.4.1 The NAT SPG was presented with a proposal for amendment to the NAT *Regional Supplementary Procedures* (SUPPs, Doc 7030) related to the NAT Radio Communication Failure (RCF) procedure. The proposed changes addressed the inconsistency stemming from the RCF procedure being split into two parts, paragraph 3.5.2 *HF operations* and paragraph 9.3 *Air-Ground Communication Failure*. To address this, it was proposed to delete paragraphs 3.5.2.3 and 3.5.2.3.1 in Section 3.5.2 and move the text unchanged to Section 9.3 *Air-Ground Communication Failure*. Therefore the following was agreed:

NAT SPG Conclusion 54/17 – Proposal for Amendment to NAT SUPPs, concerning NAT Region Radio Communication Failure (RCF) procedure

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 provided in **Appendix N** in accordance with the formal procedures.

5.4.2 In this connection, the NAT SPG was informed that the Air Traffic Management Operations (ATMOPS) Panel would be considering changes to the global radio communications failure procedures.

5.5 NAT eANP Volume III and GANP/ASBU 2017 Implementation Status Report amendments

5.5.1 The NAT SPG was presented with the following amendments to Volume III of the *Air Navigation Plan – North Atlantic Region* (NAT eANP, Vol III, Doc 9634, version June 2018) and the 2017 GANP/ASBU (Aviation System Block Upgrades) Implementation Status Report pertaining to the NAT Region (**Appendix O** and **Appendix P** refer):

a) delete the contents of Volume III Parts 2 and 3 as they were duplicated in the annual GANP/ASBU implementation status reports. Instead, Volume III Part 2 and 3 would include a link to the annual implementation status report;

b) align the GANP/ASBU implementation status report Tables with the contents of the GANP edition 2016 as approved by the 39th ICAO Assembly. (ICAO GANP and supporting material are available at **https://www.icao.int/airnavigation/Pages/GANP-Resources.aspx**); and

c) update the 2017 GANP/ASBU Implementation Status Report with input provided by States.

5.5.2 Furthermore, recalling NAT IMG Decision 48/15 to review and update the annual GANP/ASBU implementation status report, the ICAO Secretariat proposed that, because of the NAT eANP evolution since NAT IMG/48 and that the main role of the annual ASBU implementation reports was to assist ICAO in monitoring of the ASBU implementation process globally, the process agreed by NAT IMG Decision 48/15 could be improved. Accordingly, the ICAO EUR/NAT Office would prepare annual ASBU implementation reports in consultation with the NAT IMG members and submit them for approval to every spring meeting of the NAT IMG and subsequently to the NAT SPG for approval and publication.

5.5.3 Therefore, the following was agreed:

NAT SPG Conclusion 54/18 – Proposal for Amendment to NAT eANP Volume III and 2017 GANP/ASBU Implementation Status Report

That:

a) the ICAO Regional Director, Europe and North Atlantic, on behalf of NAT SPG, take the necessary actions to publish the endorsed *ICAO North Atlantic Air Navigation Plan*, Volume III (NAT eANP, Vol III, Doc 9634) as presented in **Appendix O** and the *2017 GANP/ASBU Implementation Status Report – NAT Region* as provided in **Appendix P**; and

b) the ICAO EUR/NAT Office, in consultation with the NAT IMG members, prepare and submit annual ASBU implementation status reports at each NAT SPG meeting for approval.

5.6 NAT DOC 001 - NAT SPG HANDBOOK

5.6.1 The NAT SPG was presented with some amendment proposals to the *North Atlantic Systems Planning Group* (NAT SPG) *Handbook* (NAT Doc 001) that were initiated to update the document and remove obsolete or duplicated material.

5.6.2 In particular, recalling the outcome of NAT SPG/53 concerning the review of the practical aspects of the application of a formal coordination procedure for airspace-related changes over the High Seas that had been agreed in principle (NAT SPG/53 Report, paragraphs 6.5.1-6.5.6 refer), the NAT SPG was informed that the ICAO Secretariat reviewed current practices as well as the existing NAT eANP, (Doc 9634), Volumes I and II provisions and determined that the procedure for amendment of the NAT eANP for changes to the airspace structure and ATS route network in the NAT Region met the regional air navigation agreement requirement. It was thus agreed that the High Seas Coordination Procedure in Appendix A of the NAT SPG Handbook (NAT Doc 001) be deleted.

5.6.3 Based on this input, the NAT SPG agreed the following:

NAT SPG Conclusion 54/19 – Publication of NAT Doc 001, v2.3.0, NAT SPG Handbook

That the:

a) *North Atlantic Systems Planning Group* (NAT SPG) *Handbook* (NAT Doc 001, v 2.3.0) be amended as presented at **Appendix Q**; and

b) ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish and promulgate the updated NAT Doc 001.

5.7 NAT DOC 006, PART I - AIR TRAFFIC MANAGEMENT OPERATIONAL CONTINGENCY PLAN - NORTH ATLANTIC REGION

5.7.1 The NAT SPG was presented with a proposal for amendment to Chapter 3 of the *Air Traffic Management Operational Contingency Plan - North Atlantic Region* (NAT Doc 006, Part I, v1.11) to reflect the waypoint changes within the Reykjavik Control Area (CTA) and route structure changes to and from Keflavik.

5.7.2 Therefore, the following was agreed:

NAT SPG Conclusion 54/20 – Publication of NAT Doc 006, Part I, v1.11

That the:

a) proposal for amendment to the *Air Traffic Management Operational Contingency Plan - North Atlantic Region* (NAT Doc 006, Part I, v1.11), Chapter 3, on procedures in Reykjavik Control Area, as detailed in **Appendix R,** be endorsed; and

b) ICAO Regional Director, Europe and North Atlantic take appropriate action to publish and promulgate the updated NAT Doc 006, Part I.

5.8 NAT DOC 007 - NAT OPERATIONS AND AIRSPACE MANUAL

5.8.1 The NAT SPG was informed that NAT IMG/51 and NAT SOG/17 reviewed the proposed amendments to the *NAT Operations and Airspace Manual* (NAT Doc 007) related to free route operations. The updated *North Atlantic Operations and Airspace Manual* (NAT Doc 007) (v.2018_1) (**Appendix S** refers) was approved by the NAT SPG by correspondence (State letter Ref.: EUR/NAT 17-0685.TEC of 21 December 2017 refers).

NAT SPG Conclusion 54/4 – Publication of NAT Doc 007 v.2018_1

That the ICAO Regional Director, Europe and North Atlantic, take appropriate measures to amend and publish the *North Atlantic Operations and Airspace Manual* (NAT Doc 007, v.2018_1) to include the amendments provided in **Appendix S**.

5.8.2 The NAT SPG was provided with the outcome of the work carried out in follow-up to NAT SPG Conclusion 51/22 (*Compare NAT Doc 007 with globally applicable provisions*) by the NAT POG Doc 007 Project Team.

5.8.3 The NAT SPG noted that NAT Doc 007 was a living document which would be continuously evolving and updated. The NAT SPG thanked the project team for the excellent job done following the guidelines given by the parent group. A discussion took place about para 4.1.3 of the updated NAT Doc 007 where some guidelines on the application of so-called “free route” operations were provided. While not disagreeing with the intent of this paragraph, the NAT SPG agreed it would be deleted from v.2018_2 version and the NAT IMG contributory bodies would be tasked to develop new text for future amendments to NAT Doc 007.

5.8.4 Therefore, the following was agreed:

NAT SPG Conclusion 54/21 – Publication of NAT Doc 007, v2018_2

That the ICAO Regional Director, Europe and North Atlantic, take appropriate measures to amend and publish the *North Atlantic Operations and Airspace Manual* (NAT Doc 007, v.2018_2) as provided in **Appendix T**.

6. WORK PROGRAMME INCLUDING SUB-GROUPS

6.1 REPORT OF THE NAT IMG

Election of Chairman

6.1.1 The NAT SPG noted the outcomes of NAT IMG/51 (Santa Maria, Portugal, 13 - 16 November 2017) and NAT IMG/52 (Paris, France, 24 - 27 April 2018) meetings.

6.1.2 The NAT SPG was informed that NAT IMG/52, in accordance with the *NAT SPG Handbook* procedures, and taking account of the calendar of review/elections of Chairmen and Rapporteurs (NAT SPG Conclusion 49/26 and 49/27 refer), had unanimously re-elected Mr Alastair Muir as its Chairman effective as of NAT IMG/53. The NAT SPG confirmed this election and congratulated Alastair on this important achievement.

Next meetings

6.1.3 It was agreed that NAT IMG/53 would take place in Prestwick, United Kingdom, from 22 to 25 October 2018. It was further agreed that NAT IMG/54 would take place in Paris, France, at the premises of the ICAO EUR/NAT Office, from 29 April to 2 May 2019. Finally, it was agreed that NAT IMG/55 would take place on 5-8 or 12-15 November 2019 in the United States.

6.2 REPORT OF THE NAT EFFG

6.2.1 The NAT SPG noted the outcomes of the NAT EFFG/33 (Copenhagen, Denmark, 19 to 21 September 2017) and the NAT EFFG/34 (Paris, France, 15 to 17 May 2018) meetings.

Election of Chairman

6.2.2 The NAT SPG was informed that NAT EFFG/33, in accordance with the *NAT SPG Handbook* elected Ms Thea Graham as Chairperson effective as of NAT EFFG/33. The NAT SPG confirmed this election and congratulated Thea on this important achievement.

Next meetings

6.2.3 It was confirmed that NAT EFFG/35 would take place in Reykjavik, Iceland, from 18 to 20 September 2018. NAT EFFG/36 would take place in Paris, France, from 14 to 16 May 2019 and NAT EFFG/37 be held in Miami, United States, autumn 2019 (dates to be confirmed) and that it be hosted by the United States in coordination with IATA.

6.3 REPORT OF THE NAT SOG

Election of Chairman

6.3.1 The NAT SPG was informed that at its seventeenth meeting in Dublin in 2017, the NAT SOG noted with regret information on the retirement as of 01 October 2017 of Mr Anthony Ferrante, NAT SOG Chairman. The NAT SPG expressed its sincere appreciation for his extensive contribution to the work of the NAT groups and to improving safety within the NAT Region and wished him well in all future endeavours.

6.3.2 It was noted that the NAT SOG, in accordance with the *NAT SPG Handbook* elected Mr Kevin Haggerty as its Chairman effective as of NAT SOG/17. The NAT SPG confirmed this election and congratulated Kevin on this important achievement.

Next meetings

6.3.3 It was confirmed that NAT SOG/19, at the invitation of IATA, would be held from 3 to 7 December 2018 in Miami, United States. The NAT SOG/20 would be held in ICAO EUR/NAT Office in Paris, France during the first week of June 2019 (3 to 7 June 2019).

6.4 NAT PROJECT TEAMS STATUS

6.4.1 The NAT SPG reviewed the status of the ongoing NAT SPG, NAT IMG and NAT SOG project teams.

6.4.2 With regards to the *North Atlantic Operations and Airspace Manual* (NAT Doc 007) Revision (NAT Doc 007 PT), NAT Flight Deck Procedures and Ergonomics for Oceanic Clearances and Re-Clearances (NAT FDPEOCR PT) and NAT Severity Classification Matrix Review (NAT SCMR PT) project teams, it was noted that their actions had been completed and these project teams were thanked for their efforts and disbanded.

6.4.3 Notwithstanding the above, with regard to the outcomes of the SCMR PT, the NAT SPG was informed that it was agreed that the application on the revised matrix would be tested by the NAT SG by applying to parts of the 2018 data. After testing, the NAT SG would decide whether the use of the matrix added value to the performance measurement and report the outcomes to the NAT SOG.

6.4.4 Concerning the NAT Southeast Corner Routes Project Team (SCRPT PT), the NAT SPG was informed that Ireland and the United Kingdom had jointly identified solutions and provided a briefing to the recent project team telcon. The intent was to continue this work and present a final report to NAT IMG/53, at which time the project team would be disbanded and implementation follow up actions would be carried out through the regular NAT IMG contributory bodies.

6.4.5 Similarly, with respect to the SB ADS-B (Reduced separation standards and flight efficiency through the implementation of Space Based/Low Earth Orbits (LEO) ADS-B) and NAT Operations Without Assigned Fixed Speed (OWAFS) project teams, the NAT SPG was informed that their work was expected to be finalised by the end of 2018.

7. ANY OTHER BUSINESS

7.1 NAT 2030 VISION

7.1.1 It was recalled that the NAT IMG had initiated work to review the NAT Future Vision and Concept of Operations (NAT IMG Decision 48/17 refers); however, although follow up actions had been discussed on several occasions since 2016, regrettably the desired actions and outcomes had not been achieved. The original action intended to use, as the basis for this task, material that had already been created, such as the Task Force 2025 Gap Analysis from 2012. Since the initial attempt to create a NAT Vision to 2030 had not been successful, the NAT IMG agreed that a new approach was required.

7.1.2 The NAT SPG agreed to the NAT IMG proposal that the creation of this Vision should be formed “top down” by the NAT SPG, through the identification and agreement on the high-level principles, goals and objectives of the Vision. These principles, goals and objectives would be derived through a NAT SPG level activity, namely a workshop that would consider the NAT challenges and opportunities forecast to

2030. The NAT SPG contributory bodies would then use these to update the relevant NAT documentation and work programmes, following due processes.

7.1.3 Based on the foregoing, the NAT SPG agreed to the following:

NAT SPG Conclusion 54/22 – Development of the NAT 2030 Vision high-level principles, goals and objectives

That, to create a NAT 2030 Vision, the ICAO Regional Director, Europe and North Atlantic, on behalf of the NAT SPG:

a) organise a workshop in the week of 28 January 2019 to identify the NAT 2030 Vision high-level principles, goals and objectives; and

b) task the NAT SPG contributory bodies, following NAT SPG/55 endorsement of a) above, to update the relevant NAT documentation and work programmes, for example, to deliver a NAT Future Concept of Operations that would be achieved in an efficient, effective and timely manner in the context of the challenges and opportunities to 2030.

7.2 ICAO EUR/NAT NCLB TECHNICAL ASSISTANCE PROGRAMME

7.2.1 The NAT SPG was presented a briefing on the ICAO EUR/NAT "No Country Left Behind" (NCLB) Technical Assistance Programme, its objectives, scope and current projects. The NAT SPG member States were invited to support the implementation of capacity building activities under the ICAO EUR/NAT NCLB programme as partners and donors.

7.3 ICAO EUR/NAT ACTIVITIES ON ENVIRONMENT

7.3.1 The NAT SPG was presented with a briefing on ICAO's global and EUR/NAT Regional activities in the area of Environment. In particular, the NAT SPG noted the establishment of the ICAO EUR/NAT Project Team on Environment and its planned activities.

7.4 CYBERSECURITY

7.4.1 The NAT SPG was presented with a briefing on ICAO's global and EUR/NAT Regional activities in the area of cybersecurity.

7.4.2 The NAT SPG specifically noted the outcome of the EUR/NAT aviation security conference (Lisbon, Portugal, 29-31 May 2018) and the endorsed EUR/NAT GASeP Roadmap. The NAT SPG was informed that the Roadmap included sections concerning Air Traffic Management (ATM) Security and cybersecurity. It was agreed that the *ICAO Global Aviation Security Plan* (GASeP) and EUR/NAT Roadmap would need to be analysed by the NAT SOG and NAT IMG in order to identify follow up actions at the NAT level.

7.4.3 It was recalled that security of ATM operations and systems was always considered as part of the agenda of the NAT working structure. It was agreed that a NAT regional cybersecurity risk assessment be conducted to identify areas of concern and improvements.

7.4.4 Therefore, the following was agreed:

NAT SPG Conclusion 54/23 – Incorporation of Cybersecurity into NAT Planning

That, the NAT SOG and NAT IMG undertake a review of the ICAO EUR/NAT GASeP implementation Roadmap to propose NAT Region coordinated follow up actions related to cybersecurity.

7.5 NEXT MEETING

7.5.1 The Group agreed to convene its Fifty-Fifth Meeting at the EUR/NAT Office of ICAO in Paris, France, from 24 to 27 June 2019. It was noted that the NAT IMG-SOG-EFFG coordination meeting on the NAT SPG/55 outcomes would take place in the afternoon of 27 June 2019.

7.6 FAREWELLS

7.6.1 The NAT SPG noted with deep regret that this would be the last NAT SPG meeting of Mr Leifur Hakonarson (Iceland), who was leaving for retirement. The NAT SPG would greatly miss his presence, his depth of knowledge and experience. In expressing their appreciation of his thorough professionalism and good humour, the NAT SPG wished him all happiness for a well-deserved retirement.

APPENDIX A — LIST OF PARTICIPANTS

(Paragraph 0.3 refers)

CHAIRMAN
Ásgeir PÁLSSON

CANADA
Jeff DAWSON
Jean-Pierre CÔTÉ
Noel DWYER

DENMARK
Anna Eva VILLEFRANCE

FRANCE
Christophe GUILPAIN

ICELAND
Hlin HOLM
Leifur HAKONARSON
Thordis SIGURDARDOTTIR

IRELAND
John O'SULLIVAN
Sean PATRICK
Joe RYAN

NORWAY
Roald A. LARSEN

PORTUGAL
Carlos ALVES

UNITED KINGDOM
Stuart LINDSEY
Martin DONNAN
Alastair MUIR

UNITED STATES
Michael O’DONNELL
Kevin HAGGERTY
Maurice HOFFMAN
Jennifer KILEO
Coleen HAWRYSKO
Thea GRAHAM
Travis FIEBELKORN

EUROCONTROL
Rob PETERS

International Air Transport Association (IATA)
Jeffrey MILLER
Rich STARK

International Business Aviation Council (IBAC)
Michael HOHM

International Federation of Aeronautical Information Management Association (IFAIMA)
Apologies

International Federation of Air Line Pilots Association (IFALPA)
Carlos RODRIGUEZ

International Federation of Air Traffic Controllers' Association (IFATCA)
Tom LAURSEN
Sigurjon JONASSON

NAT CMA
Carolyn READ

ICAO
Luis FONSECA DE ALMEIDA
(NAT SPG Secretary)
Elkhan Nahmadov
Erwin LASSOOIJ
Arnaud DESJARDIN
Blandine FERRIER
Christopher KEOHAN
Cornelia LUDORF
Jacques VANIER
Sven HALLE
Leyla SULEYMANOVA
Mihaela BRUNETTE
Patricia CUFF

Participants and Members Contact List

(Paragraph 0.3 refers)

To be included only on Restricted Website of NAT SPG

APPENDIX B — IMPLEMENTATION PLAN AND TASK LIST FOR AN OPERATIONAL TRIAL OF ADVANCED SURVEILLANCE-ENHANCED PROCEDURAL SEPARATION (ASEPS) USING SPACE-BASED AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST (SB ADS-B)

(paragraph 2.2.3 refers)

1. INTRODUCTION

1.1 Advancements in aircraft avionics and air traffic management flight data processing systems, further augmented by the anticipated availability of Air Traffic Services (ATS) surveillance capability in the North Atlantic (NAT) Region via reception of Automatic Dependent Surveillance – Broadcast signals, by a constellation of Low Earth Orbiting Satellites (LEOS), has driven analysis of whether the lateral and longitudinal separation standards in the current NAT High Level airspace could be reduced to increase the efficiency of the airspace.

1.2 NAT SPG Conclusion 50/07 supported expanded use of ATS surveillance capability using space-based reception of ADS-B signals. As the NAT Region was envisaged as the first place that satellite-based ADS-B ATS surveillance would be used, the NAT SPG considered appropriate that the NAT SPG be involved in the decision-making process, and that the NAT Implementation Management Group (IMG) provide input and identify all activities supporting the implementation of an ATS surveillance service.

1.3 The ICAO Separation and Airspace Safety Panel (SASP) has developed ‘advanced surveillance-enhanced procedural separation minima’ (ASEPS) that can be used in airspace where ADS-B service is provided but VHF voice is not available. The SASP has agreed on amendments to the Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM; Doc 4444) and it is anticipated that these amendments will become effective on 5 November 2020.

1.4 This Implementation Plan (and associated Task List) supports a trial implementation period beginning in March 2019 and follows the guidelines provided in ICAO Doc 9689 (Manual on Airspace Planning Methodology for Determination of Minima).

1.5 NAT SPG 53/5 agreed the following prerequisites (Table-1) that are to be fulfilled in order to enable an operational trial to use Space-Based Automatic Dependent Surveillance-Broadcast (SB ADS-B). Table-1 also references to Tasks that service these prerequisites.

Prerequisite	Reference
The Separation and Airspace Safety Panel (SASP) has agreed minima and associated requirements for Advance Surveillance-Enhanced Procedural Separation (ASEPS).	Task 2
Implementing Air Navigation Service Providers (ANSP) have; i) Completed ASEPS implementation plans aligned to the NAT SB ADS-B Concept of Operations (CONOPS) and the ICAO SASP output referred to above; ii) Confirmed their SB ADS-B service meets identified performance requirements; iii) Completed safety management activities as required by their respective regulatory authorities; and iv) Confirmed that the Performance Based Communication and Surveillance (PBCS) performance is measured and reported in the same manner as other applications of reduced separation in the NAT	This Plan Task 7 Task 13/14
The plans and the outputs of the safety management activities referred to above have been reviewed by the NAT Implementation Management Group (NAT IMG) and the NAT Safety Oversight Group (NAT SOG);	Task 13 Task 14

the NAT IMG and NAT SOG identify success criteria and trial duration;	Task 14
Neither the NAT IMG nor the NAT SOG identifies an issue that, in their opinion, requires resolution before an operational trial should commence;	-
The NAT IMG has confirmed that implementing ANSPs have completed all required implementation activities.	-
NAT SPG has approved the implementation plan and supporting task list that would also include the above listed prerequisites to enable a trial for implementation of SB ADS-B in the NAT.	NAT SPG/54

Table -1.

2. IMPLEMENTATION PROCESS

2.1 The implementation process also considers ICAO implementation consideration guidance for regional, State or local safety assessments;

Implementation Step	
Step 1	Undertake widespread regional consultation with all possible stakeholders and other interested parties.
Step 2	Develop an airspace design concept or ensure that the proposed separation minima being implemented will fit the current airspace system and regional or state airspace planning strategy.
Step 3	Review appropriate manual noting specific assumptions, constraints, enablers and system performance requirements.
Step 4	Compare assumptions, enablers, and system performance requirements in the appropriate manual with the regional or State's operational environment, infrastructure and capability.
Step 5	If a region or State or ANSP has determined that the change proposal for that region or State is equal to or better than the reference, requirements and system performance in the appropriate manual, then the region or State must undertake safety management activities including:
Step 5a)	formal hazard and consequence(s) identification, as well as safety risk analysis activities including identification of controls and mitigators;
Step 5b)	implementation plan;
Step 5c)	techniques for hazard identification/safety risk assessment which may include: 1) the use of data or experience with similar services/changes; 2) quantitative modelling based on sufficient data, a validated model of the change, and analysed assumptions; 3) the application and documentation of expert knowledge, experience and objective judgment by specialist staff; and 4) a formal analysis in accordance with appropriate safety risk management techniques as set out in the *Safety Management Manual* (Doc 9859);
Step 5d)	identification and analysis of human factors issues identified with the implementation including those associated with Human Machine Interface matters;
Step 5e)	simulation where appropriate;

Implementation Step	
Step 5f)	operational training; and
Step 5g)	regulatory approvals
Step 6	If a region or State has determined that the change proposal for that region or State is not equal to the requirements and system performance in the appropriate manual, then the region or State must: i) consider alternative safety risk controls to achieve the technical and safety performance that matches the reference in the appropriate manual; or, ii) conduct appropriate quantitative risk analysis for the development of a local standard in accordance with the *Manual on Airspace Planning Methodology for the Determination of Separation Minima* Doc 9689.
Step 7	Develop suitable safety assessment documentation including a safety plan and associated safety cases.
Step 8	Implementation activities should include:
Step 8 i)	trial under appropriate conditions;
Step 8 ii)	expert panel to undertake scrutiny of proposals and development of identified improvements to the implementation plan;
Step 8 iii)	develop an appropriate backup plan to enable reversion if necessary; and
Step 8 iv)	continuous reporting and monitoring results of incidents, events, observations.
Step 9	Develop a suitable post-implementation monitoring and review processes.

2.2 The 'Task List' supporting the Implementation Plan for Trial of Space Based Automatic Dependent Surveillance – Broadcast (ADS-B) Separations in the ICAO NAT Region is contained in **Attachment A**.

3. IDENTIFICATION OF THE NEED FOR CHANGE

3.1 NAT customers request more fuel-efficient flight profiles and routes that will reduce operating costs and show a return on operator investment in aircraft avionics. Applying a reduced lateral and longitudinal separation is expected to enhance the provision of fuel-efficient profiles and routes with minimal change to NAT operations.

3.2 The new separation standard is expected to result in a reduction in fuel burn and a consequent reduction in greenhouse gas emissions through an increased likelihood of flights being able to operate at their optimum routes and flight levels either through initial oceanic clearances and ability to be issued mid ocean-ocean altitude "step climb" clearances or dynamic re-routes.

3.3 There is added benefit of allowing return on operator investment in aircraft avionics without requiring a change from current High Level Airspace (HLA) and performance based communication and surveillance (PBCS) authorizations.

3.4 It is anticipated that, as traffic levels have been shown to steadily increase, the ability to track aircraft conformance to the ATC cleared route profile via real time surveillance will increase safety and lower the collision risk estimate in the areas where ATS surveillance services are provided.

4. DESCRIPTION OF CURRENT AIRSPACE AND THE CNS / ATM SYSTEMS

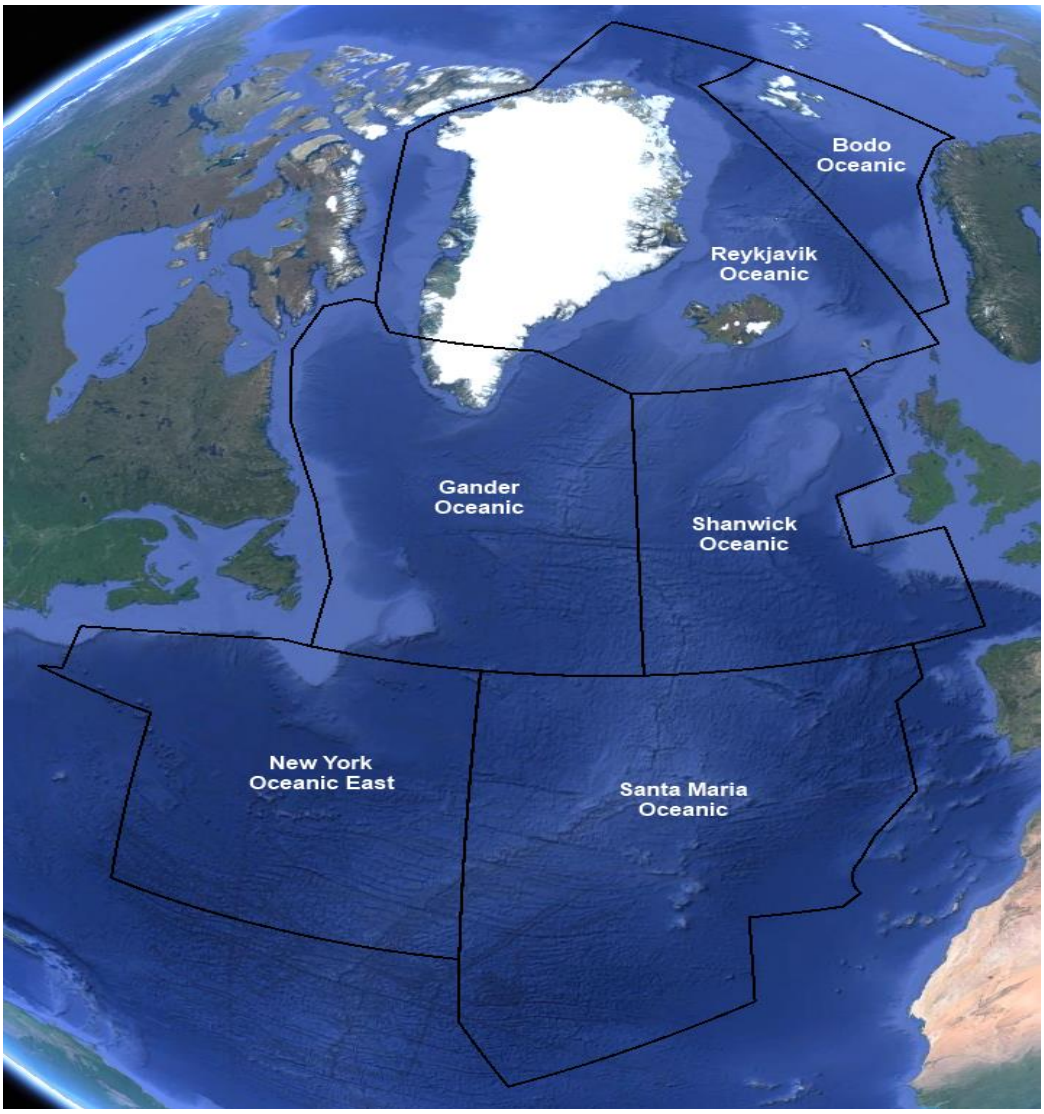
4.1 Airspace Structure

4.1.1 The responsibility for air traffic control services within the North Atlantic (NAT) Region is shared among nine states: Canada, France, Iceland, Ireland, Norway, Portugal the United Kingdom and the United States. *(Secretariat note: There are 8 States listed - to be corrected in coordination with States concerned.)*

4.1.2 The NAT Region mainly consists of Class A airspace; in which Instrument Flight Rules (IFR) apply at all times. Class A airspace has been established at and above FL 55 except in the Bodø Oceanic Control Area (OCA) and in the Nuuk Flight Information Region (FIR) where it has been established above FL 195 and in the domestic portion of the Reykjavik Flight Information Region (FIR) where it has been established at and above FL 200.

4.1.3 The NAT airspace is divided into six Control Areas (CTA) for the implementation of the Communications Navigation Surveillance/Air Traffic Management (CNS/ATM) systems. The NAT Region comprises the following FIRs/CTAs: Bodo Oceanic, Gander Oceanic, New York East Oceanic, Nuuk, Reykjavik, Santa Maria and Shanwick. *(Secretariat note: There should be either FIRs or CTAs but not both mixed together - to be clarified with States concerned.)*

4.1.4 Traffic is controlled by Oceanic centres at Reykjavik, Bodo, Gander, New York, Santa Maria, and Prestwick and by Shannon and Brest ACCs.



4.1.5 NAT traffic is predominantly commercial. International General Aviation (IGA) Business aircraft comprise a high proportion of the higher altitude airspace operations.

4.1.6 For most of the North Atlantic (NAT) airspace ATS surveillance and VHF voice communications is unavailable. With the exception of the trans-Atlantic surveillance corridor connecting the continents via the southern part of Reykjavik CTA and the north-western part of Gander CTA, air traffic management is primarily procedural in nature, although parts of other CTAs also enjoy the benefits of ATS surveillance. These parts consist of Bodø oceanic airspace with the exception of the north-west part, the NOTA, SOTA and BOTA airspaces in the eastern portion of Shanwick FIR controlled by Shannon and Brest ACCs and in the central portion of the Santa Maria OCA where ATS surveillance services are provided.

4.2 Strategic Lateral Offset Procedure (SLOP)

4.2.1 Currently, strategic lateral offsets of one or two miles right of a route or track centreline have been introduced as a means of reducing collision risk and is now standard operating procedure in the entire NAT Region. The NAT Region is considering implementation of lateral offsets of tenths of a nautical mile up to a maximum of 3.7 km (2 NM) as per the provisions published in the PANS ATM Chapter 16.5.

4.3 Airborne Collision Avoidance System (ACAS)

4.3.1 In addition to the requirements of Annex 6, (Part I paragraph 6.16 and Part II, paragraph 6.14) ACAS II shall be carried and operated in the NAT Region by all turbine-engine aircraft having a maximum certified take-off mass exceeding 5700kg or authorized to carry more than 19 passengers.

4.4 Navigation Performance Specifications

4.4.1 The NAT High Level Airspace (HLA) is established between FL285 and FL420. To ensure the safe application of separation between aircraft in the NAT HLA airspace, aircraft normally need to have a MNPS approval or a NAT HLA MNPS approval to operate within this part of the NAT airspace. An exception to this is that non-approved aircraft are allowed to enter the NAT HLA airspace if the following conditions are satisfied:

- The aircraft is provided with an ATS Surveillance service; and
- The aircraft is in Direct controller pilot communications on VHF; and
- The aircraft has a certified installation of equipment providing it with the ability to navigate along the cleared track.

4.4.2 The NAT HLA was established to ensure that the risk of collision as a consequence of a loss of horizontal separation would be contained within an agree Target Level of Safety (TLS). The navigation component of the MNPS approval is based on the Annex 6 MNPS requirements and the navigation component of the NAT HLA MNPS approval is based on the RNAV 10 or RNP4 requirements.

4.5 ATM Systems

4.5.1 The general flight data processing systems (FDPs) and associated ancillary equipment employed by the six CTAs for the implementation of Communication Navigation Surveillance/Air Traffic Management have a high level design that supports;

- General flight data processing
- Profile conformance monitoring
- Conflict probing
- Numerous controller support tools
- Electronic progress display (flight progress strips or situational graphical display)
- Automatic internal and external coordination through on-line data interfaces
- FANS1/A ADS-C and CPDLC
- ARINC 623 Oceanic Clearance Delivery
- Multi radar or ADS-B data processing and graphical display
- Flight message prioritisation and display queue

5. TRAFFIC PATTERNS & PROCEDURAL SEPARATION MINIMA

5.1 General

5.1.1 The traffic is dominated by two major axes. First, there is the axis linking Europe (and the Middle East) to North America (excluding Alaska). Second is the axis linking Europe to the Caribbean, Canaries, and South America. A substantial proportion of NAT traffic, namely that operating between cities in Europe and those in North America operate on the first axis.

5.1.2 The major traffic flow between Europe and North America takes place in two distinct traffic flows during each 24-hour period due to passenger preference, time zone differences and the imposition of night-time noise curfews at the major airports. The majority of the Westbound flow leaves European airports in the late morning to early afternoon and arrives at Eastern North American coastal airports typically some 2 hours later - local time - given the time difference. The majority of the Eastbound flow leaves North

American airports in mid/late evening and arriving in Europe early to mid-morning - local time. Consequently, the diurnal distribution of this traffic has a distinctive tidal pattern characterised by two peaks passing 30° W, the Eastbound centred on 0400 Universal Co-ordinated Time (UTC) and the Westbound centred on 1500 UTC.

5.2 North Atlantic Organised Track System (NAT OTS)

5.2.1 Although a number of fixed trans-Atlantic tracks exist, about 50% of traffic operates on tracks, which vary from day to day dependent on meteorological conditions. The variability of the wind patterns would make a fixed track system unnecessarily penalising in terms of flight time and consequent fuel usage.

5.2.2 The OTS is set up on a diurnal basis for each of the Westbound and Eastbound flows. Each core OTS is comprised of a set, typically 4 to 7, of parallel or nearly parallel tracks, positioned in the light of the prevailing winds to suit the traffic flying between Europe and North America.

5.2.3 The designation of an OTS facilitates a high throughput of traffic by ensuring that aircraft on adjacent tracks are separated for the entire oceanic crossing - at the expense of some restriction in the operator's choice of track. In effect, where the preferred track lies within the geographical limits of the OTS, the operator is obliged to choose an OTS track or fly above or below the system. Where the preferred track lies clear of the OTS, the operator is free to fly it by nominating a random track. Trans-Atlantic tracks, therefore, fall into three categories: OTS, Random or Fixed.

5.3 SEPARATION

5.3.1 Procedural Separation Application - The separation minima applied within the NAT Region airspace vary greatly depending on aircraft class (jet, prop), communication, navigational and surveillance capability, as well as FIR application. NAT Doc 008 (Application of Separation Minima) contains the latest information and references to the separations being applied. For most of the North Atlantic the following separations are applied.

5.3.2 Longitudinal Separation

5.3.2.1 Same Direction up to 90 degrees

- 10 minutes using Mach Number Technique (MNT)
- 5 to 9 minutes using MNT with speed differential
- 5 minutes between PBCS compliant aircraft
- 15, or 10 minutes between flights intersecting routes, depending on aircraft equipage.
- 50NM RNP 10 (ADS-C periodic contract rate of 27 minutes)
- 50NM RNP 4 (ADS-C periodic contract rate of 32 minutes)
- 30NM RNP 2/4/10 (ADS-C periodic contract rate of 12 minutes)

5.3.2.2 Opposite Direction Separation

- Vertical separation is required from 15minutes before until 15 minutes after the estimated passing point
- Vertical separation is required from 15 minutes before until 10 minutes after the estimated passing point if the flights have reported over a common point.

Opposite-direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft provided that ADS-C reports show that the aircraft have passed each other by the applicable separation minimum in 5.2.4.1.1.

5.3.3 Lateral Separation

5.3.3.1 The lateral separation minima applied between aircraft tracks in the airspace vary according to communication, navigational and surveillance capability and FIR application (see NAT Doc 008). For most of the North Atlantic the following separations are applied:

- 60NM or 1 degree. 'Gentle Slope Rules' have been adopted to ensure that the actual separation never falls below distances which vary with latitude but never fall short of 50.5NM.
- 50NM between RNP10 and PBCS compliant aircraft.
- 23NM between RNP4 and PBCS compliant aircraft.

5.3.4 Reduced Vertical Separation Minimum (RVSM)

5.3.4.1 RVSM airspace has been established within the confines of MNSP/HLA airspace and associated transition areas. In RVSM airspace, 1000 ft. vertical separation is applied between approved aircraft. Currently, RVSM is only applied between FL 290 and FL 410 inclusive. To ensure the safe application of the separation minimum, only RVSM approved aircraft are allowed to operate within RVSM airspace. Aircraft are monitored to ensure that the TLS is being met.

6. COMMUNICATION, NAVIGATION, SURVEILLANCE

6.1 Communication

6.1.1 Air / Ground Communication

6.1.1.1 For the most part the communications possibilities within the North Atlantic are;

- HF voice communications via Aeradio
- FANS1/A CPDLC
- SATCOM voice via Aeradio
- Oceanic Clearance Delivery via ARINC 623 datalink or VHF communications

6.1.1.2 Direct controller pilot and general purpose VHF voice communications is available in limited areas of coverage within the North Atlantic, namely close to landmass where VHF receivers and transmitters can be located, such as within the Iceland FIR/CTA. Details of communications services provided are contained within State AIPs.

6.1.1.3 All aircraft operating within the North Atlantic shall maintain continuous watch on the appropriate frequency unless engaged in direct controller pilot communications with the appropriate ATC Control. HF RTF communication equipment with appropriate frequencies available is mandatory outside VHF coverage. When operating outside VHF coverage aircraft are required to be equipped with dual long range voice communications system (HF or SATCOM).

6.1.2 Ground / Ground Communication

6.1.2.1 Communication between sectors and ANSPs within the North Atlantic is primarily affected through interactions with the Flight Data Processing System (FDPS) via On-Line Data link Interfaces. This is used for initial coordination (and in many cases re-coordination) of flights crossing the common boundary. All voice coordination between ANSPs is effected via dedicated phone lines.

6.2 Navigation

6.2.1 The required navigation performance of aircraft operating in the NAT HLA is specified in the NAT section of DOC 7030.

6.2.2 Except when operating on the special “Blue Spruce Routes” or under the exemption described in section 4.4.1 above aircraft operating in the NAT HLA are required to carry two independent long range navigation systems.

6.2.3 MNPS/ HLA aircraft navigate mostly using GNSS and IRS/INS. Several ground based navigations aids such as VOR, NDB and DME are available in Iceland, and Santa Maria but those aids are scarce and far between and do therefore not significantly contribute towards the navigation performance.

6.3 Surveillance

6.3.1 ATS Surveillance services (radar, ADS-B and Multilateration) are provided within some portions of the NAT HLA airspace, 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).

6.3.2 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 the parts of the Bodø, Reykjavik, Gander, Shanwick, Santa Maria and New York oceanic areas.

6.3.3 ADS-B services have for some time been available in some continental airspaces immediately adjacent to the NAT Region and are now provided within portions of the NAT HLA airspace, specifically in the Gander, Reykjavik and Santa Maria OCAs. Eligibility for ADS-B service in the NAT is based upon the provisions in the NAT Regional Supplementary Procedures (ICAO Doc 7030) section 5.5.

6.3.4 SASP agreed that downlinked ADS-B position performance level will be NIC $\geq$ 4 and NACP $\geq$ 5 (NUCP $\geq$ 4). In addition, the standard deviation values employed in the ASEPS CRM would utilize a standard deviation (σ) value of 0.204 NM for non-radar airspace.

6.3.5 Data will not be used by the ATC system for determining aircraft position when, as specified in ICAO Doc 7030, any of the position quality indicators have a value of 0 (zero). Consequently, an aircraft carrying 1090 MHz extended squitter (1090ES) ADS-B equipment shall disable ADS-B transmission unless:

a) the aircraft emits position information of an accuracy and integrity consistent with the transmitted values of the position quality indicator; or

b) the aircraft always transmits a value of 0 (zero) for one or more of the position quality indicators (NUCp, NIC, NAC or SIL), when the requirements of a) above cannot be met; or

c) the operator has received an exemption granted by the appropriate ATS authority.

Note.— The following documents provide guidance for the installation and airworthiness approval of ADS-B OUT system in aircraft and ensure compliance with a) above:

1. European Aviation Safety Agency (EASA) AMC 20-24; or
2. FAA AC No. 20-165A — 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.

6.3.6 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.

6.3.7 Aircraft operators wishing to receive an exemption from the procedures specified 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.

7. DETERMINATION OF PROPOSED SYSTEM

7.1 General

7.1.1 The space-based ADS-B system will consist of a constellation of LEO satellites hosting ADS-B receivers. A satellite will receive ADS-B data including position, velocity and altitude from aircraft, which is then routed through other satellites and down-linked to a satellite operations ground station from where it is on-forwarded to Shanwick and Gander.

7.1.2 Application of the ATS surveillance based procedural separation will be aligned between Gander and Shanwick by applying the same conditions for separation. No changes will be made to other procedural separations being applied between Shanwick and Gander and other ANSPs.

7.1.3 Application of the ATS surveillance based procedural separations will require RCP 240 (Required Communication Performance approvals as per NAT SPG conclusion 52/19 (PBCS Operator Requirements in the NAT Region) and contained in the Performance-Based Communication and Surveillance (PBCS) Manual (Doc 9869) and RNP 4.

7.1.4 PBCS designators will be required in the flight plan as per NAT SPG conclusion 52/20 and shall be included in inter-coordination between all adjacent ANSPs.

7.1.5 There will be no change to non VHF direct controller-pilot communications infrastructure or procedures using CPDLC, as contained in the Global Operations Data Link (GOLD) Manual (Doc 10037), and Satellite Voice Operations Manual (Doc 10037.)

7.1.6 FANS1/A ADS-C waypoint change event contracts and CPDLC confirm assigned route [UM137/DM40] will continue to be utilised to extract intent data (NEXT and NEXT+1) from the flight's FMS as part of conformance monitoring.

7.1.7 Automated position report overdue monitoring will include the monitoring of the receipt of ADS-B signals from a flight prior to and within the FIR. Non-receipt of an ADS-B signal for a defined period will raise an alert to the controller and provide conflict probe results based on the appropriate non ADS-B criteria.

7.1.8 Conformance monitoring of longitudinal positions shall be ensured through automated ground based monitoring of reported position against system estimated positions. ADS-B reports will be used to update the flight profile through a system conflict probe which will re-calculate the estimated times for ensuing positions.

7.1.9 Post implementation monitoring will be applied to space-based surveillance enabled procedural separations in accordance with practises outlined in Annex 19, and as outlined in Circular 343 (Guidelines for the Implementation of Performance-based Longitudinal Separation Minima).

7.2 Separation minima using ATS Surveillance systems where VHF voice communications are not available

7.2.1 Application of the ATS Surveillance based procedural longitudinal separation will be as per the PANS ATM, Doc 4444 proposal for amendment from the ICAO SASP, as excerpted below:

a) 14 NM longitudinal separation of aircraft operating on same identical tracks or intersecting tracks applied provided that the relative angle between the tracks is less than 45 degrees.

b) 17 NM longitudinal separation of aircraft operating on intersecting tracks applied provided that the relative angle between the tracks is less than 90 degrees.

c) Opposite-direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft provided that the aircraft have reported by ADS-B having passed each other by 5 NM.

Lateral Separation

7.2.2 7.2.1 Application of the ATS Surveillance based procedural lateral separation will be as per the PANS ATM, Doc 4444 proposal for amendment from the ICAO SASP, as excerpted below:

a) 19 NM lateral spacing between parallel or non-intersecting tracks.

b) 15 NM lateral spacing, where specified as meeting appropriate conditions.

7.2.3 The separation minima described above may be applied utilizing position information derived from an ATS Surveillance system, provided the following requirements are met:

a) A navigational performance of RNP 4 or the applicable RNP 2 shall be prescribed; and

b) The communication system shall satisfy RCP 240; and

c) An alternate means of communication shall be available to allow the controller to intervene and resolve a conflict within a total time of 9 minutes should the normal means of communication fail; and

d) Lateral conformance monitoring shall be ensured by the use of:

   a) lateral deviation warning using ATS surveillance system data with a warning threshold set at 3 NM. Higher warning thresholds may be set provided the lateral separation minima in 8.7.4.2 a) and 8.7.4.3 are increased by the same amount; and

   b) The ATS ground system shall prioritize and enable immediate recognition by the controller of the lateral deviations in i) above.

Contingency Procedures

7.2.4 Coincident with the separations listed above, SASP has proposed changes to Doc 4444 Contingency Procedures. The procedures are indicated below and will be implemented coincident with the ASEPS separations.

DESCENT BELOW FL 290

Note: the procedures for descent below FL 290 are 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.

After considering the factors cited in the note above, if the pilot elects to descend below FL 290, the procedures below should be followed in sequence:

a) Turn 45 degrees right or left of the cleared track or route to intercept and maintain a parallel, same direction track or route offset of 9.3 km (5 NM).

b) If possible, maintain the assigned flight level until established on the 9.3 km (5 NM) offset. If unable, initially minimize rate of descent to the extent operationally feasible.

c) When the offset is established, descend below FL 290 and, when able, establish a 150 m (500 ft) vertical offset from those flight levels normally used.

d) When below FL 290, proceed as required by the operational situation or if an ATC clearance has been obtained, proceed in accordance with the clearance.

REMAINING AT OR ABOVE FL 290

NOTE: RVSM Altimetry System Error may lead to less than actual 500 ft vertical separation when the procedures below are applied. In addition, with the 500 ft vertical offset applied, ACAS RAs may occur.

If the pilot elects not to descend below FL 290, the procedures below should be followed:

a) Turn at least 45 degrees right or left of the cleared track or route.

b) When clear of track or route by 9.3 km (5 NM), establish a 150 m (500 ft) vertical offset from those flight levels normally used when able and proceed as required by the operational situation.

c) If paralleling cleared track or route, when possible, maintain a 9.3 km (5 NM) track offset.

d) If an ATC clearance has been obtained, proceed in accordance with the clearance.

8. IDENTIFICATION OF THE METHOD OF SAFETY ASSESSMENT

8.1 The ICAO Separation and Airspace Safety Panel has conducted a full collision risk modelling for development of surveillance-enhanced procedural separations that will be published in the PANS ATM, Doc 4444 in November 2020.

8.2 The safety work will be described in an ICAO Manual, a draft of which is expected to be completed prior to trial commencement.

9. MODIFICATION OF THE PROPOSED SYSTEM

9.1 System Changes

9.1.1 The following changes to the Gander and Shanwick ATC system to support the application of space-based ADS-B surveillance enhanced separations will be:

- Procedural conflict probe updated to incorporate the space-based ADS-B surveillance enhanced separations covered within this implementation plan.
- Reception and application of ADS-B signals to update flight profiles.
- Enhanced conformance monitoring of ADS-B signals against cleared flight profiles.
- Monitoring of ADS-B signal quality indicators (QI).
- Various enhanced controller Human Machine Interface (HMI) which include new separations monitoring tools, improved graphical situational display and updates to flight progress strips.
- Monitoring of PBCS designators for the application of surveillance-enhanced separations.
- Automated support to determine when variable speed or fixed speed clearances can be issued.
- Automated CPDLC continuity checking.
- Enhanced separation monitoring support requirements as outlined in Annex 19.
- Adaptation tools that define areas where ASEPS can be applied.

9.1.2 Further requirement for modification will be a result of constant assessment of the system performance.

10. IMPLEMENTATION AND MONITORING OF THE PROPOSED SYSTEM

10.1.1 The longitudinal separation operational trial will commence 28 March 2019. Operators will be advised via Aeronautical Information Circular (AIC) of requirements of the trial applicable in advance and of operational trial details no less than two AIRAC cycles prior to implementation. Any delay in the implementation date or significant change to the implementation plans shall be notified by NOTAM as soon as the information is available.

10.1.2 The lateral separation operational trial will commence no earlier than 6 months after the commencement of the longitudinal separation operational trial. Operators will be advised via Aeronautical Information Circular (AIC) of requirements of the trial applicable in advance and of operational trial details no less than two AIRAC cycles prior to implementation. Any delay in the implementation date or significant change to the implementation plans shall be notified by NOTAM as soon as the information is available.

10.2 Eligible flights are those that meet all of the following requirements:

a) HLA approval

b) ADS-B

c) RNP4 approval

d) PBCS approval

10.3 ATS systems use Field 10 (Equipment) of the standard ICAO flight plan to identify an aircraft's data link and navigation capabilities. The operator should insert the following items into the ICAO flight plan (as per the 2012 flight plan format) for FANS 1/A or equivalent aircraft:

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

insert "J5" to indicate CPDLC FANS1/A SATCOM (Inmarsat) or "J7" to indicate CPDLC FANS1/A SATCOM (Iridium) data link equipment; insert "P2" to indicate RCP 240 approval;

b) Field 10b (Surveillance equipment and capabilities);

   a) insert "D1" to indicate ADS with FANS1/A capabilities; and

   b) B1 or B2 to indicate ADS-B.

c) Field 18 (Other Information); insert the characters "PBN/" followed by "L1" for RNP4.

10.4 Monitoring of NAT communication system performance and analysis of problem reports will be assisted by the NAT Data Link Monitoring Agency (NAT DLMA).

Failures and degradations of systems

10.5 In the event of a data link system failure, provisions documented in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869), the Global Operational Data Link (GOLD) Manual (Doc 10037), are applicable.

11. STAKEHOLDER CONSULTATION

11.1 Operators have indicated that, for performance planning purposes, successful implementation of the reduced separations should be directly linked to consistent receipt of user requested flight profiles (route, flight level, speed).

11.2 Confidence in the ability to receive the requested profile will be expected to result in the preferred practice of loading appropriate fuel for flight duration as opposed to the current practice of loading fuel to account for numerous scenarios of not receiving the requested flight profile.

11.3 Operator flight planning systems are rule-based in consideration of standards, requirements and best practices for successful route filing. The current NAT operating environment, with its OTS track design, increases the requirement for rules/norms which inhibit optimal flight planning. Use of reduced separations should allow for reduction of current rules/norms which in turn would lead to increased flight profile optimization.

12. SUCCESS CRITERIA – Longitudinal Separation

QUESTIONS		METRICS, DETAILS & TARGETS	
Safety	Safety	i) Longitudinal	Scrutinize each longitudinal error to determine if the application of the 14 NM and 17 NM separations had an effect on the error. If such an effect is found then quantify the effect on the longitudinal risk. Target = No increase in longitudinal risk due to the application of the 14 NM and 17 NM separations.
		ii) Vertical	Scrutinize each longitudinal error to determine if the application of the 14 NM and 17 NM separations NM had an effect on the error. If such an effect is found then quantify the effect on the vertical risk. Target = No increase in vertical risk due to the application of the 14 NM and 17 NM separations.
		iii) Lateral	Scrutinize each longitudinal error to determine if the application of the 14 NM and 17 NM separations NM had an effect on the error. Lateral errors shall be determined and classified in accordance with direction provided via NAT: That the: a) following definitions be 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) NAT CMA initiate GNE-related follow up actions in regard to GNEs of 25 NM or more. If such an effect is found then quantify the effect on the lateral risk. Target = No increase in lateral risk due to the application of the 14 NM and 17 NM separations.
	Safety	i) Monitor operator failures to correctly indicate ADSB & PBCS capabilities resulting in ineligible flights being placed on the 14 NM and 17 NM separations. • Scrutinize each failure to determine cause and source for the error. ii) Monitor failures to properly transmit valid position information by ADS-B. achieve FANS logon, or to maintain or transfer CPDLC connection resulting in ATC reverting to another form of separation • Scrutinize each failure to determine cause and source for the error. iii) Monitor communication and surveillance performance against RCP240 and the 14 NM and 17 NM separations. • NAT TIG scrutinizes the performance twice a year to verify compliance	

QUESTIONS		**METRICS, DETAILS & TARGETS**
Stakeholder Operational Efficiencies	Receipt of optimal profile: i. As flight planned ii. As requested	Provide data on route, flight level and speed: i. Cleared vs flight planned (this element will cover successful receipt of random or OTS) ii. Cleared vs requested *Note: this data may be presented by means of a dashboard.*
	Removal (or reduction) of flight planning rules and “norms” to enable fuel uplift reduction.	Provide 60, 90, 180, 270 and 360 day milepost data to incrementally review strategic removal of rules and flight planning practices based on improvements of ATM performance.

13. SUCCESS CRITERIA – LATERAL SEPARATION

13.1 TBD prior to commencement of 19 NM and 15 NM lateral separations.

ATTACHMENT A - IMPLEMENTATION PLAN FOR OPERATIONAL TRIAL OF ADVANCED SURVEILLANCE-ENHANCED PROCEDURAL SEPARATIONS (ASEPS) USING SPACE BASED AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B)

Task ID	Subject	KEY IMPLEMENTATION TASKS	Record of Updates	Next Step	LEAD(S) *NOTE: Leads will coordinate with groups identified in next column*	Coordination	Completion Date	Status
1	**Task List and Schedule**	Develop a Task List and Schedule for completion of individual tasks to prepare for commencement of, and during operational trial of Space Based ADS-B Separations.	Task List Developed POG/05.	Most advanced draft of the implementation plan reviewed by SPG/54. IMG/SOG Review outcome of SPG/54 Review Task List at POG/06. Output of meetings consolidated and submitted by correspondence to IMG then SOG. Final material to IMG/53 for approval.	NAT POG	NAT IMG	September 2018 (POG/06)	Open/On Track
2	**Concept of Operations (CONOPS)**	Update CONOPS with ICAO SASP 2018 outputs, specifically update placeholders with separation values.	POG to provide updates from SASP outputs.	Submit updated CONOPS for review to POG/06.	NAT IMG	NAT POG	November 2018 (POG/06).	Open / On Track

Task ID	Subject	KEY IMPLEMENTATION TASKS	Record of Updates	Next Step	LEAD(S) *NOTE: Leads will coordinate with groups identified in next column*	Coordination	Completion Date	Status
3	**Stakeholder Consultation**	Undertake regional consultation with appropriate stakeholders.	Consultation meeting 1 completed with updates incorporated into implementation plan and task list to be presented to NAT SPG/54	Canada & United Kingdom to arrange consultation of Implementation Plan before NAT SPG/54. Engage in coordinated planning to enable fuel uplift reductions	United Kingdom, Canada & IATA	NAT POG NAT IMG	By NAT SPG/54 (June 2018). NAT OPS Forum (Sept 2018)	Open / On Track
4	**Recommend target implementation date Longitudinal Trial**	Confirm implementation date via NAT SPG/54 Conclusion.	None.	Update Task List with implementation date at POG/06.	NAT SPG	NAT POG NAT IMG	November 2018 (IMG/53).	Open / On Track
5	**Recommend target implementation date Lateral Trial**	Confirm implementation date via NAT SPG Conclusion (possibly through correspondence).	None.	Update Task List with implementation date at POG/07.	NAT SPG	NAT IMG	March 2019 (POG/07).	Open / On Track
6	**Confirmed SB ADS-B service meets identified performance requirements**	LEOS confirmed as certified as a surveillance system.	None.	Certification to be confirmed.	NAT IMG	NAT POG	Prior to commencement of Trial.	Open / On Track
7	**ATC System Modification**	Confirmation of ATC system modification schedule to support Operational Trial.	POG/05 - Canada & United Kingdom agreed to provide update to POG/06.	Update Task List with confirmed system modification schedule at POG/06	Canada & United Kingdom	NAT POG	November 2018 (IMG/53).	Open / On Track

Task ID	Subject	KEY IMPLEMENTATION TASKS	Record of Updates	Next Step	LEAD(S) *NOTE: Leads will coordinate with groups identified in next column*	Coordination	Completion Date	Status
8	**ANSP Inter-Agreements**	Confirmation of ANSP inter-agreements to support / manage implementation of trials within Shanwick and Gander.	POG/05 - Canada & United Kingdom agreed to provide update to POG/06.	Update Task List with confirmed inter-agreement schedule before commencement of trial.	Canada & United Kingdom	NAT POG	September 2018 (POG/06).	Open / On Track
9	**Advance notice to User States and Operators (Longitudinal)**	Common wording for AIC NAT Ops Bulletin Longitudinal Trial.	POG/05 - Action agreed to prepare draft common wording for AIC to POG/06.	Draft Common Wording for AIC for review by POG/06.	NAT POG	NAT IMG	Minimum of 2 AIRAC Cycles before start of trial.	Open / On Track
10	**Advance notice to User States and Operators (Lateral)**	Common wording for AIC NAT Ops Bulletin Lateral Trial.	POG/05 - Action agreed to prepare draft common wording for AIC to POG/06.	Draft Common Wording. For AIC for review by POG/06.	NAT POG	NAT IMG	Minimum of 2 AIRAC Cycles before start of trail.	Open / On Track
11	**ICAO Sate Letter**	Publication of State Letter confirming date of commencement of Operational Trails.	None	IMG/53 and correspondence with NAT SPG Conclusion to publish State Letter.	NAT IMG	NAT POG	Minimum of 3 months prior to expected start of Trial	Open / On Track

Task ID	Subject	KEY IMPLEMENTATION TASKS	Record of Updates	Next Step	LEAD(S) *NOTE: Leads will coordinate with groups identified in next column*	Coordination	Completion Date	Status
12	**Pre-implementation Safety Assessment & Implementation Decision. (Longitudinal)**	Update and complete final Safety Assessment and Implementation Readiness Review to support implementation of trails.	None.	Complete Safety Assessment and Implementation Readiness Review no later than 3 months before implementation date as shown in **Task 5**.	NAT IMG	NAT SOG	No later than 3 months before implementation date as shown in **Task 5**.	Open / On Track
13	**Pre-implementation Safety Assessment & Implementation Decision. (Lateral)**	Update and complete final Safety Assessment and Implementation Readiness Review to support implementation of trails.	None.	Complete Safety Assessment and Implementation Readiness Review no later than 3 months before implementation date as shown in **Task 6.**	NAT IMG	NAT SOG	No later than 3 months before implementation date as shown in **Task 6**.	Open / On Track
14	**Post implementation monitoring**	Monitoring and reporting against trial, including monitoring against PBCS requirements for communications.	None.	None.	NAT POG	NAT TIG Canada & United Kingdom	Commencement of Trail.	Open / On Track

APPENDIX C — CONCEPT OF OPERATIONS (CONOPS) ON PROVISION OF SPACE BASED ADS-B SERVICES IN THE NORTH ATLANTIC REGION

(paragraph 2.2.4 refers)

Concept of Operations (CONOPS) Provision of Space Based ADS-B services in the North Atlantic Region

Issue 2 – March 2017

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Publication History

Issue	Month/Year	Change Requests and summary
Issue 1	October 2016	Submitted to IMG/49 for approval November 2016.
Issue 2	March 2017	Editorial updates for submission to POG/03, March 2017.

1 Executive Summary

This document provides the North Atlantic Region Concept of Operations (CONOPS) for the introduction of Air Traffic Services (ATS) surveillance services using Satellite -Based Automatic Dependant Surveillance - Broadcast (SB ADS-B). This this service will enhance air traffic controllers ability to provide operators with more planning and tactical options in oceanic airspace including greater flexibility for severe weather avoidance, request and receive new oceanic routes, optimized speed, and request and receive flight level changes.

Expanded ATS surveillance coverage in the North Atlantic (NAT) airspace will enable more efficient use of airspace, increase fuel savings, and enhanced safety, as compared to the services and separation standards that can be provided in the current non-surveillance environment. The Air Traffic Control (ATC), Flight Information and Alerting services provided in the NAT region will be enhanced by the real time availability of aircraft position. SB ADS-B surveillance will facilitate the application of Advanced Surveillance Enhanced Procedural Separations (ASEPs) between suitably equipped flights, resulting in a significant increase in airspace capacity, particularly in areas where there is a high volume of traffic which will allow more flights to operate within their optimum flight profiles. New airspace capability will assist reduced fuel burn with the associated environmental benefit of decreased greenhouse gas (GHG) emissions.

2 Purpose and Scope

This document describes the CONOPS for implementing advanced surveillance-enhanced procedural separation minima (ASEPs) in the ICAO North Atlantic Region utilizing ATS surveillance.

The purpose of this CONOPS is to support the detailed technical planning necessary for NAT ANSPs / States providing an Air Traffic Control Service intending to implement SB ADS-B based operations. This document will also support stakeholder consultations and regulatory engagement.

This CONOPS should be considered in conjunction with the NAT 2025 Concept of Operations. The ability to apply ATS surveillance separation and perform trajectory based monitoring in real time will support achievement of the NAT2025 CONOPS.

2.1 Introduction to SB ADS-B

ADS-B is an ATS surveillance system. ADS-B is automatic as no flight crew or ATCO action is required for the information to be transmitted. It is dependent surveillance as the surveillance-type information depends on information from the aircraft's navigation system.

ADS-B OUT systems broadcast aircraft parameters such as identification (24 bit address and flight identification as per the flight plan), position (latitude, longitude and pressure altitude), 3-D velocity and position integrity, via a broadcast-mode data link. Aircraft identification information is broadcast every 5 seconds while aircraft position and velocity data is typically broadcast twice per second.

APPENDIX C contains a table of required and optional AMC 20-24, US and European elements for ADS-B Out systems used in the NAT.

The space-based ADS-B surveillance system will consist of a constellation of Low Earth Orbiting Satellites (LEOS) hosting ADS-B receivers. A satellite will receive ADS-B data including positon, velocity and altitude from aircraft, which is then routed through other satellites and down-linked to a satellite operations ground station from where it is on-forwarded to Air Navigation Service Providers (ANSPs) and/or aircraft operators.

2.2 Aircraft Equipage

ADS-B mandates, which are effective on the 1st of January 2020 in the United States and 7th of June 2020 in European airspaces, state that no person may operate an aircraft in Class A airspace unless the aircraft has ADS-B out and Mode S enhanced. This is expected to increase the percentage of aircraft equipped with ADS-B transponders compatible with the low earth orbit ADS-B system (i.e. DO-260, DO-260A and DO-260B).

PLACEHOLDER: Specific equipage requirements to support ASEPs expected to be confirmed by SASP. Copy of Separation Table to be inserted when published.

2.3 Change Rationale and Philosophy

The North Atlantic Systems Planning Group (NAT SPG) is the ICAO Planning and Implementation Regional Group responsible for coordinating the provision of ATS in the ICAO NAT Region. Significant operational changes in the NAT Region normally require consensus agreement by the NAT SPG Member States (Canada, Denmark, France, Iceland, Ireland, Norway, Portugal, United Kingdom and the United States) along with the airspace user organizations (IATA, IBAC and IFALPA) who participate in the working structures of the NAT SPG.

The NAT SPG has developed a service development strategy and roadmap to maximize airspace safety and optimization. Specifically, this strategy seeks to safely deploy reduced separation minima, delivering airspace user operational efficiencies, improved operational flexibility and increased service resilience and predictability. These improvements are planned to leverage current aircraft and air/ground communication capabilities together with the planned deployment of low earth orbit ATS surveillance.

This CONOPS builds upon the successful introduction of FANS 1/A (and equivalent) Controller-Pilot Data Link Communications (CPDLC) and Automatic Dependent Surveillance - Contract (ADS-C) into the NAT airspace and the progressive reductions in separation minima these have enabled. The change philosophy is to build on these successes to maximize benefits to airspace users using current aircraft capabilities through a progressive evolution of the ATM system. This approach is designed to achieve a safe and deliverable rate and scale of change for all stakeholders. This CONOPS supports the service vision for the North Atlantic.

3 Current Operational Environment

3.1 NAT Airspace Structure

The responsibility for air traffic control services within the International Civil Aviation Organisation (ICAO) NAT Region is shared among nine states: Canada, Denmark, France, Iceland, Ireland, Norway, Portugal, the United Kingdom and the United States.

The ICAO NAT Region mainly consists of Class A airspace; in which Instrument Flight Rules (IFR) apply at all times. Class A airspace has been established at and above Flight Level (FL) 055 except in the Bodø OCA and in the Søndrestrøm Flight Information Region (FIR) where it has been established above FL195 and in the domestic portion of the Reykjavik FIR where it has been established at and above FL200.

The ICAO NAT Region airspace is divided into seven FIRs or Control Areas (CTA) for the implementation of Communications Navigation Surveillance/Air Traffic Management (CNS/ATM) systems, as depicted in Figure 1 below. The ICAO NAT Region comprises the following FIRs/CTAs: Bodø Oceanic, Gander Oceanic, New York Oceanic East, Reykjavik, Santa Maria, Shanwick, and Søndre Strømfjord.

Air traffic control services are provided by oceanic area control centres at Reykjavik, Bodø, Gander, New York, Santa Maria and Prestwick and by Shannon and Brest Area Control Centres (ACC).

Shanwick OACC at Prestwick provides air traffic control services in the Shanwick OCA and is supported by the High Frequency (HF) radio station at Ballygirreen in the Republic of Ireland.

Gander OACC at Gander provides air traffic control services in the Gander OCA with a collocated HF radio station.

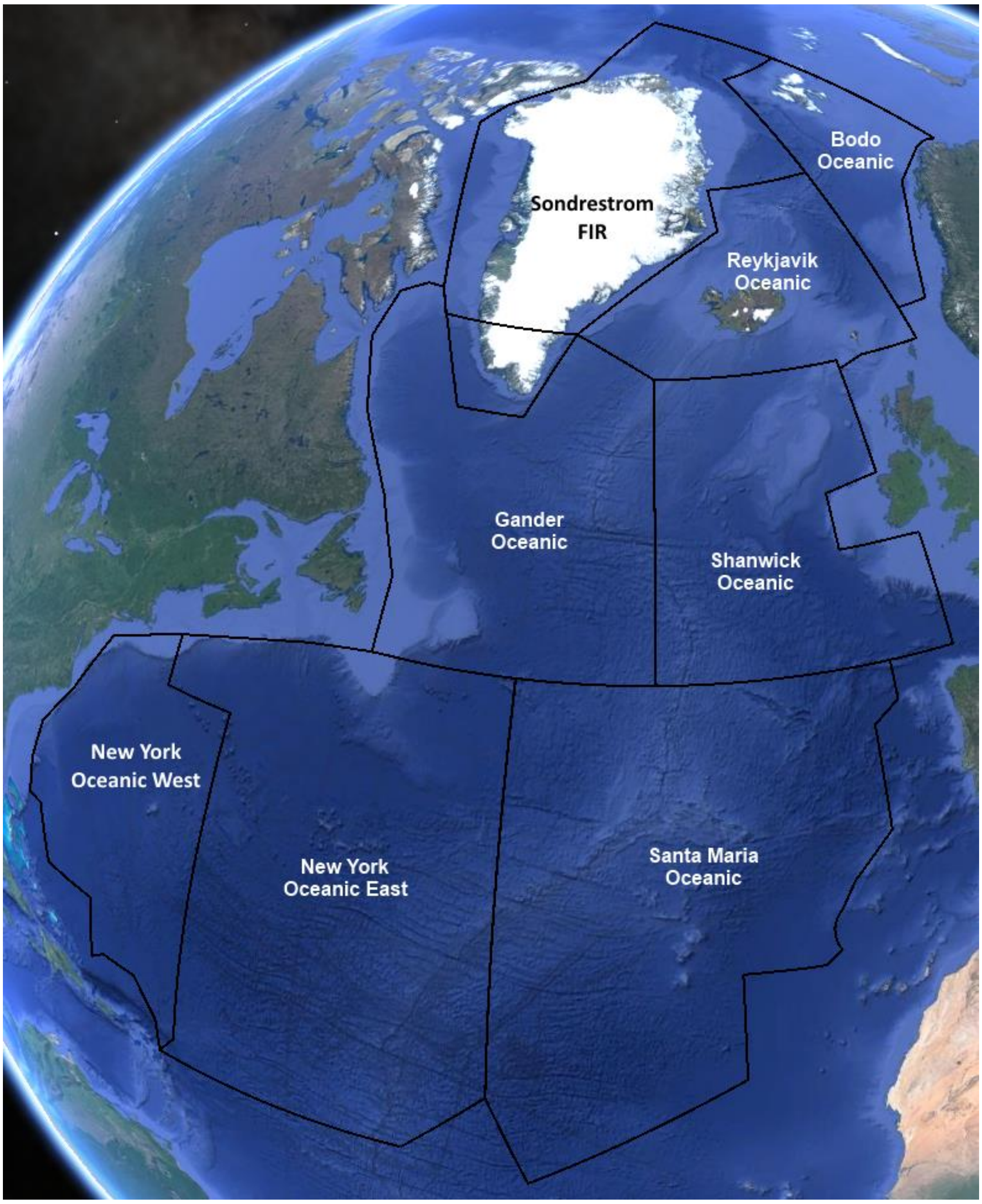


Figure 1 - North Atlantic Oceanic FIRs

ATS surveillance and Very High Frequency (VHF) voice communications are not available in most of the NAT airspace, therefore procedural control is exercised. The exceptions ~~is~~ are the southern part of the Reykjavik area, Bodø oceanic airspace (except the north-west part), the Northern Oceanic Transition Area (NOTA), Southern Oceanic Transition Area (SOTA) and Brest Oceanic Transition Area (BOTA) airspaces in the eastern portion of the Shanwick FIR controlled by Shannon and Brest ACCs, the central portion of the Santa Maria OCA and the Gander Oceanic Transition Area (GOTA), where surveillance separation is provided using a combination of radar and ADS-B.

Figure 2 illustrates where VHF communications / ATS Surveillance based services are applied within the North Atlantic Region.

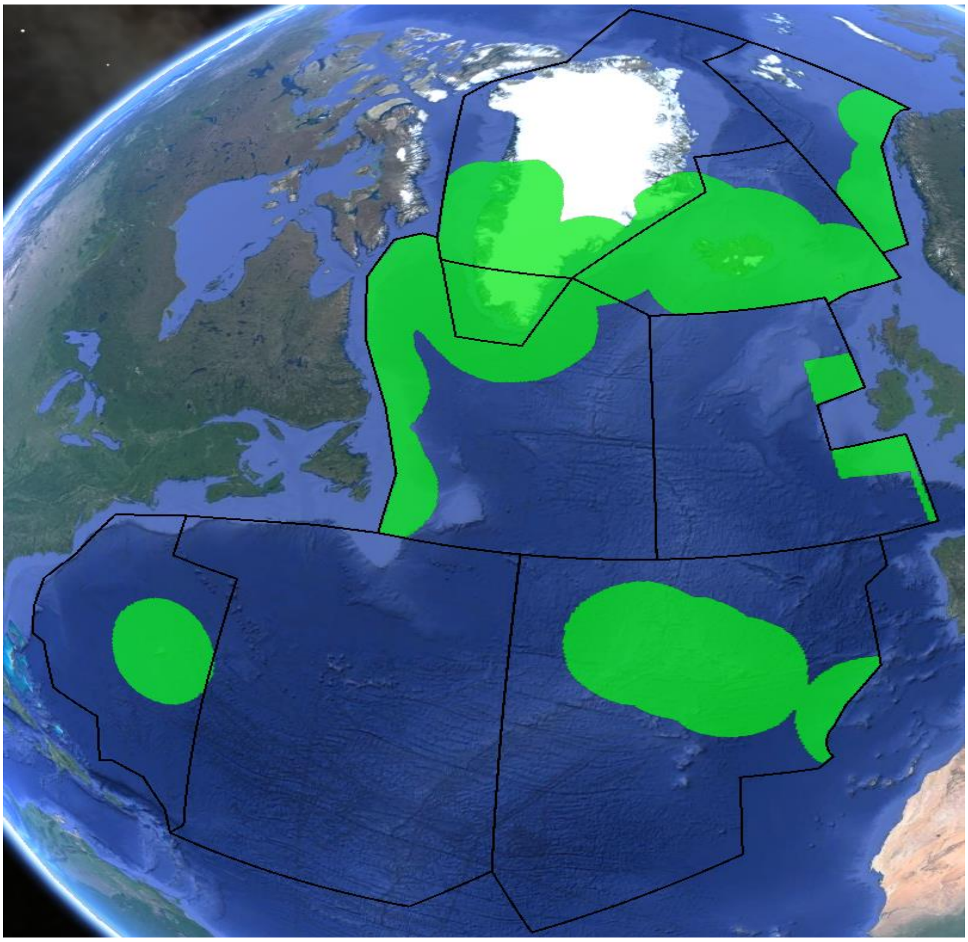


Figure 2 – ATS-Surveillance Based Services in NAT Region

NAT High Level Airspace (NAT HLA) with an associated Minimum Navigation Performance Specifications (MNPS) requirement has been established between FL285 and FL420 within the Oceanic Control Areas of Santa Maria, Shanwick, Reykjavik, Gander Oceanic, Bodø and New York Oceanic East, excluding the area south of 38°30” North latitude. Only NAT HLA MNPS approved aircraft are permitted to operate within the NAT HLA airspace. Monitoring is conducted to verify aircraft performance and scrutinize operational safety performance.

From 1 January 2015 the means of compliance for demonstrating performance to MNPS was amended to include PBN Specification RNAV10 (RNP10) or Required Navigation Performance RNP4 navigation specifications as detailed in ICAO’s Performance based Navigation (PBN) Manual (Doc 9613). Aircraft which were already MNPS approved by the State of Registry or the State of the Operator based on standard deviation of lateral track error of 11.7 Kilometres (km) (6.3 Nautical Miles (NM)) before 1 January 2015 are permitted to operate in NAT HLA airspace until 1 January 2020.

Reduced Vertical Separation Minima (RVSM) airspace is established within the ICAO NAT Region from FL290 to FL410 inclusive. In RVSM airspace, 1,000 feet vertical separation is applied between approved aircraft. Only RVSM approved aircraft are allowed to operate within NAT RVSM airspace. Monitoring is conducted to verify aircraft performance and scrutinize operational safety performance.

The application of strategic lateral offset procedures (SLOP), which allows flights to apply offsets of one or two miles right of a route or track centreline, is permitted in the ICAO NAT Region.

PLACEHOLDER: Expect SLOP text to be revised as part of the SASP work. SLOP details are located in PANS ATM (Doc 4444) Chapter 16.5. Insert any revisions to SLOP here.

Planning for CPDLC and ADS-C implementation started in the ICAO NAT Region at the end of 1990. The NAT Data Link Mandate (NAT DLM) Phase 2A commenced on February 5, 2015 and applies from FL350 to FL390 within the NAT Organised Track System (OTS). Phase 2B is planned to start on December 7, 2017 and will apply from FL350 to FL390 throughout the ICAO NAT Region. Phase 2C is planned to start on January 30, 2020 and will apply from FL290 and above throughout the ICAO NAT Region. The NAT DLM requires aircraft to be capable of FANS 1/A (or equivalent) ADS-C and CPDLC operations in order to operate in the airspace.

3.2 CNS / ATM Systems

Each Air Navigation Services Provider (ANSP) providing air traffic control services within the ICAO NAT Region employ Flight Data Processing Systems (ATM Systems) which provide decision support tools tailored to the NAT operational environment. These assist ATCOs in planning flight profiles, formulating air traffic control clearances, exchanging data link messages with flights, monitoring flight progress, detecting and resolving potential and actual conflicts and exchanging flight data with adjacent ANSPs using ATS Inter-Facility Datalink Communications (AIDC.)

3.3 NAT Procedural Position Reporting

At present NAT flights are normally required to flight plan and report at positions separated by 10 degrees of longitude. Position reports are sent either via voice, normally through HF radio, or by ADS-C reports. ADS-C Periodic and Event reports are used for conformance monitoring and updating of the flight profile held in the Flight Data Processing System (FDPS). The current maximum interval between ADS-C Periodic reports is 14 minutes.

3.4 NAT Separation Minima

The Application of Separation Minima – North Atlantic Region (NAT Doc008) which is published on behalf of the North Atlantic Systems Planning Group (NAT SPG.) It details the separation methods and minima that are, or planning to be, applied to aircraft transiting the ICAO North Atlantic (NAT) Region.

It contains definitions, general rules pertaining to the application of separation minima, separation minima in the vertical, lateral, and horizontal planes applicable to aircraft operating in the ICAO NAT Region. It 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.

Appendix A of The Application of Separation Minima (NAT Doc008) contains a table of separation minima that are being applied, or plan to be applied by the various ANSPs serving the ICAO North Atlantic Region, which is regularly reviewed and updated by State Representatives within the NAT SPG working group structure.

This table also contains ICAO references and communication, navigation & surveillance requirements associated with each minima.

Other ICAO documents, such as the Procedures for Air Navigation Services-Air Traffic Management (Doc 4444) and the NAT Regional Supplementary Procedures (Doc 7030) should be read in conjunction with NAT Doc008 and this CONOPS.

The separation environment in the NAT , into which SB ADS-B services in the ICAO North Atlantic Region is being introduced, is a mixture of procedural separation types, including performance based separations as contained with PANS-ATM Chapter 5 and NAT Regional Supplementary Procedures (Doc7030) Chapter 6.2.

The application of surveillance separation in accordance with PANS-ATM (Doc4444) Chapter 8 is restricted to those areas where ATS surveillance and VHF coverage are available as shown in Figure 2.

By March 2018, all performance based separations will only be applied between flights who have the appropriate RCP and RSP designators within their flight plan in accordance with the NAT Region Performance Based Communications Surveillance plan (PBCS)

<u>Lateral Separation:</u>

Lateral separation is consistently applied so that the distance between those segments 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.

<u>Longitudinal Separation:</u>

Longitudinal separation is applied so that the spacing between the estimated positions of the aircraft is never less than a prescribed minimum. Longitudinal separation between aircraft following the same or diverging tracks may be maintained by application of speed control, including Mach Number Technique.

Longitudinal separation is applied between flights that are on the same track, reciprocal tracks or crossing tracks as defined in PANS-ATM Chapter 5.4.2.

Longitudinal separation is measured either as a time or a distance.

Vertical Separation:

Vertical separation is applied in terms of flight levels.

3.5 Flight Planning and Coordination

Flight planning within ICAO NAT airspace will be in accordance with the processes detailed in the applicable State aeronautical information publications.

Communication and coordination of flight data between ANSPs and appropriate agencies will be via automated ATM system messages using ATS Inter-Facility Datalink Communications (AIDC), supplemented as required using voice.

4 Proposed Operational Environment

4.1 Pre-Implementation Assumptions

The following assumptions are made about the operational practices and technical capabilities which will exist at the time SB ADS-B is introduced into the ICAO North Atlantic Region.

a. SB ADS-B will have been confirmed as an ATS surveillance system.

b. The SB ADS-B system will have been confirmed as being capable of receiving ADS-B signals from equipped aircraft which meet, or exceed those specified in European Aviation Safety Agency (EASA) Acceptable Means of Compliance (AMC) 20-24 (or equivalent), United States' FAA Advisory Circular (AC) 20-165() (or equivalent) or EASA Certification Specification for Airborne Communications, Navigation and Surveillance (AC – ACNS).

Note: Potential US difference: ADS-B Version 0 vs. Version 2 requirement. The US is considering applying ASEPs based on SB ADS-B only to aircraft using ADS-B Version2. Aircraft approved under provisions of AMC 20-24 would, therefore, not be eligible for ASEPS in US controlled oceanic airspace.

c. Each ANSP that plans to implement SB ADS-B will have obtained the necessary regulatory approvals from their respective State regulators to implement SB ADS-B.

d. The NAT SPG will have endorsed the implementation plan and supporting task list.

e. The capability to appropriately process and display all available aircraft position data will have been implemented ahead of application of surveillance-enhanced separations.

f. Geographic waypoints for aircraft routes will consist of named waypoints or waypoints defined using whole degrees of longitude and whole and half degrees of latitude.

g. NAT OTS tracks can be spaced by whole or ½ degree of latitude.

h. Random routes will be issued using whole or ½ degrees of latitude.

i. Flights may be planned and cleared to enter the ICAO North Atlantic Region from domestic European and Canadian and American FIRs with longitudinal and lateral spacing appropriate to aircraft criteria.

j. Flight Data Processing System conformance monitoring functionality will process SB ADS-B data.

k. An ADS-B non-compliance list is in place which has been coordinated between NAT providers, and is used to ensure that ADS-B data from non-compliant aircraft is not displayed to ATCOs.

l. The NAT DLM will apply from FL350 to FL390 inclusive (NAT DLM Phase 2B).

4.2 Operating Assumptions

The following assumptions are made about the operating practices that will be implemented as part of the application of surveillance-enhanced procedural separations within the ICAO North Atlantic Region.

a. Adjacent domestic ANSPs will undertake any necessary enhancements to assure sufficient service quality to for aircraft operating across the oceanic/domestic interface.

b. The requirement to obtain an oceanic clearance prior to entering the OCA will remain in place for all aircraft.

c. ADS-C conformance monitoring will remain in place; i.e. waypoint change event, vertical and lateral deviation contracts will be set up between aircraft equipped with FANS 1/A or equivalent. ADS-C periodic contracts may not be established with ADS-B aircraft.

   PLACEHOLDER: Note Expect SASP to provide additional clarity on where ADS-C / CPDLC will be required for the application of separation standards.

d. The NAT OTS will remain in use, although its geographic "footprint" may be reduced.

e. ADS-B and non-ADS-B flights will operate in the same airspace; i.e. mixed-mode operations.

f. An ADS-B flight is an aircraft that is equipped with and using an appropriately approved ADS-B system and which can be expected to be surveillance identified while operating in the ICAO North Atlantic Region.

g. Reduced separations will only be applied between surveillance-identified aircraft operating within and transiting between ICAO North Atlantic Region ANSPs which are applying ASEPS.

h. Reduced separation minima will be applied in accordance with material developed by the ICAO SASP on a trial basis pending its incorporation into the PANS ATM.

i. The required communications performance (RCP) will be RCP240.

j. The required navigation performance for the airspace (RNP) may be RNP2 or RNP4.

k. PLACEHOLDER: Expect SASP to provide clarity on whether or not an RSP value will be required for the application of separation standards.

4.3 Changes Introduced by this CONOPS

4.3.1 ADS-B Position Updates

ADS-B messages contain aircraft position information and also Aircraft Position Quality Indicators (QI). ADS-B position information is normally provided by the Global Navigation Satellite System (GNSS). The SB ADS-B system will be compatible with the DO-260, DO-260A and DO-260B transponders.

Normally, aircraft identification information is broadcast every 5 seconds and aircraft position and velocity information is typically broadcast twice per second.

SASP separations are predicated on aircraft position information updates every 15 seconds.

4.3.2 Flight Conformance Monitoring

ATS surveillance information will more frequently be checked for conformance. This will be achieved through automated ground based route and level adherence monitoring and alerting against the flight's cleared profile as held in the Flight Data Processing System, which will result in controllers being alerted more quickly to any de deviation.

ADS-C event reports, in the form of Waypoint Change Event (which include NEXT and NEXT+1) and Lateral / Vertical Deviation Event, will continue to be checked for conformance through automated adherence monitoring and altering.

Any predicted or actual deviations from the cleared profile held in the flight data processing system will result in alerts being presented to controllers for immediate action.

4.3.3 Enhanced Profile Monitoring

This CONOPS will introduce the ability for ICAO North Atlantic Region ANSPs to introduce system automation that will extract additional filed flight plan information such as step climbs and speed changes.

In addition to pilot requests, operator (flight plan) requests will be regularly checked by the flight data processing systems against the cleared profile, and will present those requests to the controller if it becomes possible to accommodate them prior to oceanic entry and during the oceanic portion of the flight.

4.3.4 Speed Control

Reduced separation~~s~~ standards and increased position update information provided by SB ADS-B supports the ability to assign variable, rather than fixed, Mach numbers. This will allow aircraft to operate in ECON mode. Fixed Mach numbers will be assigned when required.

Aircraft will either be issued a speed range or with 'not ATC speed.' Details of how variable speeds profiles will be issued in clearances will be included in State AIPs.

4.3.5 Human Factors

ATCOs:

There are no fundamental changes to the roles and responsibilities of the ATCO, as they remain responsible for the management of the airspace, maintaining separation and providing information to flight crews.

With the introduction of various separation values based on a number of communication and surveillance criteria, a full Human Factors review of new and existing HMI will take place to ensure that the ATCO is provided with not only with the correct information, but in the correct manner.

Flight Crew:

There are no fundamental changes to basic methods of operation, however, because aircraft will be in closer proximity both laterally and longitudinally, emphasis will need to be placed on:

a. Pilot awareness of the physical proximity of other aircraft both visually and on ACAS.

b. The necessity for pilots to contact ATC as soon as possible in contingency situations with requests for revised clearance. (The intent is to provide as much time as possible for ATC to assess and act upon the request).

b. The necessity for pilots to be prepared to execute ASEPS contingency procedures quickly and correctly, due to the reduced distance in which to maneuver the aircraft.

Note: Flight Crew contingency procedures are under review for ASEPS operations.

4.3.6 Interfaces with Domestic Airspace

It is likely that, subject to specific coordination with each adjacent domestic ANSP concerned, aircraft will be permitted to transition between domestic and oceanic airspace with less spacing than is required in the current operational environment.

4.3.7 Interfaces with Oceanic Airspace

ADS-B flights may transition between OCAs using surveillance- enhanced separation. The procedures for the transfer of control and surveillance identification between Oceanic areas must be detailed in their inter-unit Letter of Agreement.

4.4 Phased Introduction of ASEPS

Introduction of ASEPS may done through a phased implementation, and will be detailed within each ANSP implementation plan.

The following are the three possible phases of application.

4.4.1 Phase 1 - ATS Surveillance-Enhanced Longitudinal Separation (Same Identical Track)

ADS-B aircraft pairs operating in the same direction, on non-converging same tracks, on the same identical track or on diverging tracks, may be separated using xx(Note1) NM surveillance-enhanced longitudinal separation provided that no part of the track(s) is outside the area of application (unless otherwise agreed by the adjacent ANSP(s) concerned).

Opposite direction ADS-B aircraft on reciprocal tracks may be cleared to climb or descend to the, or through the, level(s) occupied by another aircraft provided that ADS-B reports show that the aircraft have passed each other and are at least xx(Note1) NM apart and that vertical or an appropriate form of longitudinal separation will be established before either aircraft exits the Gander or Shanwick OCA, unless otherwise agreed by the adjacent ANSP(s) concerned.

Note 1 – PLACEHOLDER: 'xxNM' is a placeholder and will be replaced with the separation standard expected to be proposed by SASP in November 2016.

4.4.2 Phase 2 – ATS Surveillance-Enhanced Lateral Separation

Same or opposite direction ADS-B aircraft may be laterally separated by requiring them to operate on non-intersecting tracks that are never less than yy(Note2) NM apart provided that this separation is only applied while both aircraft are within the Gander and/or Shanwick OCAs (unless otherwise agreed by the adjacent ANSP(s) concerned).

Outside the NAT OTS, this will permit more efficient routes to be utilized in areas where operators would prefer to operate in a more north-south alignment.

Note: NAT OTS tracks will be spaced by at least 25 NM. If either aircraft in a pair is not an ADS-B aircraft, the pair will be planned and separated using the appropriate lateral separation minimum, based upon the qualification of both aircraft.

Note 2 – PLACEHOLDER: 'yyNM' is a placeholder and will be replaced with the separation standard expected to be proposed by SASP in November 2016.

4.4.3 Phase 3 - ATS Surveillance-Enhanced Same Longitudinal Separation (Same Direction)

Same or opposite direction ADS-B aircraft on converging, including intersecting, tracks may be separated by ensuring that the distance between target centres is never less than xx(Note1) NM or that another form of separation is established before the distance between target centres reduces to xx(Note1) NM. This separation may only be applied while both aircraft are within the Gander or Shanwick OCAs (unless otherwise agreed by the adjacent ANSP(s) concerned.

If either aircraft in a pair is not an ADS-B aircraft, the pair will be planned and separated using an appropriate separation minimum, based upon the qualification of both aircraft.

4.5 ADS-B Fixed ATS Route Operations

PLACEHOLDER: Insert any SASP or SPG outcomes in relation to ASEPs on fixed routes.

5 Contingencies

5.1 Degraded Mode Operations - Unplanned

Procedures are covered within NAT implementation Plan that support SB ADS-B.

5.2 Degraded Mode Operations - Planned

The SB ADS-B service includes a capability of providing dynamic information about where and when certain areas may be without SB ADS-B coverage due to degraded performance or satellite failure.

ANSP agreements will ensure those affected by any planned outage will be given sufficient notice so that ATC apply the appropriate separations.

5.3 Flight Crew Contingency Procedures

Note: Flight Crew contingency procedures are under review for ASEPS operations, and any revisions will be made to PANS ATM (Doc 4444.)

APPENDIX A Glossary

ABI Advance Boundary Information

ACC Area Control Centre

ACI Area of Common Interest

ACP Acceptance

ADS-B Automatic Dependent Surveillance - Broadcast

ADS-B Out system the overall set of avionics that generate, transport, process, and transmit ADS-B data.

ADS-C Automatic Dependent Surveillance - Contract

AIDC Air Traffic Services Inter-Facility Data Link Communications

AMC Acceptable Means of Compliance

ANSP Air Navigation Services Provider

ASEPS Advanced Surveillance-Enhanced Procedural Separation

ATC Air Traffic Control

ATCO Air Traffic Controller

ATM Air Traffic Management

ATS Air Traffic Services

ATS surveillance generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft

ATS Surveillance enhanced separation: the use of ATS surveillance to provide high integrity and frequent position updates to support the application of reduced separation minima

BET Boundary Error Trapping

BOTA Brest Oceanic Transition Area

CDN Coordination

CDO Clearance Delivery Operator

CNS/ATM Communication, Navigation and Surveillance / Air Traffic Management

CONOPS Concept of Operations

CPDLC Controller-Pilot Data Link Communications.

CPL Current Flight Plan

CTA Control Area

Data Link communication technology where 'Data Link' equipped aircraft communicate with 'Data Link' capable ground units to exchange digital information (bi-directional exchange).

DCPC Direct Controller Pilot Communications

EASA European Aviation Safety Agency

FANS 1/A CPDLC and/or ADS-C avionics certified in accordance with the requirements specified in RTCA DO-258/EUROCAE ED-100 or equivalent

FDPS Flight Data Processing System

FIR Flight Information Region

FL Flight Level

FPL Flight Plan

GAATS+ Gander Automated Air Traffic System Plus

GHG Greenhouse Gas (emissions)

GNSS Global Navigation Satellite System

GOTA Gander Oceanic Transition Area

HF High Frequency

HMI Human/Machine Interface

ICAO International Civil Aviation Organisation

IFR Instrument Flight Rules

km Kilometre

MNPS Minimum Navigation Performance Specifications

MNT Mach Number Technique

NAT North Atlantic

NAT DLM North Atlantic Data Link Mandate

NAT HLA North Atlantic High Level Airspace

NAT SPG North Atlantic Systems Planning Group

NM Nautical Miles

NOTA Northern Oceanic Transition Area

OACC Oceanic Area Control Centre

OCA Oceanic Control Area

OCL Oceanic Clearance

OCM Oceanic Clearance Message

OTS Organised Track System

PBCS Performance Based Communications & Surveillance

PBN Performance-Based Navigation

QI Quality Indicators

RACON GAATS+ Gander functionality that uses the received Surveillance data (Radar /ADS-B) to conformance check flights against the profile held in the GAATS+ Flight Data Processor.

RBT Route Based Trajectory

RCL Request for Clearance

RLatSM Reduced Lateral Separation Minimum of 25 nautical miles

RLongSM Reduced Longitudinal Separation Minimum (of 5 minutes between ADS-C equipped aircraft)

RNAV Area Navigation

RNP Required Navigation Performance

RVSM Reduced Vertical Separation Minima

SAR Search and Rescue

SB ADS-B Space-Based Automatic Dependant Surveillance - Broadcast

SESAR Single European Sky Air Traffic Management (ATM) Research

SLOP Strategic Lateral Offset Procedures

SOTA Southern Oceanic Transition Area

SWIM System Wide Information Management

VHF Very High Frequency

APPENDIX B References

(1) Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B) ED-102A January 2012

(2) Working Copy of the 5th Edition of the NAT Regional Supplementary Procedures (SUPPs) (Doc 7030), Amendment No. 8, dated 01 November 2013.

(3) Certification Specifications and Acceptable Means of Compliance for Airborne Communications, Navigation and Surveillance CS-ACNS Initial Issue 17 December 20131

(4) NAV CANADA Space Based ADS-B Concept of Operations Version 3 - October 2014

(5) ICAO's Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).

(6) COMMISSION IMPLEMENTING REGULATION (EU) No 1207/2011 of 22 November 2011 laying down requirements for the performance and the interoperability of surveillance for the single European sky (Text with EEA relevance) http://easa.europa.eu/system/files/dfu/2013-031-R-Annex%20I%20to%20ED%20Decision%202013-031-R.pdf

(7) NAT 2025 Concept of Operations for the North Atlantic. Issue 1 Feb 2013

(8) North Atlantic Systems Planning Group 12_NATSPG49 Final REPORT.docx June 2013

(9) EUROCONTROL STANDARD DOCUMENT FOR SURVEILLANCE DATA EXCHANGE, Part 12: Category 021 ADS-B Reports, SUR.ET1.ST05.2000-STD-12-01, version 2.1, May 2011 https://www.eurocontrol.int/sites/default/files/content/documents/nm/asterix/part2-cat021-asterix-ads-b-messages-part-12.pdf

(10) SESAR Concept of Operations Step 1 Project title Concept of Operation Project N° B4.2 Project Manager DFS Deliverable Name Concept of Operations Step1 Deliverable ID D65-011 Edition 01.00.00 http://www.sesarju.eu/sites/default/files/documents/highlight/SESAR_Conops_Document_Step_1.pdf

(11) ICAO Performance Based Navigation (PBN) Manual (Doc 9613).

APPENDIX C AMC 20-24, US and European ADS-B Requirements

Parameters	**U.S.**	**E.U.**	**AMC 20-24** (1)
Length and width of the aircraft	R	R	O
Latitude and longitude	R	R	R
Barometric pressure altitude	R	R	R
Velocity	R	R	O
TCAS II or ACAS is installed & operating in a mode that can generate resolution advisories	R	R	O
If a resolution advisory is in effect when an operable TCAS II or ACAS is installed	R	R	O
Mode 3/A transponder code	R	R	O
Aircraft Identification (the aircraft's call sign)	R	R	R
An emergency, radio, communication failure, or unlawful interference indication	R	R	R (allows generic EMG) (2)
"IDENT" indication (SPI)	R	R	O
Assigned ICAO 24-bit address	R	R	R
Emitter category	R	R	O
ADS–B In capability	R	O	O
Geometric altitude	R	R	O
Navigation Accuracy Category for Position (NAC_P)	R ≥8	R (≥7)	R
Navigation Accuracy Category for Velocity (NAC_V)	R ≥1	R (≥1)	O
Navigation Integrity Category (NIC)	R ≥7	R (≥6)	R (or NUC in DO260)
System Design Assurance (SDA)	R ≥2	R ≥2	O
Source Integrity Level (SIL) (3)	R =3	R =3	R
Version number	R =2	R =2 (4)	R
Geometric Vertical Accuracy (GVA)	O	R	O
Vertical rate	O	R	O
GNSS antenna offset	O	R	O
Selected altitude	O	R	O
Barometric pressure setting	O	R	O

R = required information. O = optional

(1) This column describes the European Aviation Safety Agency (EASA) Acceptable Means of Compliance (AMC) 20-24 standard. It is planned to be the minimum standard for NAT ASEPS operations. However, the U.S. is considering restricting use of SB ADS-B for separation only to aircraft using ADS-B Version 2 (i.e., meeting U.S. and E.U. mandate requirements). (Even though AMC 20-24 lists "Velocity" as optional, there are no known aircraft implementations without it).

(2) AMC 20-24, 8.8.2: For ATC transponder-based ADS-B transmit systems, the discrete emergency code declaration capability should be integrated into the transponder functionality and should be controlled from the transponder control panel. Permissible deviation for initial implementations: For initial implementations, instead of the required transmission of the discrete emergency codes 7500, 7600 and 7700 when selected by the flight crew, the transmission of only the generic emergency indicator can satisfy this requirement. Such deviation from the above target requirement needs to be listed in the Aircraft Flight Manual.

(3) Note that SIL has a different meaning in ADS-B Version 2 than in ADS-B Version 1; SIL did not exist in ADS-B Version 0. For ANSPs that don't require Version 1 or Version 2, an "R" in this row means "required if available in the transmitted ADS-B Version."

(4) The E.U. mandate requires Version 2 ADS-B avionics. However, specific (early) local deployments in Europe accept the legacy ADS-B standards, ADS-B Version 0 and 1.

-- END --

APPENDIX D — NAT UPLINK LATENCY TIMER PROJECT DEFINITION

(*paragraph 2.3.1 refers*)

Project Title	NAT Uplink Latency Timer Project Team (NAT ULT PT)
Parent Group	NAT SPG
Project Supervisory body	NAT SOG and NAT IMG
Project Period	January-December 2018
Project Objective	To review and investigate potential corrective actions by CSPs, air operators, and ANSPs to avoid pilots acting on "old" CPDLC uplink messages, focusing on the already defined aircraft latency timer but also considering the potential implementation of a message expiration timer in the ground network.
Project Outcomes:	Coordinate and implement corrective actions by CSPs, air operators, and ANSPs to avoid pilots acting on "old" CPDLC uplink messages, focusing on the already defined aircraft latency timer but also considering the potential implementation of a message expiration timer in the ground network.
Membership	NAT TIG and POG members, CSPs, SSPs, aircraft and avionics manufacturers. *Note: participants from regulators and operators and other subject matter experts, as deemed appropriate by the Project Team.*
Coordination Requirements	NAT SOG, NAT IMG and their contributory bodies as appropriate
Project High level Tasks	• Develop procedures for the use of the aircraft uplink message latency timer. • Consider the viability of implementing a network uplink message expiration timer. • Report to NAT IMG/52.
Project Lead	NAT TIG Rapporteur
Project Secretariat Support	ICAO EUR/NAT Office

APPENDIX E — NAT DEMA REPLACEMENT PROJECT TEAM (NAT DEMA RPT) DEFINITION

(*paragraph 3.1.3 refers*)

Project Title	**NAT DEMA Replacement Project Team**
Parent Group	NAT SPG
Project Supervisory Body	NAT SOG
Project Period	01 July 2018 – 31 December 2018
Project Objective	To create the NAT safety occurrence database to support necessary NAT safety management activities
Project Outcomes	1. **“Master requirements”** document 2. Budget request and financing mechanisms definition 3. Database with software interfaces and reporting functions 4. Report to NAT SPG on preliminary testing and proposals for deployment the database in 2019.
Membership	NAT SG, NAT MWG, NAT ANSPs (including IT experts), NAT CMA
Coordination Requirements	NAT SOG
Project High Level Tasks	1. Collect requirements from NAT SG, NAT MWG, NAT ANSPs, NAT CMA: a. for data fields to be made available in the database; b. for web-based interfaces for accessing the database; c. for querying and reporting functions; d. security protection; e. additional requirements proposed. 2. Create the “**Master requirements”** document for the database. 3. Identify the budgeting requirements and financing mechanisms to be agreed by NAT SPG via correspondence. 4. Develop the database and software for accessing the database based on the requirements collected. 5. Test the software by inputting the collected data from ANSPs Report back to NAT SOG and NAT SPG via correspondence with proposal for deployment the database in Q1 2019.
Project Lead	NAT CMA
Project Secretariat Support	ICAO EUR/NAT

APPENDIX F — NORTH ATLANTIC ANNUAL SAFETY REPORT (NAT ASR) 2017

(*paragraph 3.3.5 refers*)

International Civil Aviation Organization (ICAO) North Atlantic Region

2017 Annual Safety Report

Executive Summary

The North Atlantic Region's fifth annual safety report is issued by ICAO's North Atlantic (NAT) Systems Planning Group (NAT SPG). As stipulated in its terms of reference, the NAT SPG shall continuously study, monitor and evaluate the air navigation system in the NAT Region in light of changing traffic characteristics, technological advances and updated traffic forecasts. This report is based on data from January to December 2017 and provides basic information on the Region, its safety principles, and its risks. The report also describes some of the NAT SPG's collaborative safety management efforts.

The management of safety in the NAT Region is partly conducted by the use of Safety Key Performance Indicators (SKPIs) that have been developed and established by the NAT SPG. A modified list of Safety Key Performance Indicators and a revised definition of targets for many of the SKPIs was adopted at the NAT SPG/53 in 2016; new targets are applicable from 2019. For the year 2017, targets were met for the three SKPIs that have defined targets.

The use of Strategic Lateral Offset Procedure (SLOP) is an important safety initiative. If there were better utilization of SLOP, the vertical risk would have been significantly improved. The use of SLOP should be encouraged at all NAT related user forums.

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 Economic, Financial and Forecast Group (NAT EFFG) estimates that in 2017, during the peak week of July 15 to July 21, approximately 13,520 flights crossed the North Atlantic. The NAT EFFG expects traffic in this Region to grow at an average annual growth rate of 3.9 % over the next 5 years, as shown in **Table 1** below. This projection is down from an estimate of 5.3% growth noted in last year's report. **Figure 1** below further illustrates these projections. The long-term average annual growth rate from 2017 to 2037 is expected to be somewhere between 2.4% and 3.4%. This year's increase is a good illustration of increased demand in the busiest oceanic airspace in the world, and the importance of the safety work of the NAT Safety Oversight Group (SOG). The NAT SOG is responsible to the NAT SPG for safety oversight in the NAT Region.

Table 1: Forecasts of aircraft movements in the ICAO NAT Region during the Peak Week of July 15-July 21

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total	10,386	11,012	11,563	12,682	13,520	13,866	14,515	15,162	15,916	16,341
Year over Year Growth		6.0%	5.0%	9.7%	6.6%	2.6%	4.7%	4.5%	5.0%	2.7%
5-year Year over Year Growth										3.9%

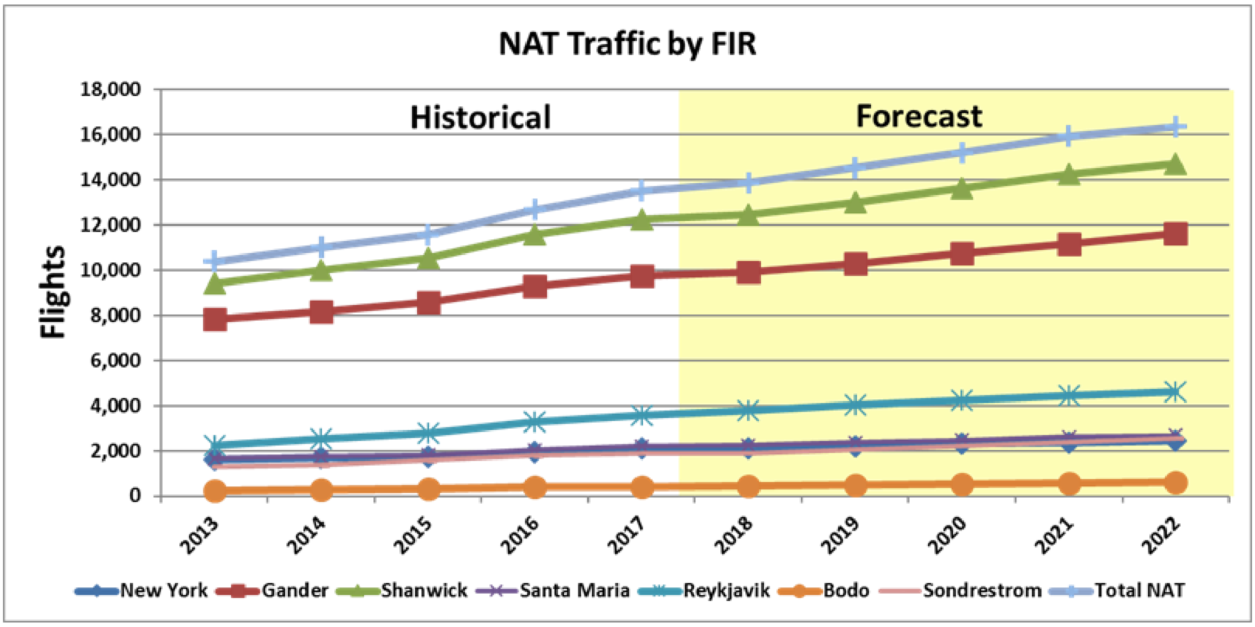


Figure 1: NAT Traffic by FIR

Traffic mainly flows in a broadly East-West orientation in a twice daily pattern, whose timing reflects the needs of passengers in North America and Europe, and where a daily organized track system takes account of airspace users' needs and weather patterns. This core traffic operates for a large part without radar surveillance and increasingly with the use of Automatic Dependent Surveillance-Contract (ADS-C) and Automatic Dependent Surveillance-Broadcast (ADS-B). 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 makes any comparison with the domestic airspace of North America and Europe difficult. NAT core traffic flow is almost exclusively jet transport aircraft that operate in the upper airspace in the en-route phase of flight. 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.

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 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 (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.

Safety Performance

Table 2: Most common errors within the NAT HLA, below, lists the most common event types reported in the NAT High Level Airspace (HLA)[1]. The three most common errors that led to these events are given with their respective frequencies.

Table 2: Most Common Errors in the NAT HLA

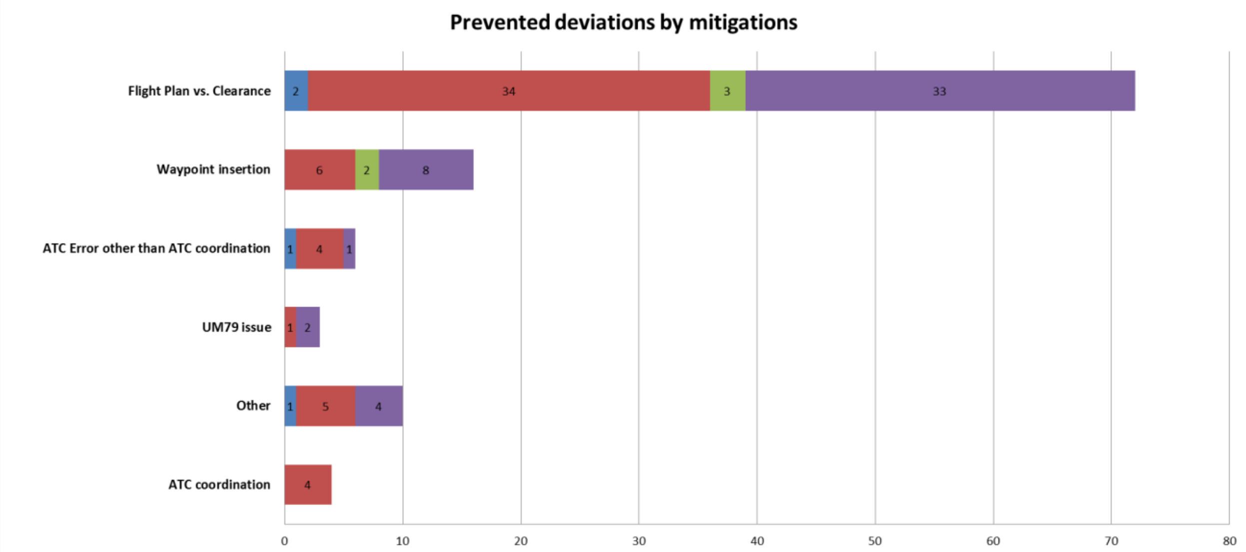
2017 Reported Events		Top 3 errors as defined by the NAT SG
Vertical Large Height Deviations (LHDs)	**91**	Crew Error **(51)**
		ATC Error **(25)**
		Other **(15)**
Lateral deviations	**54**	Crew Error **(33)**
		ATC Error **(11)**
		Other **(10)**
ATC Interventions and Preventions to prevent a lateral deviation	**139**	n/a

Note 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 preemptive action. ATC Interventions are events where the Air Traffic Controller caught and corrected a mismatch between the flight plan protected by ATC and the aircraft crew's intentions before it developed into a deviation. An ATC Prevention is an event where the Air Traffic Controller intervened to prevent a lateral deviation. Underlying causes of all lateral deviations (incipient or actual) are often identical – the magnitude depends upon the timeliness of identification and corrective action.

Preventions of Deviations

The NAT Scrutiny Group (SG) categorized 111 events that have occurred in 2017 and in which ATC prevented a deviation. The Group classified the prevented deviation events according to the implemented mitigations which were identified as being responsible for the prevention. The results of this classification are presented in **Figure 2**, demonstrating inter alia 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.

[1] Airspace between Flight Levels 285 and 420 inclusive, formerly Minimum Navigation Performance Specification (MNPS) airspace



	ATC coordination	Other	UM79 issue	ATC Error other than ATC coordination	Waypoint insertion	Flight Plan vs. Clearance
Controller detected		1		1		2
Next Next+1 position report	4	5	1	4	6	34
Pre boundary conformance check					2	3
UM137/DM40		4	2	1	8	33

Figure 2: Prevented lateral deviations by mitigations for January-December 2017

Safety Key Performance Indicators (KPIs)

The NAT SPG has established Safety KPIs for the ICAO NAT Region. Targets are reviewed annually by the NAT SOG.

For 2017 performance monitoring, the NAT SPG agreed to amend and modify certain KPIs and related targets, to better reflect current improvements in data systems and for revision of data collection techniques. The revised SKPIs distinguish between aircraft utilizing data link and aircraft not utilizing data link, as data indicates that more than 80% of aircraft operating in NAT airspace are equipped and using data link. In addition, substantial changes were agreed upon on the way many of the safety targets are defined. Targets for nine of the SKPIs now rely on the previous three years rolling average. Safety performance, as of the beginning of 2018, will be measured from the baseline of the average performance of 2015, 2016 and 2017. This means that for 2017 performance measurements, there are only defined targets for three out of the 12 reported SKPIs. For those three, the safety targets were met in 2017.

The NAT Region's performance in 2017 as demonstrated with defined safety KPIs is shown in **Table 3** below. As explained above, due to a revised method for target setting, nine of the KPIs do not have targets, however for comparison purposes, the 2016 performance information and the baseline average (which will apply for 2018 performance) are provided.

Table 3: Modified NAT Safety KPIs (beginning 2017)

Safety KPI		Target		2016 Performance	2017 Performance
i	Number of accidents	0		0	0
ii	Number of fatal accidents	0		0	0
iii	Number of fatalities related to aviation fatal accidents	0		0	0
		Target for 2018 performance	**2015-2016-2017 baseline**[2]	**2016 Performance**	**2017 Performance**
iv	Rate of LHD events (No of LHD events divided by No of flight hours flown in the NAT region), involving operations with Data Link in use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	3.45×10^{-5}	3.19×10^{-5}	3.71×10^{-5}
v	Rate of LHD events (No of LHD events divided by No of flight hours flown in the NAT region), involving operations with Data Link not in use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	6.60×10^{-6}	4.48×10^{-6}	8.72×10^{-6}
vi	Percent of Long Duration[3] LHD events	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	2.73%	5.7%	0.0%
vii	Rate of minutes that aircraft, with Data Link in use, spent at the wrong flight level (Amount of minutes spent at the wrong flight level divided by total duration of flights in minutes)	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	0.15	0.2	0.1
viii	Rate of minutes that aircraft, with Data Link not in use, spent	Reduction over previous rolling three-year period	0.51	0.9	0.2

[2] While 2015 performance contributed to the 2015-2016-2017 baseline, those figures are not reported in Table 3. Therefore, the baseline, when compared to only 2016 and 2017 performance, may not be intuitive.

[3] Long Duration LHD event means an event exceeding 20 minutes, based on a threshold established after review of historical data reported to the NAT CMA

	at the wrong flight level (Amount of minutes spent at the wrong flight level divided by total duration of flights in minutes)	of performance compared to 2015-2016-2017 baseline			
ix	Rate of GNE events[4] (No of GNE events divided by No of flight hours flown in the NAT region) , involving operations with Data Link in use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	1.79×10^{-5}	1.79×10^{-5}	1.80×10^{-5}
x	Rate of GNE events (No of GNE events divided by No of flight hours flown in the NAT region), involving operations with Data Link not in use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	3.01×10^{-6}	0.56×10^{-6}	5.45×10^{-6}
xi	Rate of losses of separation (vertical) (No of losses of separation events divided by No of flight hours flown in the NAT region)	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	1.40×10^{-5}	1.23×10^{-5}	0.13×10^{-5}
xii	Rates of losses of separation (lateral) (No of losses of separation events divided by No of flight hours flown in the NAT region)	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline	6.50×10^{-6}	8.95×10^{-6}	9.27×10^{-6}

Large Height Deviations

The NAT SPG has targeted vertical risk specifically for the last several years through an emphasis on reducing LHD events. A NAT Vertical Risk Reduction Implementation Plan was agreed and targets established for vertical risk, was as follows:

That:

a) (LD) long duration LHDs in the vertical dimension are defined as those events which occur for 20 minutes or more;

b) the definition of LD LHD be reviewed annually in order to maintain improvement in reduction to LHDs;

c) a target is to reduce the number of LHDs in the NAT RVSM airspace over a three year rolling average;

[4] GNE is a deviation of 10NM or greater

d) a target is to reach a total number of LHD events within the NAT RVSM airspace by 2018 not exceeding 85 per year;

e) a target is to reduce the total number of minutes associated with the three longest LHDs within the NAT RVSM airspace;

f) a target is to eliminate the number of LD LHD events within the NAT RVSM airspace by the end of 2018; and

g) the NAT SOG request trend-specific action when any adverse trend develops.

In 2017, there were 80 LHDs events at RVSM levels and 108 in the entire NAT airspace, which includes the HLA (shown in parentheses in the text in **Table 4** below). This is a decrease from last year. Based on the three year rolling average (2013-2015). The Region is on target for meeting the 2018 goal.

Table 4: LHD Summary Report

	LHD Data	2010	2011	2012	2013	2014	2015	2016		2017	2018 (Long Term Target)
# OF EVENTS	# of LHDs within RVSM (within entire NAT)	115 (138)	88 (107)	128 (163)	102 (128)	92 (116)	100 (120)	82 (105)		80 (108)	85
	# of LD LHD (10 min+) within RVSM[5]	13	14	15	3	5	6	8[6]	# of LD LHD (20 min+) within RVSM	0	0
	# of LHD (< 10 min) within RVSM	102	74	113	99	87	94	74[7]	# of LHD (< 20 min) within RVSM	80	
TIME	# of LHD Minutes within RVSM	621	707	718	217	266	260	333	# of LHD Minutes within RVSM	149	
	# of LD LHD (10 min+) within RVSM	409	582	564	42	171	170	284	# of LD LHD (20 min+) within RVSM	0	

A deviation that results in a loss of separation is considered to be risk bearing. Collision Risk Estimates include only risk bearing LHDs in NAT HLA. In **Figure 3** below, this "risk bearing" factor is compared to all LHDs in HLA in historical context. It is also compared to the number of LHDs attributed to aircrew and ATC errors.

There were 64 operational risk-bearing LHDs during 2017, resulting in a total duration of 147 minutes at the incorrect flight level and 30 uncleared flight levels crossed. The two longest duration events accounted for a total of 19% of the total time spent at the wrong flight level. Removing these two events would reduce the overall vertical risk by 18% from 46.1 to 37.9 x 10^{-9} fapfh.

[5] Beginning in the 2017 reporting period, the time threshold for an LD LHD will be 20 minutes as agreed by NAT SOG/15

[6] Including 6 events of duration 11-19 minutes

[7] Including 2 events of duration 11-19 minutes

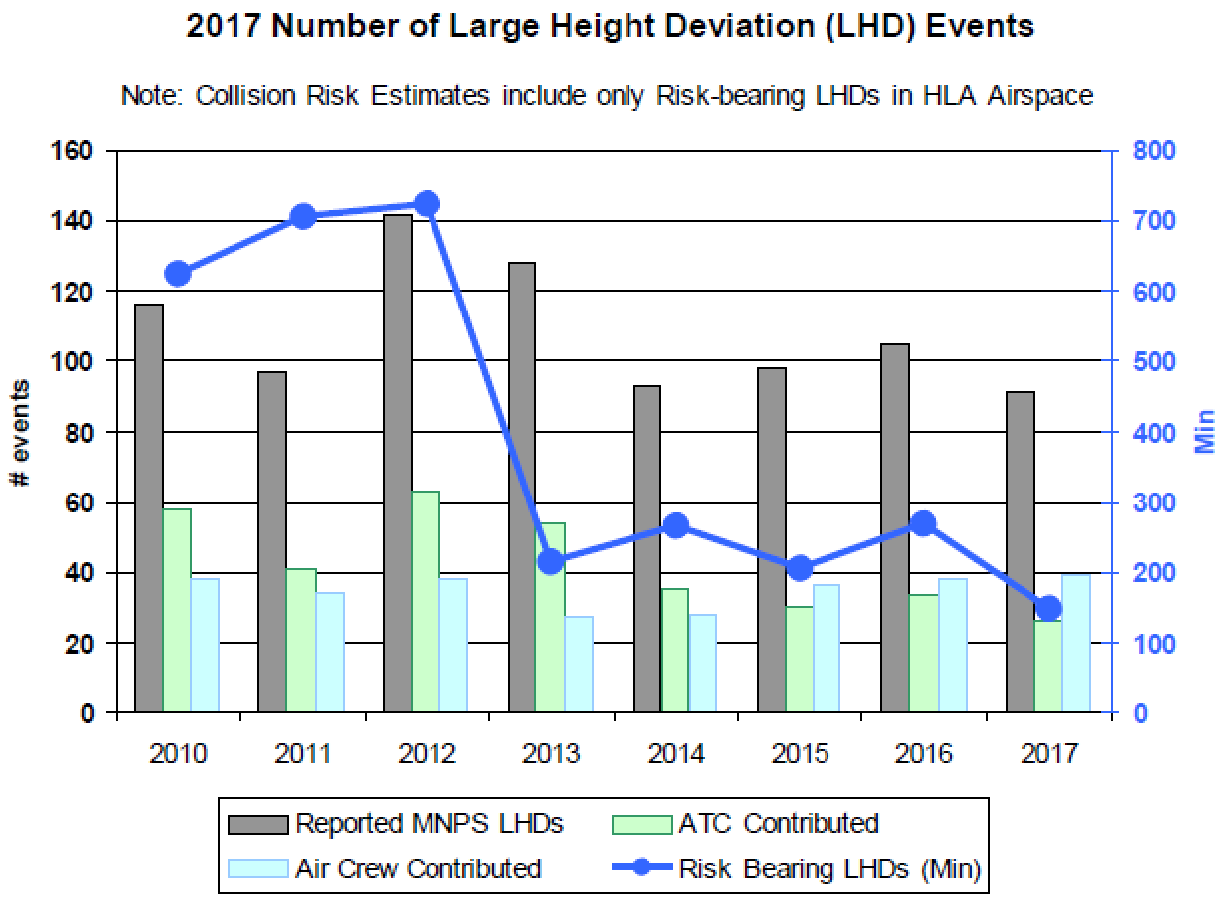


Figure 3: 2017 Number of LHD Events

Alignment with the Global Aviation Safety Plan

The 2017-2019 GASP sets out a continuous improvement strategy for States and Regions to implement over the next 15 years through the establishment of core, and then more advanced, aviation safety systems. The target dates and the broad objectives are set out below:

Target Date	Broad Objective
(a) Near-Term (by 2017)	Effective Safety Oversight
(b) Mid-Term (by 2022)	ICAO State safety program implementation
(c) Long-Term (by 2028)	Predictive risk management

All NAT provider States have met the near-term objective of the GASP and are working toward the mid-term and long-term objectives, particularly in the areas of proactively managing risks through the identification and control of existing or emerging safety issues. 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 Region's safety policy (presented previously in this report) 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.

The NAT SPG assigned the task of reviewing the current safety KPIs and proposing new safety KPIs and targets to the NAT SOG. This is an on-going task for the NAT SOG which the group revisits at each of its meetings. The NAT

Central Monitoring Agency (CMA), which is the Regional Monitoring Agency for the NAT region, collects NAT event data and uses it along with the NAT SG and the NAT MWG to assess safety performance within the Region.

The NAT reporting requirements have gradually expanded to meet the needs of system risk assessment, understanding of operational errors, and informing the safety assessments involved with reductions in separation. Formal reporting requirements have been introduced through the Conclusions of the NAT SPG. In order to ensure that the necessary data would be available to inform discussion of future developments, the NAT SPG recognized that these reporting responsibilities needed to be organized and easily accessible. Therefore, in 2015 the NAT SPG developed and endorsed the NAT Consolidated Reporting Responsibilities Handbook (NAT Doc 010). This document compiles relevant reporting requirements and guidance previously agreed to by the member States that make up the NAT SPG as outlined in the conclusions from its first meeting in 1965 through its 53rd meeting in June 2017.

NAT Regional Priorities

A number of Air Navigation Service (ANS) initiatives are on-going in the NAT Region. In line with the safety policy and as stipulated in the terms of reference and the work structure of the NAT SPG, it is imperative that acceptable safety arguments are provided in relation to system developments in the NAT Region. The agreed policy is as stated above, to maintain and where possible improve the agreed safety standards in all activities. In this regard, the safety work that provides confidence that upcoming initiatives do not negatively affect the safety of the ICAO NAT Region, is ongoing. Work undertaken by the NAT Regional subgroups on a number of significant initiatives took place in the ICAO NAT Region in 2017, including:

a) Reduced Lateral Separation Minima between FANS equipped aircraft (RLatSM);
b) The NAT Data Link Mandate (DLM) implementation (Phase 2A); and
c) Definition and Components of safety cases in support of changes to the NAT air navigation system requiring NAT SPG approval.

Following are short summaries of the projects, stipulating how the NAT States will collaboratively ensure or have ensured (depending on the status of the project) the safe implementation and application on a regional level.

Reduced Lateral Separation Minima between FANS equipped aircraft (RLatSM)
An operational trial of RLatSM was based on suitably equipped aircraft assigned half degree track spacing making position reports via ADS-C and equipped with CPDLC. The goal of RLatSM is to decrease fuel cost to airlines by providing the opportunity for more optimal flight profiles within the NAT and without negative impact on collision risk.

The RLatSM Phase 1 trial commenced November 12, 2015 in the Gander and Shanwick OCAs. NAV CANADA, overseen by Transport Canada, led the project in conjunction with United Kingdom‘s NATS. The implementation of Performance-Based Communications and Surveillance on 29 March 2018 moved RLatSM from the trial phase to the operational phase. Half degree tracks will be published based on fleet equipage and demand.

Safety Improvements with Data Link in the NAT Region
In June 2014, the NAT CMA began to record information related to the use of data link with each safety occurrence report. **Figure 4** provides a sample of this evaluation from occurrence reports contributing toward vertical operational risk. The results show the time spent at wrong flight level and number of flight levels crossed incorrectly decreased 14 and 56 percent, respectively, for risk-bearing events reported via data link for calendar year 2017 compared with the similar data observed for year 2014. As more aircraft are equipped with data link capability, we expect this trend to continue.

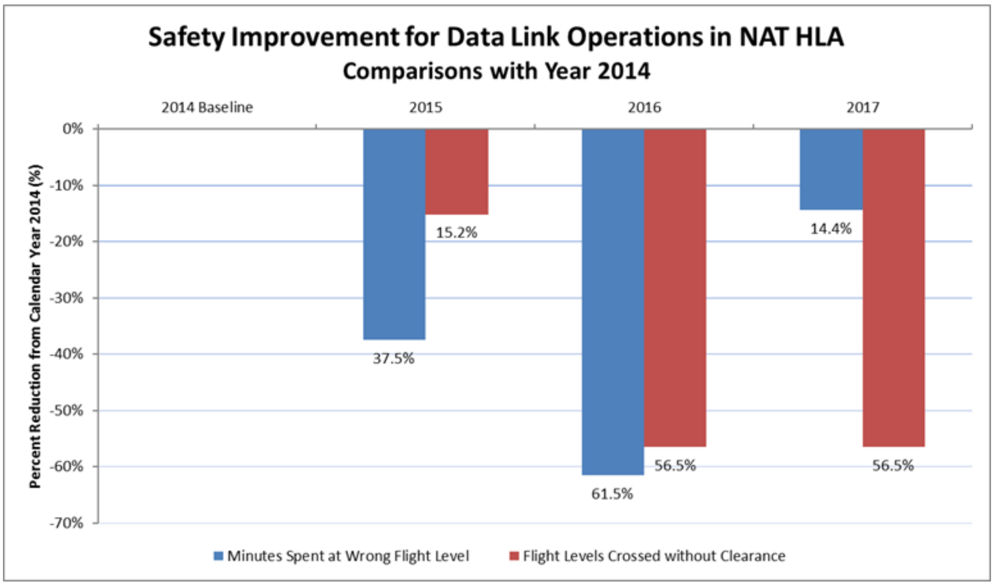


Figure 4: Safety Improvement with Data Link

Definition and Components of safety cases in support of changes to the NAT air navigation system requiring NAT SPG approval

The NAT SPG identified the need for a clear definition of the contents of safety cases prepared to support changes to the NAT air navigation system so that safety planning can be conducted in such a way that safety arguments and supporting documentation are presented by or through the NAT IMG to the NAT SOG in a manner that fulfils the NAT SOG's requirement to review safety cases.

Therefore, the NAT SPG developed the definition of a safety case that, in part, states that a safety case 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, and includes the assessment of safety risk associated with the proposed change, 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 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.

A Look Ahead

The NAT SPG is laying the groundwork towards enabling a seamless separation approach throughout the NAT Region. As such, the NAT SPG is planning to coordinate through the working structure all required procedures, analyses, and planning documents related to Air Traffic Service (ATS) surveillance-enabled services using space-based Automatic Dependent Surveillance–Broadcast (SB ADS-B) planned for March 2019. The ANSPs providing services in the Gander and Shanwick OCAs, NAV CANADA and NATS, have begun coordinating on a common implementation strategy. Some of the prospective features for SB ADS-B include:

a) flights would continue to be planned and cleared on conflict free flight profiles from oceanic entry to exit between the Gander and Shanwick OCAs;

b) Surveillance-enabled longitudinal separation between a pair of ADS-B equipped aircraft would be applied if both flights have active CPDLC connections with the appropriate ATS unit(s);

c) the application surveillance-enabled separation could be used to permit one ADS-B equipped aircraft to climb or descend to or through the level of another ADS-B equipped aircraft;

d) surveillance separation could be applied between same direction aircraft only while they were operating on the same exact track;

e) surveillance separation could be applied between opposite direction ADS-B equipped aircraft provided that they have both passed a common point.

f) the application of surveillance separation could be tactically initiated between ADS-B equipped aircraft pairs operating on the same exact non-NAT OTS track.

Conclusion

The NAT Region continues to make progress toward achieving its safety targets, although LHDs and vertical risk continue to be of specific concern. At the same time, the Region also continues to conduct the safety analyses and operational trials necessary to introduce new technologies and procedures intended to increase the efficiency of the busy oceanic airspace.

Appendix A

ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
ANS	Air Navigation Service
ATC	Air Traffic Control
ATS	Air Traffic Service
CPDLC	Controller-pilot data link communications (data link)
DLM	Data Link Mandate
EFFG	Economic, Financial and Forecast Group
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
LD LHD	Long Duration LHD
LHD	Large Height Deviation
MNPS	Minimum Navigation Performance Specification
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
RVSM	Reduced Vertical Separation Minimum
SLOP	Strategic Lateral Offset Procedure
TLS	Target Level of Safety

APPENDIX G — NAT TRAFFIC AND FLEET FORECAST

(paragraph 4.2.4 refers)

NAT TRAFFIC DEMAND FORECAST METHODOLOGY AND PROJECTION 2017-2037

1. INTRODUCTION

1.1 BACKGROUND ON NORTH ATLANTIC FORECAST

In the past, the NAT traffic forecast was unconstrained and driven by economic variables and forecasts. The results of the unconstrained forecast produced a traffic growth forecast that was unbounded, while most major European airports and a few U.S. international airports have slots or scheduling limits. In addition, the ten different route group forecasts did not provide explicit forecasts for the seven Flight Information Regions (FIR) in the North Atlantic. Also noteworthy, the forecast only had a two-year update cycle and did not capture variations in the business cycles. To address these issues with the NAT traffic forecast, the new forecast methodology recognizes that the number of air carrier operations over the next several years has already been determined by air carrier fleet planning. Any carrier's key strategic activity involves projecting the expected demand for travel in different markets in both the geographical and consumer sense, determining which of those identified markets the carrier will attempt to serve, and what type of aircraft fleet it will use to serve those markets. Air carriers then match the identified markets opportunities to their existing capacity, enter into binding agreements to either acquire the needed aircraft and crew, or enter into contractual agreements through joint ventures with partner airlines. These agreements typically cannot be discharged absent bankruptcy or some other force majeure event.

The previous forecasting methodology relied on economic models of passenger demand, aircraft gauge, load factors, etc. In contrast, this new forecast methodology relies on the decisions already made by the air carriers of how the markets should be served. In addition, most economic forecasting methodologies rely on generic fleet assumptions, which do not reflect the various business models that different carriers may be pursuing. The new methodology reflects airline business models, as they are the foundation for the fleet plans developed by the individual carriers. A key limitation of this approach, however, is how far in advance airlines plan their fleets. Therefore, the projection is segmented at the five-year forecast horizon. Beyond five years, a macroeconomic-based forecast is used. The macroeconomic forecast is a composite of forecasts from different sources including ICAO, Boeing and Airbus, defining low, medium and high growth forecasts beyond the five-year point.

1.2 SUBJECT

The NAT forecast methodology is implemented in two phases:

- Phase 1 – The near-term forecast (first five years) is based on detailed projections for individual carriers, each of which is based on publicly available information about their individual fleet and network plans. Sources include public announcements (press releases and investment community presentations and discussions), official financial statements, and news reports. The current collection of 44 individual carriers includes only scheduled commercial passenger airlines and makes up about 80 percent of the total NAT scheduled traffic. The selected 44 carriers include the largest operators, fastest growing carriers, low-cost carriers (LCC) and other carriers of special interest, like the group of Middle East carriers. The remainder of the traffic is assumed to remain constant and categorized as "other". In a previous release of the forecast, the total count of specifically analysed carriers was 45. Thompson Air is now excluded because of irregular reporting due to it flying scheduled and unscheduled charter flights. However, Thompson Air scheduled flights are included in the "other" category
- Phase 2 – the long-term forecast uses the end of the near-term forecast as its starting point and uses a macroeconomic forecast to determine low, baseline, and high growth rates. The macroeconomic

forecast is a composite of forecasts from different sources including IATA, ICAO (FESG CAEP), Boeing and Airbus, defining low, medium and high growth forecasts beyond the five-year point.

1.3 PURPOSE

The purpose of this forecast is to help the North Atlantic Air Navigation Service Providers (ANSP) and other stakeholders develop traffic growth expectations for the NAT. This is particularly important for the ANSPs because they use the traffic forecast to set rates or route charges and staffing requirements. In addition, this forecast will help support analysis related to NAT region operational requirements and mandates.

2. METHODS AND ASSUMPTIONS

2.1 SCOPE

Geographic Scope

As described in the Summary of Discussions of the North Atlantic Economic, Financial and Forecast Group Traffic Forecast Workshop (Lisbon, Portugal, 25 February to 26 February 2016), this work currently addresses the forecast requirements for seven of the north Atlantic flight information regions (FIR), Shanwick, Gander, Santa Maria, New York, Reykjavik, Bodo, and Sondrestrom (Figure 1).

Figure 1: North Atlantic Flight Information Regions

Carriers Identified for Individual Analysis

For the purpose of the analysis, the following individual carriers were identified of particular interest:

Table 1: Select airlines for which individual NAT forecasts are developed.

Delta Airlines	**Ryan Air**	**TAP Portugal**
United Airlines	**Turkish Air**	**Avianca**
American Airlines	**Air Berlin**	**Aeroflot**
British Airways	**Scandinavian Airlines**	**Polish Airlines**
Icelandair*	**Swiss Air**	**EasyJet**
Air Canada*	~~**Thompson**~~	**SATA International**
Lufthansa	**Thomas Cook Airlines**	**Air India**
Air France	**Condor**	**Royal Air Maroc**
Virgin Atlantic	**Norwegian Air***	**Air Greenland**
KLM	**Alitalia**	**Qatar Airways**
Aer Lingus	**Air Europa**	**Finnair**
Air Transat	**Jet2**	**Atlantic Airways**
Iberia Airlines	**Etihad Air**	**TAM Airlines**
United Emirates	**WestJet**	**jetBlue**
WOW Air	**Air Caraibes**	**Southwest Airlines**
***Air Canada is combined with Rouge; Icelandair is combined with Air Iceland; Norwegian Air is a combination of Norwegian Air Shuttle and Norwegian Air International** **^Thompson Air removed from the list of carriers whose fleet plans were analyzed in detail**		

These carriers have been identified as being in one or more of the following categories: Middle East, LCC, fastest growing, large legacy, or are of particular interest to at least one ANSP. To support the NAT forecast, individual NAT forecasts are developed for each of these carriers, which represent more than 80 percent of the total scheduled NAT air traffic. The remaining 20 percent of the scheduled NAT air traffic is made up of flights operated by smaller carriers.

2.2 DATA SOURCES

Scheduled data

To develop a baseline for the analysis, scheduled flight data is acquired from FlightGlobal/INNOVATA for one week in each year. The representative week was selected to be from July 15 to July 21 for 2013 – 2017. The scheduled data is processed through a trajectory model to extract only city-pairs with flights that would traverse through NAT airspace based on a great circle distance flight path. This assures that all flights that flew through the NAT are counted regardless of wind variations and other unpredictable factors. Generating a baseline through this method allows consistency between successive forecasts.

ANSP provided historic data

To determine the traffic within individual FIRs, each of the participating ANSPs have provided actual flown data for air traffic that traversed their particular NAT FIR for the same week the schedule data covered. The following table lists the participating NAT FIRs that are currently included in the forecast and the ANSPs that support them:

Table 2: FIRs and corresponding ANSP

FIR	ANSP
Gander	Nav Canada
New York	FAA
Reykjavik	Isavia
Santa Maria	NAV Portugal
Shanwick	IAA and NATS
Bodo	Avinor
Sondrestrom	Isavia

Eurocontrol also provided flight data for various FIRs, which was extremely useful for crosschecking between data sets. The data sets provided by the ANSPs included the following fields for each of their respective FIRs for the historic data for the representative week for each year including 2013 - 2017:

Table 3: Historic Data Fields

Year: 2013 - 2017	ANSP Name
FIR Name	Flight Call Sign
Carrier three letter ICAO code	Aircraft type (later standardized across reported data sets)
Tail Number	Flight type: Passenger, Cargo, Private
Departure Date (Z)	Departure time (Z)
Departure Airport	Departure Country
Arrival Airport	Arrival Country
Arrival Date (Z)	Arrival Time (Z)
Carrier Name	

Flight data was not specifically provided for Sondrestrom FIR, however, scheduled flights were identified as flying through the FIR by computing the great circle distance of city-pairs.

Fleet Data

Fleet data and fleet plan information was collected from various public sources, including individual carrier web sites, financial reports, manufacturer order books, and crowd source websites like planespotters.net

Forecasts for Categories of Special Interest

The FAA commissioned two separate studies to support forecasts for two categories of carriers of special interest. The two categories are LCCs that are flying or are expected to begin flying transatlantic operations, and the Middle East carriers. For each of these two cases, GRA Incorporated, a strategic and economic consulting firm with expertise in the global aviation industry, provided a comprehensive analysis. Their forecasts are incorporated in this work and a copy of their work is attached as a separate file.

2.3 KEY ASSUMPTIONS

The forecast is based on a few key assumptions. First, this methodology assumes that airline fleet plans are relatively fixed for the near future, out to approximately five years. This assumption is based on the observation that airlines are bound by contractual obligations from which they can be released only under special circumstances, like bankruptcy or by mutual agreement with the other parties. These contracts include aircraft purchase and lease agreements, and capacity purchase agreements with regional carriers. There are both upside and downside risks to this assumption. On the downside, carriers may reject these agreements in bankruptcy, as has happened with most of the major U.S. carriers in the past decade. On the upside, carriers have the ability to opportunistically acquire aircraft when demand warrants. In practice, relatively few aircraft have been removed during the industry's recent bankruptcies, while the upside risk often involves transferring assets between carriers, rather than adding new aircraft to the system. (The transfer of Boeing 717s from Southwest to Delta is an example of the latter effect [Mutzabaugh, 2013b].)

A second key assumption is that the mission profile for a particular aircraft type does not change over time. For example, in 2015 Air France's 747s had an average stage length of 7,000 kilometres and utilization of 12 departures per week. The forecast methodology assumes that the mission profile of a particular aircraft type will continue to be the same through the next five years. In general, all aircraft in the forecast are considered to be trans-oceanic capable; however, some aircraft types have shorter ranges than others. For example, the single aisle aircraft, such as the A321 neo, generally have relatively shorter range than the twin aisle aircraft. Therefore, the single aisle aircraft are expected to be deployed on routes that connect points relatively near the coastline on opposite sides of the Atlantic, while the longer-range capable aircraft do not have this restriction. A related assumption is that if a new aircraft type is added to a carrier's fleet, this type will have a similar mission profile as comparable existing aircraft, unless the carrier specifies a strategic purpose for the new aircraft type. For example, Delta's new A350-900s are assumed to have approximately the same mission profile as the 777s which Delta has had in its fleet for many previous years.

A third assumption is that the forecast beyond five years is not dependent on a detailed fleet forecast. The fleet assumptions apply primarily to the first five years of the forecast. Because carrier fleet plans become far less firm beyond the first five years, a higher-level macroeconomic approach is used for year six and beyond.

3. METHODOLOGY FOR NEAR-TERM NAT FORECAST

Once the carriers' fleet plans are determined for the select set of carriers, the mission profiles for each aircraft type are used to calculate the number of weekly transatlantic flights that are planned for the each aircraft in that fleet. In this analysis, we call the weekly transatlantic flight count the carrier's utilization rate for that fleet type. The utilization rate tells how many times a single aircraft of this fleet type for a particular carrier will fly a transatlantic mission. The purpose of the utilization rate is to recognize that carriers can assign aircraft to multiple missions, and count only the operations that traverse the North Atlantic. The utilization rates are based on each carrier's historic operational trends as determined by matching fleet data with the published flight schedules.

The utilization rates are applied to the carrier future fleet plans to project the total number of North Atlantic operations for each carrier. If additional carrier specific information is available, the utilization rates can be manually adjusted to better reflect those strategic plans (e.g., if a carrier announces a new strategy for its current or future fleet). This provides a standardized way to project North Atlantic activity for each carrier by fleet. The product of the fleet counts and utilization rates gives the total number of flights.

Once the total number of NAT flights for each carrier is determined, the next step is to distribute them among the carrier's NAT network. This is done manually by first selecting the top 25 city-pairs operated by each NAT carrier. The remaining city-pairs are grouped into the "Other" category. This approach focuses on the routes responsible for most of the traffic in the NAT. New routes, not yet in operation, are also added for select carriers such as Norwegian Air whose trans-Atlantic operations are anticipated to grow. Through the use of historical trend analysis and information from public announcements by the carriers, flights are added (or removed) to (from) the baseline year as a total number of flights or a percentage of the base year. A process flow of the methodology is shown in Figure 2.

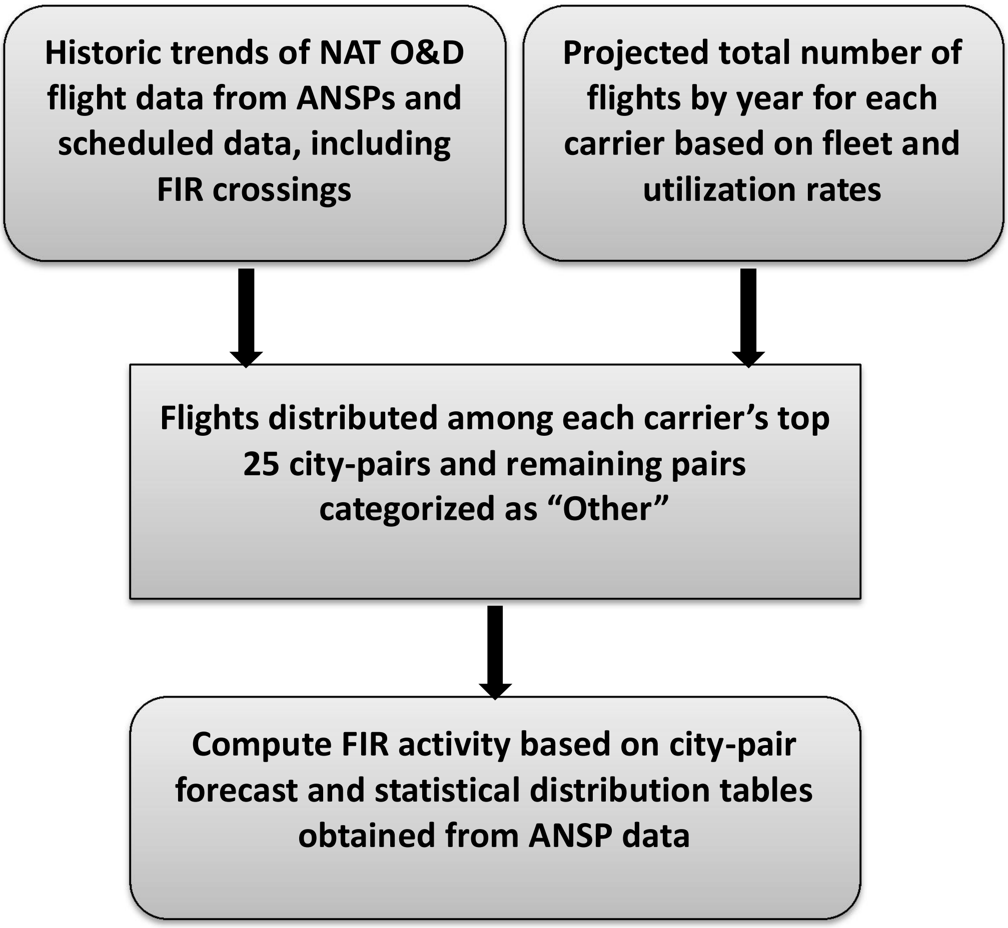


Figure 2: NAT Near-Term Forecast Process Diagram

To complete the near-term forecast, the baseline level of activity for all other carriers is added to the projection for the select set of carriers developed using the fleet and market analysis described above. These flights make up the remaining 20 percent of the total number of scheduled NAT flights. If a particular carrier in this group becomes of interest, it can be removed from the general group and incorporated into the group of carriers with individual forecast without disrupting the continuity of successive forecasts. Unscheduled flights are not included because their irregularity would introduce an increased level of uncertainty to the forecast. Such irregular flights include helicopters, charter flights, cargo, and military flights. We recognize cargo is an important part of NAT activity but primarily in terms of tonnage because total cargo flights do not contribute significantly to overall NAT traffic.

4. NEAR-TERM FORECAST RESULTS

1. The final forecast results show 20.9 percent growth in the number of NAT flights between 2017 and 2022. Table 4 below shows the baseline data for 2017 according to published schedules with the projected number of flights for 2022. The far right column is the carrier's rank based on the number of flights added to the system.

Table 4: Preliminary NAT Five-Year Forecast by Carrier

			HISTORICAL					FORECAST					
Row #	Carrier Name	Carrier	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Rank Order by Growth
1	Delta Airlines	DAL	1,081	1,079	1,160	1,192	1,222	1,231	1,272	1,333	1,368	1,393	4
2	United Airlines	UAL	1,060	1,073	1,126	1,124	1,092	1,093	1,095	1,122	1,160	1,225	6
3	American Airlines	AAL	882	940	924	910	910	921	930	940	957	1,017	8
4	British Airways	BAW	842	880	870	878	880	918	919	917	917	930	18
5	Icelandair	ICE	452	522	582	734	780	852	888	936	960	972	2
6	Air Canada	ACA	436	479	554	648	696	753	741	742	730	732	23
7	Lufthansa	DLH	597	604	608	630	635	626	657	647	656	656	30
8	Air France	AFR	534	540	540	544	554	575	611	625	660	660	9
9	WOW Air	WOW	0	108	146	234	368	416	509	533	556	556	3
10	Virgin Atlantic	VIR	304	306	366	368	364	396	418	445	454	454	10
11	KLM	KLM	308	320	326	336	344	361	395	427	433	433	11
12	Aer Lingus	EIN	198	234	268	295	334	398	372	379	379	379	21
13	Air Transat	TSC	272	271	270	276	290	312	312	312	312	312	29
14	Iberia Airlines	IBE	216	232	252	271	282	283	317	317	366	365	13
15	Ryan Air	RYR	170	214	214	226	274	231	237	272	355	355	14
16	Norwegian Air	NAX	18	92	100	134	268	381	511	662	792	962	1
17	United Emirates	UAE	120	155	208	254	228	240	263	309	352	352	7
18	Air Berlin	BER	132	134	140	178	208	0	0	0	0	0	44
19	Turkish Air	THY	106	130	146	198	188	191	191	191	191	191	37
20	Scandinavian Airlines	SAS	118	126	142	176	188	190	195	179	184	181	43
21	Thomas Cook Airlines	TCX	76	80	95	153	167	167	167	167	167	167	39
22	Swiss Air	SWR	148	150	162	176	162	178	177	176	176	176	32
23	Condor	CFG	108	116	132	138	160	160	160	160	160	160	39
24	Alitalia	AZA	132	122	126	132	144	144	144	144	144	144	39
25	Air Europa	AEA	94	94	104	118	142	150	166	166	228	228	12
26	Jet2	EXS	50	80	78	104	114	121	146	155	164	174	16
27	Etihad Air	ETD	48	76	96	102	106	83	102	121	154	154	19
28	Air Caraibes	FWI	64	62	64	76	90	90	90	120	120	120	24
29	WestJet	WJA	0	14	28	84	84	82	118	138	167	226	5
30	Avianca	AVA	50	54	70	70	84	101	109	118	134	134	17
31	TAP Portugal	TAP	42	58	50	72	82	81	96	101	111	111	26
32	Aeroflot	AFL	74	72	62	66	82	84	94	100	110	110	27
33	Polish Airlines	LOT	60	60	60	64	78	90	94	122	150	150	15
34	SATA International	RZO	44	52	48	50	67	67	77	82	97	97	24
35	EasyJet	EZY	36	46	66	64	62	62	80	96	109	109	20
37	Air India	AIC	42	42	42	42	51	57	69	69	71	71	31
36	Royal Air Maroc	RAM	26	38	32	40	48	48	56	64	68	76	27
38	Finnair	FIN	28	20	26	30	40	48	49	52	52	52	34
39	Air Greenland	GRL	34	32	28	32	36	39	39	39	39	39	38
40	Qatar Airways	QTR	74	110	118	30	34	34	34	67	75	79	22
41	Atlantic Airways	FLI	12	18	16	24	24	24	24	24	24	24	39
42	TAM Airlines	TAM	20	18	14	14	18	21	26	27	28	28	35
43	Southwest Airlines	SWA	0	0	0	0	0	0	0	0	13	13	33
44	jetBlue	JBU	0	0	0	0	0	0	0	0	6	6	36
45	Scheduled Others	Oth	1,278	1,159	1,104	1,395	1,540	1,567	1,567	1,567	1,567	1,567	
	Total		10,386	11,012	11,563	12,682	13,520	13,866	14,515	15,162	15,916	16,341	
	Yr-Yr %Change			6.0%	5.0%	9.7%	6.6%	2.6%	4.7%	4.5%	5.0%	2.7%	
	5-Year %Change		20.9% Total 5-Yr Growth										
	5-year Yr-Yr %Change		3.9% Avg Yr-Yr Growth										

Figure 3 shows FIR peak-week traffic trends by FIR. Traffic volumes at Gander and Shanwick are at similarly high levels compared to the traffic volumes at the other FIRs. This is intuitively consistent, since some of the highest frequency NAT markets pass through these two FIRs, including most of the traffic between North America and Western Europe, including the highest frequency market John F. Kennedy Airport (JFK)-London Heathrow (LHR).

Note that the total forecast for the NAT does not equal to the sum of the forecasts of each the individual FIRs. Because of the way the North Atlantic is partitioned into FIRs, most NAT flights traverse more than a single FIR. Summing the flights from all FIRs would result in counting single flights more than once. The total NAT forecast is determined by summing the market-level forecasts for each year.

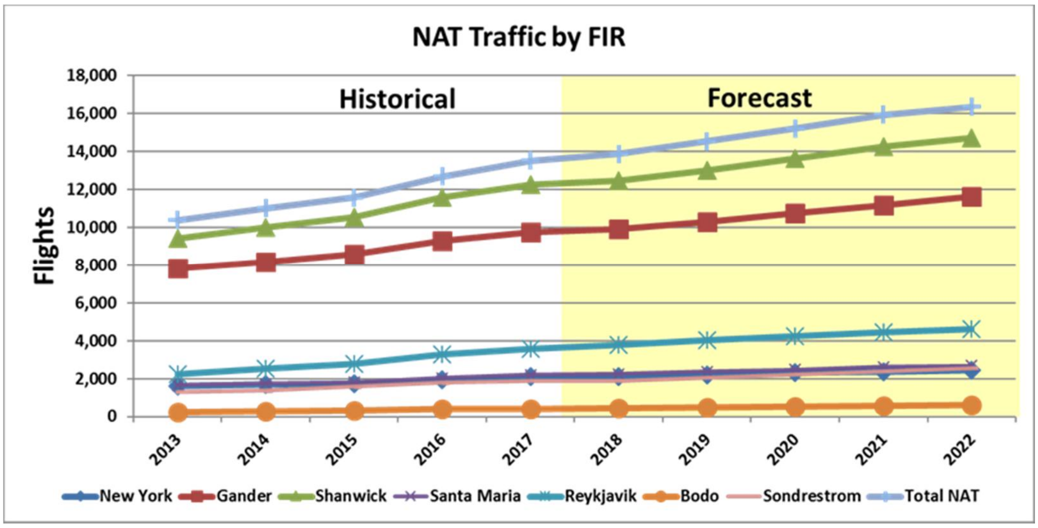


Figure 3: NAT Peak Week Traffic Trends by FIR

Table 5: Preliminary NAT Five-Year Forecast by Carrier and FIR

Average Yearly Growth Rates by FIR		
FIR	2013 – 2017 (actual growth rate)	5-Yr Projected
New York	7.1%	2.9%
Gander	5.6%	3.6%
Shanwick	6.8%	3.7%
Santa Maria	7.6%	3.9%
Reykjavik	12.4%	5.1%
Bodo	13.4%	7.4%
Sondrestrom	9.9%	6.2%
Total NAT	6.8%	3.9%

Table 5 lists the annual historic growth rate from 2013 to 2017 along with the five-year (2017-2022) average annual forecast growth rates. The growth rates in the forecast are supported by the publicly accessible fleet information for 44 identified carriers. Note that while the percentage growth rates for Shanwick and Gander are lower than for some other NAT FIRs, Shanwick and Gander total traffic is by far larger than the other FIRs. The percentage growth rates for Reykjavik, Bodo, and Sondrestrom are higher, although over a lower base.

More detailed and complete forecast results are posted at ICAO's secure portal (**https://portal.icao.int/NATEFFG**).

5. METHODOLOGY FOR LONG-TERM NAT FORECAST

Once the near-term forecast is established, the long-term forecast (beyond the first 5 years) is based on the long-term forecast beyond 2022 is expected to be in the range of 1.94 percent to 3.3 percent, consistent with the combined passenger traffic growth rate forecast from an updated IATA forecast, a 2017 ICAO working paper, Airbus forecast, and Boeing forecast.

Since there is less certainty in the long-term forecast, the long-term forecast is not expanded to the detailed market and carrier levels as in the near-term forecast. Instead, the long-term forecast growth rates are applied to the end points of the aggregate traffic numbers at the FIR level to determine the FIR long-term growth projections beyond the short-term forecast.

Table 6: Long-term North Atlantic Passenger Growth Forecasts (*Assembly 39th session-economic commission working paper)

Sources	CAGR from 2017 to 2036	CAGR from 2012 to 2032	CAGR from 2012 to 2042	CAGR from 2022 to 2036
IATA				1.94%
Boeing	2.9%			
Airbus	2.9%			
ICAO High*		3.3%	3.3%	
ICAO Central*		3.1%	2.9%	
ICAO Low*		2.8%	2.7%	

Table 7: Summary of North Atlantic Passenger Growth Forecasts

Summary of Long-Range (2022-2037) North Atlantic Passenger Growth Forecast	
High	3.30%
Central	2.90%
Low	1.94%

Tables 6 and 7 provide long-term passenger growth forecasts. Table 6 shows specific forecasts by source and their respective forecast periods. Table 7 summarizes the results from Table 6 to provide High, Central and Low growth rate forecasts, which correspond to the maximum, median, and minimum growth rates presented in Table 6, respectively.

The forecasts in Table 6 do not all reference the same base year, nor do they all reference the same end-point to define their growth forecasts; however, since these forecasts project far into the future (referencing 2010 to 2020 as a starting point and 2030 to 2035 as the end-point), we consider these growth rates to be comparable.

The long-term forecast branches into high, central and low forecasts from the end of the near-term forecast, based on the high, central and low forecasts shown in the long-range growth summary table. The long-range forecast is presented as a range to reflect the increased uncertainty of the forecast as it looks farther into the future. In addition, because the fleet plans beyond five years are less developed, it is reasonable to treat passenger and flight count growth rates interchangeably.

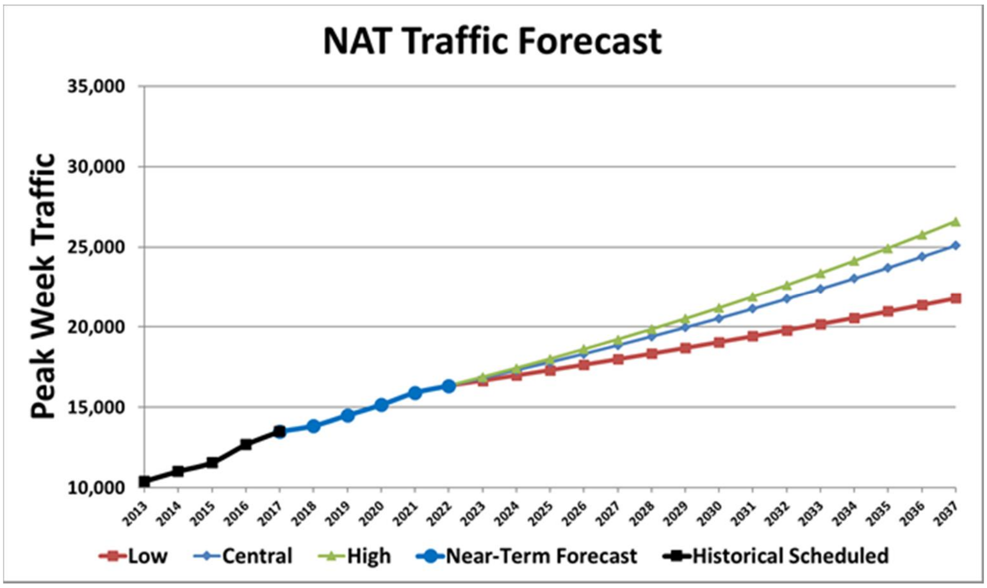


Figure 4: NAT Peak Week Traffic Forecast

When the near-term forecast is combined with the long-term forecast as shown in Figure 4, the average annual growth rate for the entire period ranges from 2.4 percent at the low end, 3.4 percent at the high end and forecast 3.1 percent as the central forecast.

7. CONCLUSIONS

7.1 Near-Term Forecast

Total NAT operations are expected to grow at an average annual rate of 3.9 percent between 2017 and 2022.

Gander and Shanwick, the busiest FIRs, are expected to continue to grow at a rate of 3.6 percent and 3.7 percent annually. These FIRs manage the heavily travelled North Atlantic Organised Track System (NAT-OTS) between North America and Europe. Shanwick has slightly higher activity than Gander due to more intra-FIR traffic with flights between the UK, Iceland, and the rest of Europe.

Traffic through the New York FIR is expected to grow 2.9 percent due to aggressive growth plans from the Middle East carriers, as well as Norwegian Air, Air Europa, and jetBlue. Note that while the percentage growth rate in this region appears to be high, it is being applied to a relatively small base.

Santa Maria will also see a significant growth of 3.9% primarily due to Air Europa which has a large order book for Boeing 788s and 789s. The higher percentage growth rate is being applied to a relatively small base.

Reykjavik is expected to grow significantly at a rate of 5.1% due to Icelandair, Norwegian Air, and WOW. Bodo is expected to grow by 7.4% which is primarily driven by these same three carriers.

Finally, Sondrestrom is expected to grow by 6.2% which is primarily driven by Russian carrier Aeroflot, Westjet, WOW, and Icelandair.

LCCs such as Westjet, WOW, Norwegian Air, and Air Canada's Rouge will add significant growth in the North Atlantic.

Large order books by Middle East carriers Etihad, Qatar, Emirates, and Turkish Air will contribute to FIR traffic growth.

NAT traffic volumes by legacy carriers such as American, Delta, Air France, and British Airways are expected to remain relatively stable.

7.2 Long-Term Forecast

The long-term forecast, which provides a range of expected growth rates for the NAT beyond 2022, is appended to the near-term forecast. The long-term average annual growth rate forecast ranges from 1.94 percent to 3.3 percent, with 2.9 percent as the central forecast. Combining the near-term forecast with the long-term forecast, the average annual growth rate for the entire period ranges from 2.4 percent at the low end, 3.4 percent at the high end. The central forecast projects a 3.1 percent average annual air traffic growth rate in the NAT for 2017 to 2037.

8. CURRENT ISSUES AND RISKS TO FORECAST

Delivery and Retirements Assumptions

While the current forecast may seem aggressive relative to the historical trends, it is a reflection of the aircraft delivery and retirement assumptions. These assumptions may be too optimistic or not aggressive enough, respectively, particularly for year five (2022). This forecast effort will continue reviewing aircraft delivery orders and expected retirements.

Structural Changes

Structural changes can cause significant changes in trends over time. Middle East carriers and LCCs are anticipated to grow aggressively. In addition, fuel price volatility can significantly affect carriers' plans and strategies. Carriers may also go out of business such as Air Berlin, which has already ended operations past 2018, and Alitalia may possibly be next.

Middle East Carriers

Middle East carriers have a very large order book but the identity of new markets is not certain. A conservative estimate of future operations is projected although the Middle East carrier order books indicate potential for greater growth.

Legacy Carriers

Current market level forecast method allows only aircraft that already serve a market to continue to serve it in the future. Legacy carrier aircraft are not assigned new markets because we don't have information on where specific aircraft will be deployed in the future.

Forecast Differences among Carriers

The legacy carrier forecast is a top-down forecast such that we use the total fleet forecast to determine how much traffic will fall into each of the FIRs and O/D routes. For the legacy carriers, growth of current markets is based on their future fleet inventory and their current ratios of utilization. However, an in-depth analysis was performed to identify new markets for the Middle East carriers and the LCCs.

9. FUTURE WORK

Future work on this project includes:

- Continually reviewing and refining the fleet forecast. Deliveries of new aircraft are continuing to refine the market-level forecasts
- Updating the forecast semi-annually

This forecast will continue to be updated and refined. Forecast updates are planned to be released semi-annually.

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APPENDIX H — NAT OPS BULLETIN – NAT COMMON DLM AIC (SERIAL NO: 2017_001_REVISION 03)

(paragraph 5.1.2 refers)

NAT OPS BULLETIN

Serial Number: **2017_001**_Revision 03[1] **Issued: 27 December 2017**

Subject: NAT common DLM AIC **Effective: 27 December 2017**

Originator: NAT SPG

The purpose of North Atlantic Operations Bulletin 2017_001_Revision 03 is to provide guidance to North Atlantic (NAT) operators to prepare them for Phase 2B of the North Atlantic Data Link Mandate (NAT DLM).

~~This Bulletin may be updated, as necessary, as progress is made toward the start date for **Phase 2b** of the NAT DLM.~~

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

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

[1] *This NAT OPS Bulletin supersedes Serial Number: 2017_001_Revision 02.*

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

NOTICE OF PLANNED EXPANSION OF MANDATE FOR DATA LINK SERVICES IN THE NORTH ATLANTIC REGION

Introduction

The first phase of the mandate for data link services in the North Atlantic (NAT) Region commenced on 7 February 2013. As of that date, all aircraft operating on or at any point along two specified tracks within the NAT organized track system (OTS) between flight level (FL) 360 to FL 390 (inclusive) during the OTS validity period are required to be fitted with, and using, controller-pilot data link communications (CPDLC) and Automated Dependent Surveillance–Contract (ADS-C) equipment.

As notified in State letter EUR/NAT 12-0003.TEC (dated 04 January 2012), Phase 2 of the mandate began on 5 February 2015.

Purpose of Circular

This common NAT Aeronautical Information Circular (AIC) outlines the plan for Phase 2 of the NAT Data Link Mandate (DLM). As detailed below, Phase 2 is planned to be implemented in three steps (2A, 2B and 2C), commencing on 5 February 2015, 7 December 2017 and 30 January 2020, respectively. This AIC also provides information on the expanded vertical and horizontal boundaries of NAT DLM airspace, policy for flight planning into NAT DLM airspace and NAT DLM operating policies.

Background

As concluded at the forty-ninth meeting of the North Atlantic Systems Planning Group (NAT SPG), the objectives of the NAT DLM are to enhance communication, surveillance and air traffic control (ATC) intervention capabilities in the NAT region, in order to reduce collision risk and enable the NAT target level of safety to be met, particularly in the vertical plane. ADS-C provides capabilities for conformance monitoring of aircraft adherence to cleared route and FL, thereby significantly enhancing safety in the NAT region. ADS-C also facilitates search and rescue operations and the capability to locate the site of an accident in oceanic airspace. CPDLC significantly enhances air/ground communication capability and therefore controller intervention capability.

The NAT SPG goals for the expansion of the NAT DLM to increase the level of aircraft data link system equipage, are in concert with the International Civil Aviation Organization (ICAO) Global Air Navigation Plan (GANP) (Doc 9750) Aviation System Block Upgrade (ASBU) Block 0, Module B0-TBO. This module calls for safety and efficiency improvements for enroute operations supported by data link. The NAT SPG objectives are that by 2018, 90% of aircraft operating in the NAT Region airspace at FL 290 and above will be equipped with Future Air Navigation Systems 1/A (FANS 1/A) ADS-C and CPDLC systems and that by 2020, 95% of aircraft operating in that airspace, will be so equipped.

Planned Vertical and Horizontal Boundaries for NAT Region DLM Airspace

- Phase 2A, commenced~~ing~~ 5 February 2015: FL 350 to FL 390 (inclusive) all tracks within the NAT OTS. This phase applies to all aircraft operating on or at any point along the tracks;

- Phase 2B, commenced~~ing~~ 7 December 2017: FL 350 to FL 390 (inclusive) throughout the ICAO NAT region;

- Phase 2C, commencing 30 January 2020: FL 290 and above throughout the ICAO NAT Region.

Airspace Not Included in NAT Region DLM Airspace

- Airspace north of 80° North (N). (Airspace north of 80°N lies outside the reliable service area of geostationary satellites);

- New York Oceanic East flight information region (FIR);

- ~~Air traffic services (~~Airspace where an ATS~~)~~ surveillance ~~airspace, i.e. airspace where surveillance~~ service is provided by means of radar, multilateration and/or ~~automatic dependent surveillance-broadcast (~~ADS-B~~) and~~, coupled with VHF voice communications ~~services are available,~~ as depicted in State Aeronautical Information Publications (AIP), provided ~~that~~ the aircraft ~~are~~ is suitably equipped ~~with~~ (transponder/ADS-B extended squitter transmitter);

- Specific areas as agreed through the NAT SPG and specified below:

a) the implementation of the NAT DLM Phase 2B goes ahead on 7 December 2017 except for non-DLM equipped aircraft that are allowed to operate on:

   i. T9 and T213 until solutions to provide ATS surveillance and VHF services (eventually moving T213 to the east in order to be fully covered) are implemented, after which time the NAT DLM would no longer be applicable in this airspace. This implementation will be achieved as early as possible but no later than 30 January 2020; and

   ii. T13, re-aligned T16 and T25 until 30 January 2020

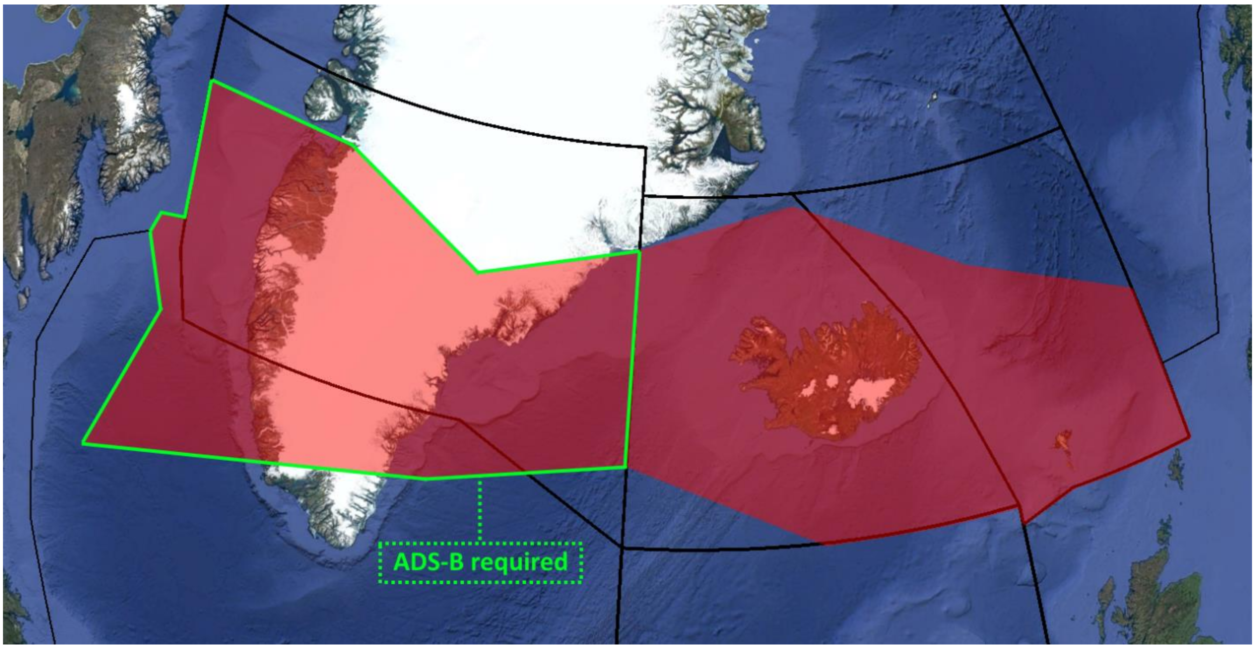
b) there will be no other changes to the applicability of Phase 2B and that the date of implementation of Phase 2C remains on 30 January 2020.

Note 1: the aircraft operators using Tango routes within the NAT DLM area of applicability will either complete their fleet upgrades by January 2020 or will not be allowed to operate in that volume of airspace.

Note 2: Whenever an Organised Track infringes Tango Route(s), the North Atlantic Data Link Mandate applies within the level band FL350 to FL390 inclusive, for that portion of the route infringed, during the Organised Track System times (i.e. 0100z to 0800z and 1130z to 1900z). This procedure, applied during the NAT DLM Phase 2A, will remain in force during the NAT DLM Phase 2B.

~~For planning purposes, a depiction and description of the estimated extent of ATS surveillance airspace considered to be exempt from the DLM in the NAT region on 25 January 2017 is depicted in the chart provided below.~~

CHART 1. GUIDANCE FOR TRANS-ATLANTIC FLIGHT PLANNING BY NON-DATALINK AIRCRAFT



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 - 62N040W - 61N050W – SAVRY

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/ADS-B extended squitter transmitter).

CHART 2. ESTIMATED EXTENT OF ATS SURVEILLANCE AIRSPACE IN THE NAT REGION

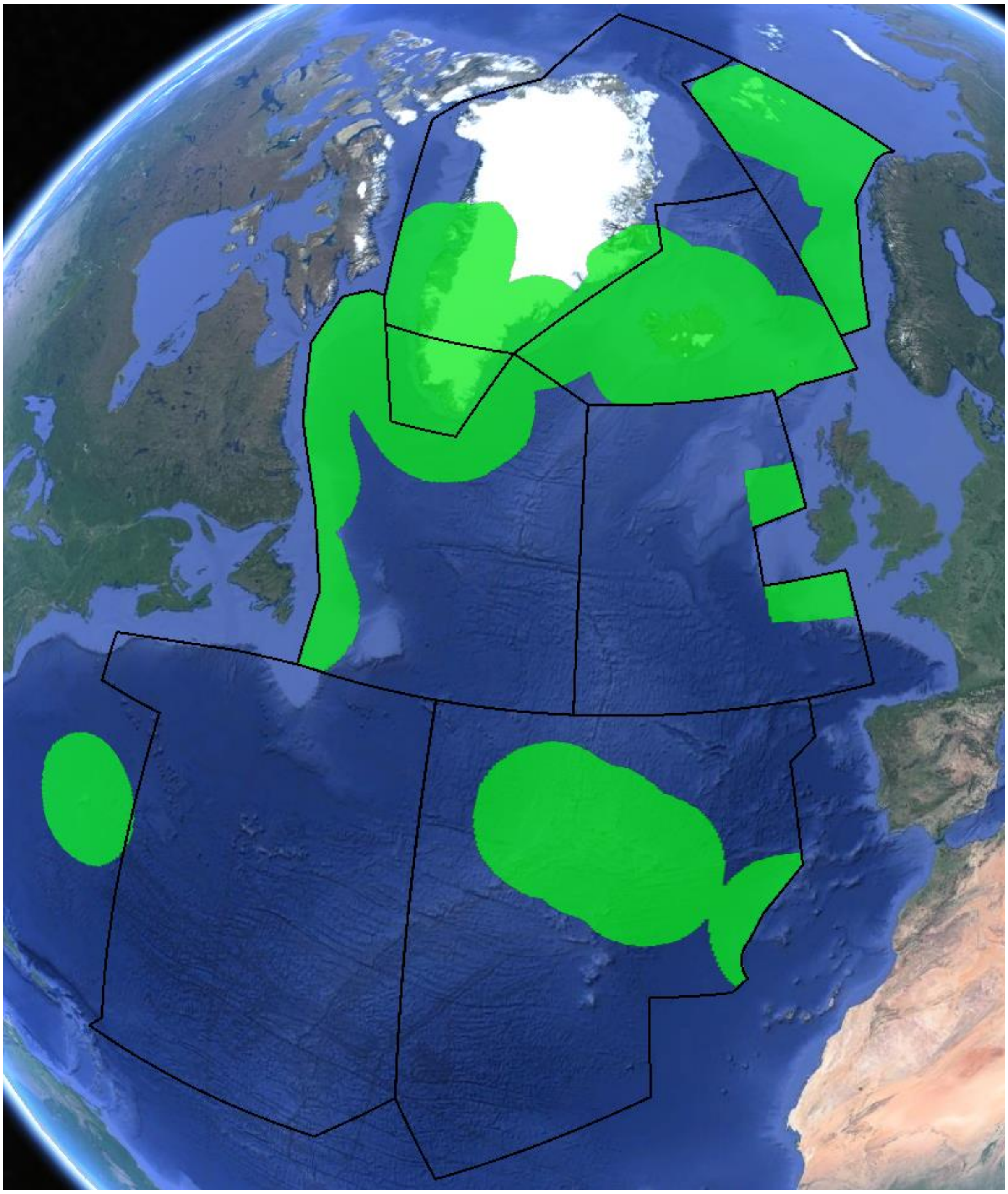
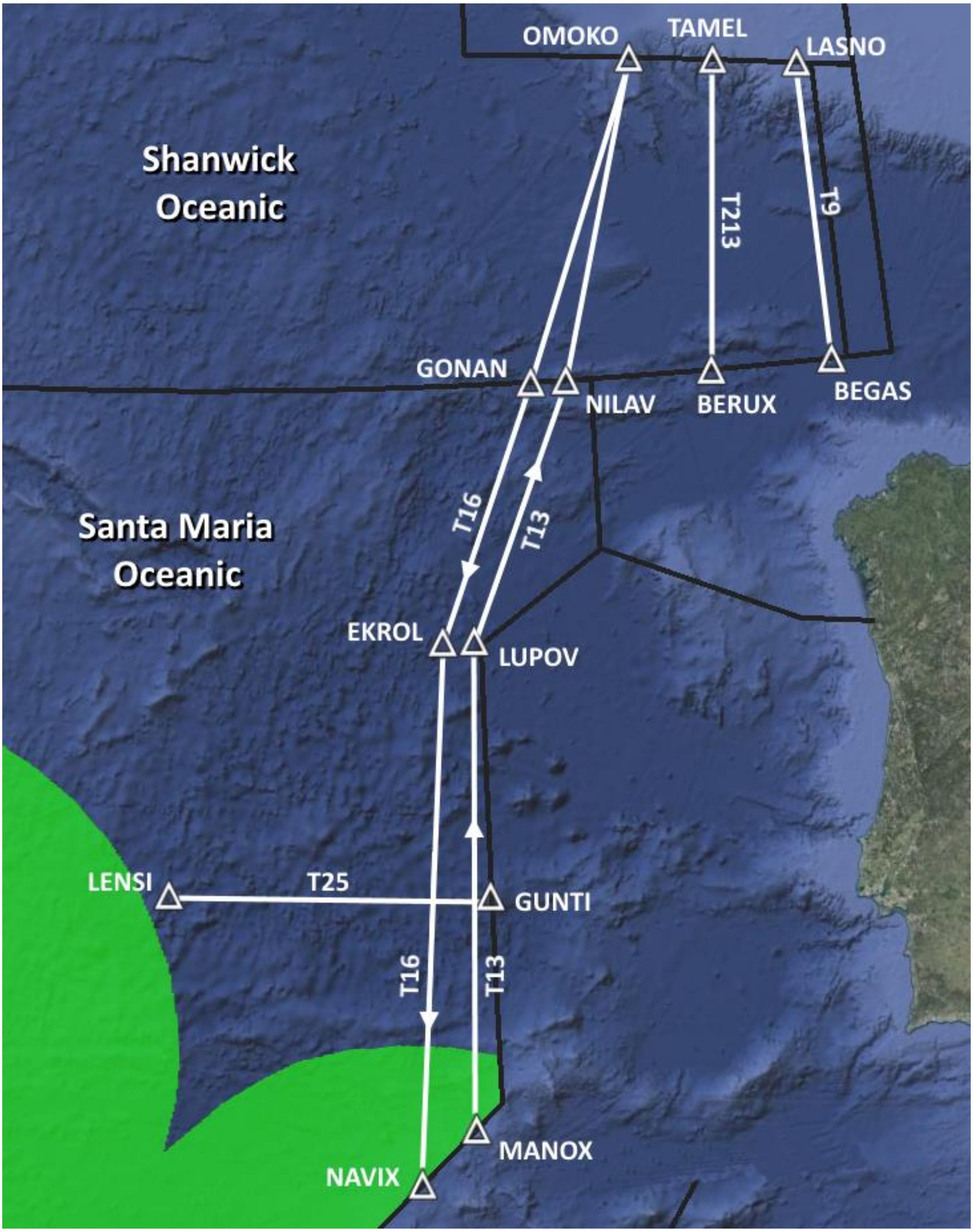


CHART 3. TANGO ROUTES IN THE NAT AIRSPACE WHERE DLM PHASE 2B WAS POSTPONED UNTIL 30 JANUARY 2020



Flights Allowed to Flight Plan into NAT Region DLM Airspace

The following flights will be permitted to flight plan to enter the NAT DLM airspace:

1. Flights equipped with and prepared to operate FANS 1/A (or equivalent) CPDLC and ADS-C data link systems. (NAT Regional Supplementary Procedures (ICAO Doc 7030) paragraphs 3.3.2 and 5.4.2 apply for CPDLC and ADS-C respectively); and

2. 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).

Operational Policies Applicable To NAT Region DLM Airspace

Any aircraft not equipped with FANS 1/A (or equivalent) systems may request to climb or descend through the NAT DLM airspace. Such requests, as outlined below, will be considered on a tactical basis. This provision will not be applicable after commencement of Phase 2C.

- Altitude reservation (ALTRV) requests will be considered on a case by case basis (as is done today regarding NAT minimum navigation performance specifications [MNPS] airspace), irrespective of the equipage status of the participating aircraft.

- 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.

- 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.

- 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.

European/North Atlantic (EUR/NAT) Interface Flight Planning

Where the NAT interfaces with the EUR data link implementation rule airspace, procedures will be established by the air navigation service providers (ANSP) concerned to facilitate the vertical transition of traffic to and from the NAT region DLM and the EUR data link implementation rule areas. The transition will be conducted as soon as is practicable by the initial EUR domestic area along the common FIR / upper flight information region (UIR) boundary bordering the NAT region DLM. The operator and the ANSP shall ensure that the vertical transition is complete prior to crossing any subsequent FIR/UIR boundary.

Further Information

For further Information, please contact icaoeurnat@paris.icao.int and consult AIPs of NAT provider-States.

- END –

APPENDIX I — NAT OPS BULLETIN – NAT DATA LINK SPECIAL EMPHASIS ITEMS

(paragraph 5.1.3 refers)

NAT OPS BULLETIN

Serial Number: 2017_004 Issued: Daymth2017
Subject: NAT Data Link Special Emphasis Items Effective: DayMth2017
Originator: NAT SPG

The purpose of North Atlantic Operations Bulletin 2017-004 is to provide background information and guidance material to North Atlantic (NAT) operators that could be included in pilot and dispatcher training programs and operations manuals to best prepare them for FANS 1/A (CPDLC/ADS-C) operations in the NAT.

Introduction

FANS data link is utilized in the NAT Region for communication via Controller Pilot Data Link Communication (CPDLC) and position reporting via Automatic Dependent Surveillance-Contract (ADS-C).

AIS publications of the NAT ATS Provider States should be consulted to determine the extent of current implementation in each of the NAT OCAs. Operational procedures to be used are specified in the **ICAO Doc 10037 Global Operational Data Link (GOLD) Manual**. These procedures are intended to facilitate the uniform application of Standards and Recommended Practices contained in:

- Annex 2 — Rules of the Air,
- Annex 10 — Aeronautical Telecommunications and
- Annex 11 — Air Traffic Services,
- The provisions in the Procedures for Air Navigation Services — Air Traffic Management (PANS ATM, Doc 4444) and, when applicable, the Regional Supplementary Procedures (Doc 7030).

Chapter 4 of the GOLD 'Flight Crew Procedures' is intended to assist operators in the development of appropriate procedures, documentation and training programs that ensure flight crews are knowledgeable in data link operations specific to aircraft type.

Chapter 4 is constructed as follows:

- General overview
- Differences between voice communications and CPDLC
- Logon procedures
- CPDLC messaging
- ADS-C contracts
- Non routine and emergency procedures.

This Bulletin may be updated, as necessary, as progress is made toward improved FANS 1/A (CPDLC/ADS-C) data link connectivity in the NAT region.

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

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NAT OPERATIONS BULLETIN – FANS 1/A (CPDLC/ADS-C) SPECIAL EMPHASIS ITEMS

1. Purpose of Bulletin – FANS 1/A (CPDLC/ADS-C) Special Emphasis Items.

1.1 The purpose of this bulletin is to provide background information and guidance material to North Atlantic (NAT) operators that could be included in pilot and dispatcher training programs and operations manuals to best prepare them for FANS 1/A (CPDLC/ADS-C) operations in the NAT.

1.2 With the increasing application of performance based separations within the NAT Region, it is important that FANS 1/A (CPDLC/ADS-C) data link operations ~~is~~ are functional so as to reduce impact and workload ~~to~~on both ATC and flight crews.

1.3 Operator attention is directed to Attachment A. which provides a "quick reference" for FANS 1/A (CPDLC/ADS-C) flight crew procedures. It is intended to be used as ~~a job~~ an aid for operators developing pilot training material.

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

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

2. FANS 1/A (CPDLC/ADS-C) Overview

2.1 Data link services, such as CPDLC and ADS-C, provide communications and position report information that are intended to support safer and more efficient air traffic management and increase capacity.

2.2 Controller Pilot Data Link Communications (CPDLC)

2.2.1 CPDLC significantly improves ATC intervention capabilities through enhanced communications ~~capabilities~~ which allows the exchange of uplink and downlink messages between an aircraft and an ATS U~~u~~nit.

2.2.2 An aircraft can have a maximum of two CPDLC connections established concurrently, each with a different ATS U~~u~~nit.

a) A~~n~~ ~~active Current Data Authority (CDA)~~CPDLC connection ~~can be~~ immediately becomes active when established ~~upon completion of the logon procedure~~ if **no** previous CPDLC connection exists ~~with the aircraft~~at that time. An active CPDLC connection allows an ATS Unit and the aircraft to exchange CPDLC messages. The ATS Unit with which an aircraft has an active CPDLC connection is referred to as the Current Data Authority (CDA).
b) An inactive connection Next Data Authority (NDA) ~~connection~~ can be established upon completion of the logon procedure if a previous CPDLC connection exists with the aircraft.

2.2.3 Under normal circumstances, the ATS Unit with the CDA connection will manage its CPDLC connections, including transferring and terminating the connection when no longer needed. CPDLC transfers will be initiated before the aircraft transits from the current ATS U~~u~~nit to another CPDLC-capable ATS Unit, and will terminate the connection as the aircraft leaves the ATS Unit's airspace. These ~~auto-~~transfers are automatic and should be seamless to the crew without any action required.

2.2.4 Should a datalink transfer fail to complete, the transferring ATS Unit will be alerted, which may result in ~~the transferring ATS Unit requesting that~~a request to the crew to disconnect CPDLC and to either perform a re-logon to recycle the transferring process, or to logon to the next ATS Unit.

2.2.5 It is imperative that equipped aircraft are logged on CPDLC/ADS-C prior to oceanic entry. This can be accomplished with an initial logon with a "domestic" FANS capable ATS Unit which then allows for an automatic transfer to the oceanic ATS Unit. If entering from an area where a data link connection has not been established, initiate the logon with the oceanic ATS Unit ~~no later than~~ between 15 and ~~20~~25 minutes prior to the boundary. Pilots should ensure the correct CPDLC identifier is populated for the "active ~~ATSU~~ center" [active ATC] (CDA)~~, and the NDA as well~~.

2.3 Automatic Dependent Surveillance-Contract (ADS-C)

2.3.1 ADS-C uses various systems on board the aircraft to automatically provide aircraft position, altitude, speed, intent and meteorological data, which can be sent in a report to an ATS U~~u~~nit or AOC facility ground system for surveillance and route conformance monitoring.

2.3.2 When the ATS ground system receives a logon request message, the Flight Data Processing System (FDPS) will automatically initiate ADS contracts with the aircraft. These contract requests are dealt with by the avionics systems and are transparent to the flight crew. The following contracts are typically formed and provide alerts to the controller;

a) Periodic contract with a typical interval of 10-14 minutes. Aircraft avionics will send an updated position report which will include level, time and NEXT and NEXT+1 waypoints inserted in the active flight plan.

b) Event contract for the following events:

- Waypoint change event (WCE). Waypoint change event will trigger an automatic position report (which will include level, time and NEXT and NEXT+1 waypoints) whenever the aircraft passes a waypoint contained within the active flight plan, or whenever a crew amends a waypoint that is either NEXT waypoint or NEXT+1 waypoint in the active flight plan.

- Lateral deviation event (LDE). Deviation contract that will trigger an automatic position report (which will include level, time and NEXT and NEXT+1 waypoints) whenever the aircraft deviates from the cleared route ~~by more than 5nm (or less)~~beyond Strategic Lateral Offset (SLOP) provisions.

- Level range deviation event (LRDE). Deviation contract that will trigger an automatic position report (which will include level, time and NEXT and NEXT+1 waypoints) whenever the aircraft deviates from the cleared level by 300ft or more.

- Vertical Rate Change Event (VRE). Deviation contract that will trigger an automatic position report (which will include level, time and NEXT and NEXT+1 waypoints) whenever the rate of descent exceeds 5000 feet per minute.

c) Demand contract which can be used by the controller to trigger an instantaneous position report by the aircraft avionics~~ for use during noted deviations and emergencies~~.

d) Emergency contract ADS-C also supports emergency alerting. An ADS-C emergency report is a periodic report that is tagged as an 'emergency' report, allowing the emergency situation to be highlighted to ATC.
~~*Note – there have been reported instances of inadvertent ADS-C emergencies being transmitted, should ATC request to confirm ADS-C emergency check for inadvertent activation.*~~

3. FANS 1/A (CPDLC/ADS-C) LOGON and Subsequent Transfers.

3.1 The logon is the first step in the data link process and is initiated either by the flight crew, or automatically following data link transfer from a previous ~~ANSP~~ATS Unit.~~,~~ Once the logon is ~~performed to establish~~ complete, the ATS Unit will request a CPDLC connection and/or ADS-C contracts, which should be automatically accepted by the aircraft.

3.2 Provisions concerning the establishment of FANS (CPDLC/ADS-C) connection are contained within Annex 10, Volume II, Chapter 8, 8.2.8 and ICAO Doc 4444, paragraph 14.2.

3.3 An initial logon request, ~~is needed~~ when the aircraft is south of 82° North, is required regardless of whether or not ATS surveillance services are being provided. CPDLC provides communication redundancy and controllers will in many cases use CPDLC for communication even though the pilot is maintaining a listening watch on the assigned Direct Controller Pilot Communication (DCPC) VHF frequency.

3.4 At and north of 82° North, data link services cannot be guaranteed for aircraft equipped with Inmarsat SATCOM due to limitations in satellite coverage. However, t~~T~~his does ~~however~~ not prevent flights from trying to establish~~ing~~ a data link connection. Such limitations do not apply to aircraft equipped with Iridium SATCOM.

Note: Data link services for Northbound flights that fly north of 82° North and are not equipped with Iridium SATCOM data link are terminated at 82° North.

3.5 If not already logged on prior to North Atlantic entry, pilots should initiate ~~The following are examples of when a flight would require an initial~~ a FANS 1/A (CPDLC/ADS-C) logon in the following circumstances;

a) Flights departing ~~from~~ airports in close proximity to the oceanic boundary that have not established a FANS logon with the ATS Unit prior to the oceanic ATS Unit.
b) Flights that will enter the NAT Region from an area where data link connections have not been established or maintained or,
c) When instructed to do so by ATC (i.e. following a failed data link transfer).

3.6 Pilots should enter the CPDLC/ADS-C 4 letter identifier located on the charted FIR boundary for the appropriate ATS Unit ensuring that the aircraft registration and flight number are correct.

3.7 Once the unique aircraft registration and flight number are correlated by the FDPS, the ~~ANSP~~ATS Unit will automatically establish the appropriate CPDLC connections and the ADS-C contracts.

3.8 Because of the necessity for the Oceanic ATS Units to ensure FANS data link capability, all flights equipped with and prepared to operate FANS 1/A (or equivalent) CPDLC and ADS-C data link systems ***must*** have either an established FANS 1/A (CPDLC/ADS-C) connection, or make an initial logon between 15 and 25 minutes prior to the oceanic boundary.

If no logon is detected by ATS Unit prior to the oceanic boundary, the air traffic controller will be alerted and a late revision to the oceanic clearance could occur.

3.9 Under normal circumstances following initial logon, data link operations ~~should be~~ are seamless. However, the data link communications network is complex and made up of a number of components which can result in unsuccessful operation. Whenever a connection or transfer issue is identified, the controlling ATS Unit will normally try a reset of the connection by requesting the logon ~~to by~~be re-cycled, even though the aircraft may be indicating that the connection is working normally.

3.10 Despite indications in the cockpit ~~that may indicate~~ of the correct active centre (CDA) ~~established~~, ATC may issue an instruction to "DISCONNECT CPDLC AND LOG ON TO [ATSU]." It is vitally important to act on this instruction to ensure that the current flight profile ~~of the flight~~ can be maintained.

4. Operator/Aircraft Eligibility.

4.1 Operators should ensure that all flights filed to operate in Data Link Mandate (DLM) airspace are:

a) Equipped with and prepared to operate FANS 1/A (or equivalent) CPDLC and ADS-C datalink systems. (NAT Regional Supplementary Procedures (ICAO Doc 7030) paragraphs 3.3.2 and 5.4.2 for CPDLC and ADS-C respectively.)

5. Flight Planning Provisions

5.1 Operators must file the correct ICAO Flight Plan annotations in Items 10 and 18 to indicate that FANS 1/A (CPDLC/ADS-C) required are operational for the flight;

a) Item 10a (Radio communication, navigation and approach aid equipment and capabilities).
- Insert "J2" to indicate FANS 1/A (or equivalent) CPDLC HFDL and/or "J5" to indicate FANS 1/A (or equivalent) Inmarsat CPDLC SATCOM and/or "J7" to indicate FANS 1/A (or equivalent) CPDLC Iridium SATCOM data link equipage and operation;

b) Item 10b (Surveillance equipment and capabilities)
- Insert "D1" to indicate FANS 1/A (or equivalent) ADS-C equipage and operation.

Note: Although J2, J5 or J7 meet the eligibility requirements for NAT DLM airspace, some ATS Units will only initiate CPDLC connections if a flight has filed J5 or J7.

6. Additional Requirements

6.1 Since SATCOM is required in oceanic airspace to maintain data link connectivity, pilots should ensure that SATCOM is functional prior to oceanic entry.

6.2 Even though a CPDLC connection ~~is~~may be active, flight crews are responsible for responding to SATVOICE calls, ~~and~~ conducting ~~an~~ HF SELCAL checks or maintaining a listening watch on the assigned frequency while in the NAT region.

6.3. Prior to exiting NAT oceanic airspace and transitioning into a domestic area, the transferring ATS Unit will uplink the appropriate voice frequency. If no such message is received prior to exiting, crews should request the frequency by voice to ensure contact with the ATS Unit ***before*** oceanic exit.

7. Contingency Procedures

7.1 FANS 1/A (CPDLC/ADS-C) procedures for loss of data link connectivity.

- **FANS 1/A (CPDLC/ADS-C) Data Link Equipment Failure Prior to Departure.** If a flight experiences a FANS data link failure **PRIOR TO DEPARTURE**, the flight should flight plan so as to remain clear of NAT DLM airspace

- **FANS 1/A (CPDLC/ADS-C) Data Link Equipment Failure After Departure But Prior to NAT DLM Airspace**. If a flight experiences a FANS data link failure **AFTER DEPARTURE BUTPRIOR TO ENTERING AIRSPACE**, the flight should contact ATC and request a revised clearance that will keep it clear of NAT DLM airspace.

- **FANS 1/A (CPDLC/ADS-C) Data Link Equipment Failure After Entering NAT DLM Airspace Track.** If a flight experiences a FANS data link failure **WHILE OPERATING IN NAT DLM AIRSPACE**, ATC must be immediately advised. Such flights may be re- cleared to exit NAT DLM airspace, but consideration will be given to allowing the flight to remain in the airspace, based on tactical considerations.

8. Websites

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

9. Contacts

The following individuals may be contacted for information or to provide feedback on FANS 1/A (CPDLC/ADS-C) operations:

UK NATS
Tim Murphy
Senior Systems Engineer
Oceanic Services
NATS Prestwick Centre
Fresson Avenue
PRESTWICK
KA9 2GX
Direct line: +44 (0)1292-692772
E-mail: **tim.murphy@nats.co.uk**

NAV CANADA
Gander Area Control Centre
P.O. Box 328
Gander, NL A1V 1W7 Attn: Jeffrey Edison Manager, ACC Operations
Direct line: +1 709-651-5223
E-mail: **edisonj@navcanada.ca**

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ATTACHMENT A – SUMMARY OF FANS 1/A (CPDLC/ADS-C) SPECIAL INTEREST ITEMS CONTAINED IN THIS NAT OPS BULLETIN

Special Emphasis Items for FANS 1/A (CPDLC/ADS-C) Procedures. The Special Emphasis Items (SEI) listed below should be incorporated into operator training programs and operations manuals with the intent of raising pilot and dispatcher awareness of the importance of following proper FANS 1/A (CPDLC/ADS-C) procedures in the NAT.

Planned Vertical and Horizontal Boundaries for NAT Region DLM Airspace

☑ ~~Phase 2A, FL 350 to FL 390 (inclusive) all tracks within the NAT OTS. This phase applies to all aircraft operating on or at any point along the tracks;~~

☑ Phase 2B, commencing 7 December 2017: FL 350 to FL 390 (inclusive) throughout the ICAO NAT region;

☑ Phase 2C, commencing 30 January 2020: FL 290 and above throughout the ICAO NAT Region.

Operator/Aircraft Eligibility and Flight Planning Provisions;

- ~~1.~~ Equipped with and prepared to operate FANS 1/A (or equivalent) CPDLC and ADS-C datalink systems. (NAT Regional Supplementary Procedures (ICAO Doc 7030) paragraphs 3.3.2 and 5.4.2 for CPDLC and ADS-C respectively.)
- ~~2.~~ Insert "J2" to indicate FANS 1/A (or equivalent) CPDLC HFDL, "J5" to indicate FANS 1/A (or equivalent) Inmarsat CPDLC SATCOM and/or "J7" to indicate FANS 1/A (or equivalent) CPDLC Iridium SATCOM data link equipage and operation in Item 10a (Radio communication, navigation and approach aid equipment and capabilities) of flight plan.
- ~~3.~~ Insert "D1" in field 10b to indicate FANS 1/A (or equivalent) ADS-C equipage and operation.

Flight Crew

- ~~1.~~ Ensure a FANS (CPDLC/ADS-C) connection prior to entering NAT oceanic airspace, ~~regardless of surveillance services being provided. It is~~ Connections are essential for ATC to be able to issue the most optimal oceanic clearance, provide more capacity, and to use ADS-C for route conformance along with efficient and expeditious communications through CPDLC.
- ~~2.~~ Be proactive in ensuring the flight is connected to the correct ATS Unit. ~~and that the next ATS Unit is properly displayed.~~
- ~~3. Ensure you have an ADS-C connection.~~
- ~~4.~~ Follow ATC instruction to "DISCONNECT CPDLC AND LOG ON TO [ATSU]" if advised.
- ~~5.~~ Ensure SATCOM and HF functionality
- ~~6.~~ Contact the domestic ATS Unit on the frequency provided ***before*** exiting oceanic airspace.

Common Pre-~~Formatted~~Defined Freetext CPDLC Uplink Messages

CPDLC Pre-~~Formatted~~Defined Uplink Text	Reason ATS Unit would uplink	Crew Action
DIVERGENCE FROM ATC ~~EXPECTED~~ ROUTE AFTER NEXT WAYPOINT IS DETECTED. ~~ATC CLEARANCE TO FOLLOW~~CHECK FMS	Out of conformance of NEXT+1 waypoint contained within ADS-C report.	~~To c~~Check loaded routing, and confirm if any changes have been made.
YOUR POSITION REPORT INDICATES INCORRECT ROUTING. CHECK FULL DEGREES AND MINUTES LOADED INTO FMC. ~~YOUR CLEARED ROUTE IS [ROUTE]~~	Out of conformance contained within ADS-C report.	~~Important to c~~Check full degrees and minutes loaded to ensure no half or whole degree latitude errors, and report deviations from route to ATC immediately. ~~The pilot shall i~~Immediately display the full DEGREES and MINUTES loaded into the FMC for the NEXT waypoint and verify against the cleared route.
CONFIRM ASSIGNED ROUTE DOWNLINK OUT OF CONFORMANCE. ~~YOUR CLEARED ROUTE IS [ROUTE]~~	Route contained within 'CONFIRM ASSIGNED ROUTE' downlink out of conformance.	
CHECK FMS AND CORRECT ACTIVE WAYPOINT	Incorrect Sequence (after Weather Dev, the ADS track is moving backward)	
ADS-C ~~INDICATES OFF ROUTE.~~DEVIATION DETECTED. VERIFY AND ADVISE. ~~INTENTIONS~~	ADS-C Present Position is off-route	
ADS-C ESTIMATES APPEAR INACCURATE. CHECK FMS	Estimate for next waypoint contained in ADS differs from ATS Unit estimate	Confirm latest estimate for next Waypoint to ATS Unit
CONFIRM ASSIGNED ROUTE	Request to confirm assigned route	Respond to the uplink. If an anomaly occurs that prevents the pilot from responding, send free text UNABLE TO SEND ROUTE
DATA LINK SERVICES WILL BE TERMINATED WHEN LEAVING SATELLITE COVERAGE AT 82N. AT AND NORTH OF 82N USE VOICE FOR POSITION REPORTS AND OTHER COMMUNICATIONS	Northbound aircraft (not equipped with Iridium SATCOM data link) estimated to exit data link coverage area at 82° degrees North.	Resume voice communications including position reporting at and north of 82° degrees North.

Contingency Procedures

1. Advise ATC immediately of any data link issues that might affect FANS (CPDLC/ADS-C) data link operations.

–END–

APPENDIX J — NAT OPS BULLETIN – RLATSM PHASE 2 AIC (SERIAL NO: 2017_003)

(paragraph 5.2.1 refers)

NAT OPS BULLETIN

Serial Number: 2017_003	**Issued: 15 December 2017**
Subject: RLatSM Phase 2 AIC	**Effective: 15 December 2017**
Originator: NAT SPG	

The purpose of North Atlantic Operations Bulletin 2017-003 is to provide guidance to North Atlantic (NAT) operators to prepare them for Phase 2 of the trial implementation of 25 nautical mile (NM) lateral separation minimum in the ICAO NAT Region.

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

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

NOTICE

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

AERONAUTICAL INFORMATION CIRCULAR

NOTICE OF PLANNED EXPANSION OF THE TRIAL IMPLEMENTATION OF 25 NAUTICAL MILE LATERAL SEPARATION MINIMUM IN THE ICAO NORTH ATLANTIC REGION

Introduction

The first phase of the reduced lateral separation minimum (RLatSM) of 25 nautical miles (NM) in the North Atlantic (NAT) region commenced 15 December 2015. As of that date, all flights operating between flight level (FL) 350 and FL 390 inclusive on the three published RLatSM tracks within the Gander and Shanwick oceanic control areas (OCA) and have participated in the trial.

Phase 2 will expand the introduction of tracks that are spaced by one-half degree, beyond the core tracks of the NAT organized track system (OTS) between FL 350 and FL 390 inclusive.

RLatSM Phase 2 is expected to begin no earlier than 1130Z on the 4th of January 2018.

A progressive approach to tactical track design will be adopted to support operators, ATC and neighboring ANSPs adjust to the changes in demand that transition to RlatSM Phase 2 is expected to bring.

Background

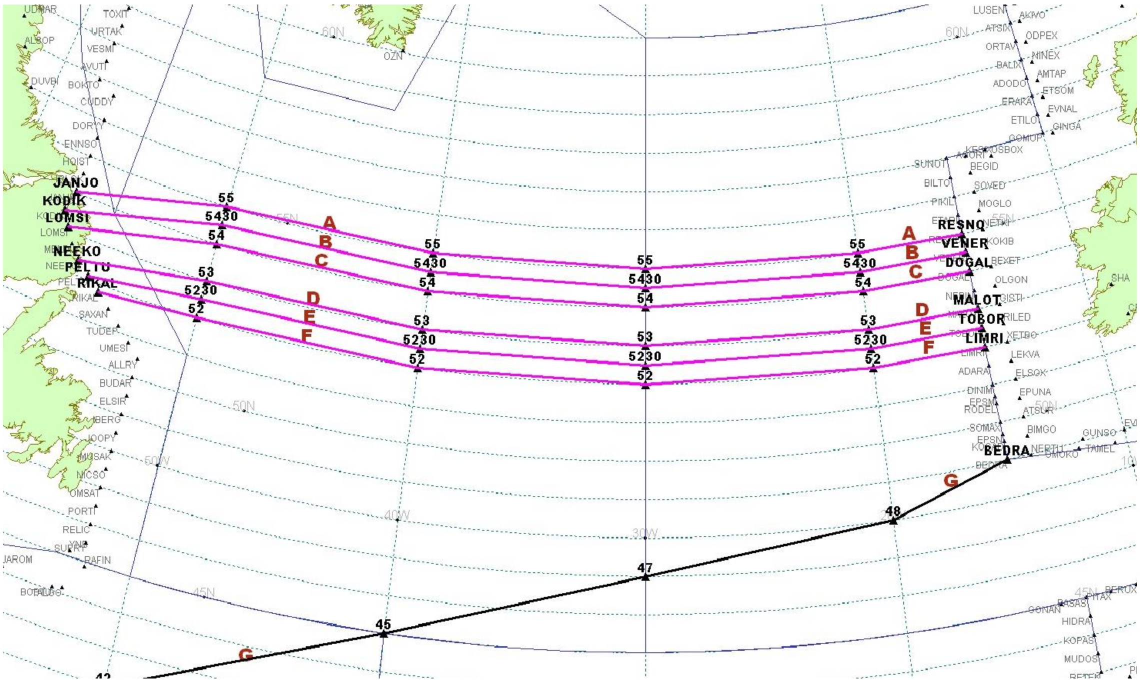
Advancements in aircraft avionics and air traffic management flight data processing systems have driven an initiative to analyze whether the lateral separation standard in the current North Atlantic (NAT) minimum navigation performance specification (MNPS) airspace (one degree of latitude, which equates nominally to 60 NM) can be reduced to increase the number of route options available and therefore increase capacity at optimum flight levels.

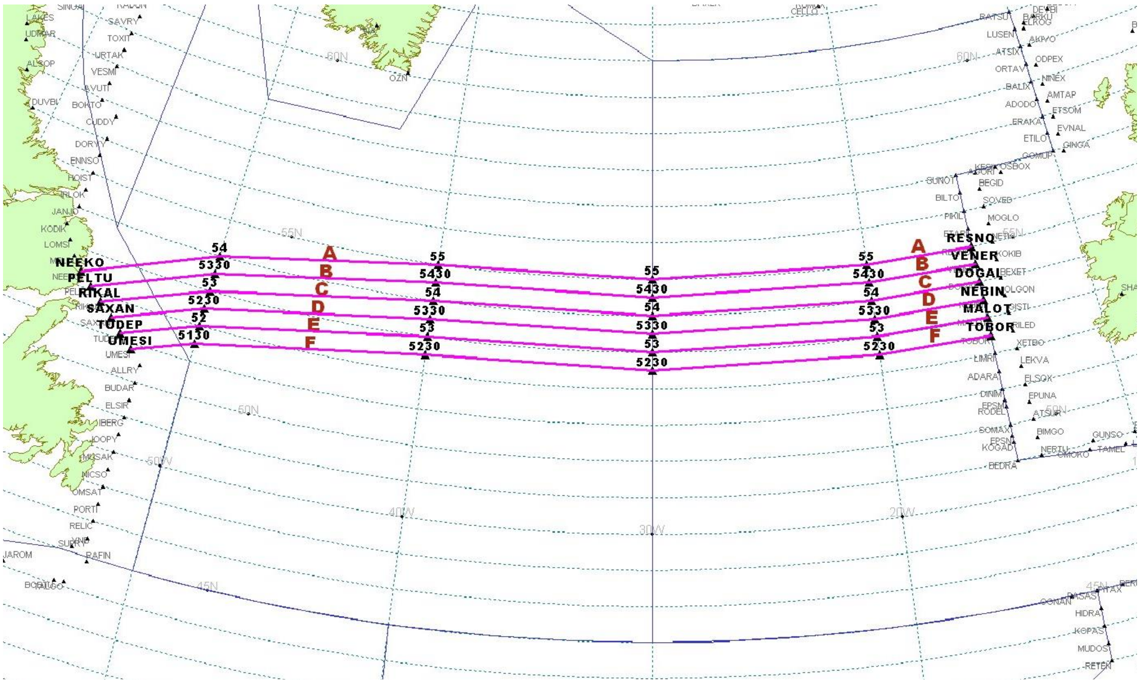
Operator Eligibility and Participation

Aircraft operating on or at any point along the published RLatSM tracks (see example diagram below) within the NAT OTS between FL 350 to FL 390 inclusive during the OTS validity period are required to be fitted with, and using, controller-pilot data link communications (CPDLC) and Automated Dependent Surveillance–Contract (ADS-C) equipment (see North Atlantic Operations Bulletin 2012-031).

The trial implementation of RLatSM will occur in NAT HLA airspace; therefore HLA approval remains a requirement. Only those operators/aircraft eligible for RLatSM operations will be allowed to operate on designated RLatSM tracks between FL 350-390 (inclusive). All RLatSM tracks and FLs will be uniquely identified in Note 3 of the OTS Track Message

Flights operating on or at any point along published RLatSM tracks will be permitted to request a climb or descent outside the FL350 to FL390 level band, clearances being subject to tactical traffic situations. However 60 NM lateral separation will then be applied.





Operators will be eligible to flight plan RLatSM tracks provided the flights are:

a) RNP4 approved;

b) Automated Dependent Surveillance–Contract (ADS-C) equipped; and

c) controller-pilot data link communications (CPDLC) equipped.

The required CNS systems must be operational and flight crews must report any failure or malfunction of global positioning system (GPS), ADS-C, or CPDLC equipment to air traffic control (ATC) as soon as it becomes apparent.

Contingency and Strategic Lateral Offset Procedures

Contingency procedures applicable in the NAT Region are contained in Chapter 15 (15.2 Special Procedures for In-Flight Contingencies in Oceanic Airspace) of the Procedures for Air Navigation Services – Air Traffic Management (Doc 4444), Chapter 9 (Special Procedures) of the NAT Regional Supplementary Procedures (SUPPS) (Doc 7030) and Chapter 13 (Special Procedures for In-Flight Contingencies) of the North Atlantic Operations and Airspace Manual (NAT Doc 007). Analysis conducted as part of the RLatSM safety assessment has confirmed these procedures remain appropriate for the application of the 25 NM lateral separation minimum. Therefore, no additions or changes to the existing procedures are required.

The strategic lateral offset procedure (SLOP) which distributes aircraft along a route or track centerline with offsets of one or two miles to the right thereof has been implemented as a standard operating procedure in the NAT Region since 2004. Detailed guidance on SLOP application in the NAT Region is contained in Chapter 16.5 PANS-ATM (Doc 4444) Procedures Strategic Lateral Offset Procedures (SLOP.) Calculations used in the RLatSM safety assessment demonstrate sufficiency to allow provisions for the application of SLOP up to 2 NM right of track or route centerline where the 25 NM lateral separation minimum is being applied.

Flight Planning

Air traffic services (ATS) systems use Field 10 (Equipment) and Field 18 (Other Information) of the standard ICAO flight plan to identify an aircraft's data link and navigation capabilities. The operator should insert the following items into the ICAO flight plan for RNP 4 authorized and FANS 1/A or equivalent aircraft:

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

insert "J5" to indicate CPDLC FANS1/A SATCOM (Inmarsat) and/or "J7" to indicate CPDLC FANS1/A SATCOM (Iridium) data link equipment;

b) Field 10b (Surveillance equipment and capabilities);

insert "D1" to indicate ADS with FANS 1/A capabilities;

c) Field 18 (Other Information);

insert the characters "PBN/" followed by "L1" for RNP 4.

Correct use of the CNS equipment that is indicated in the flight plan

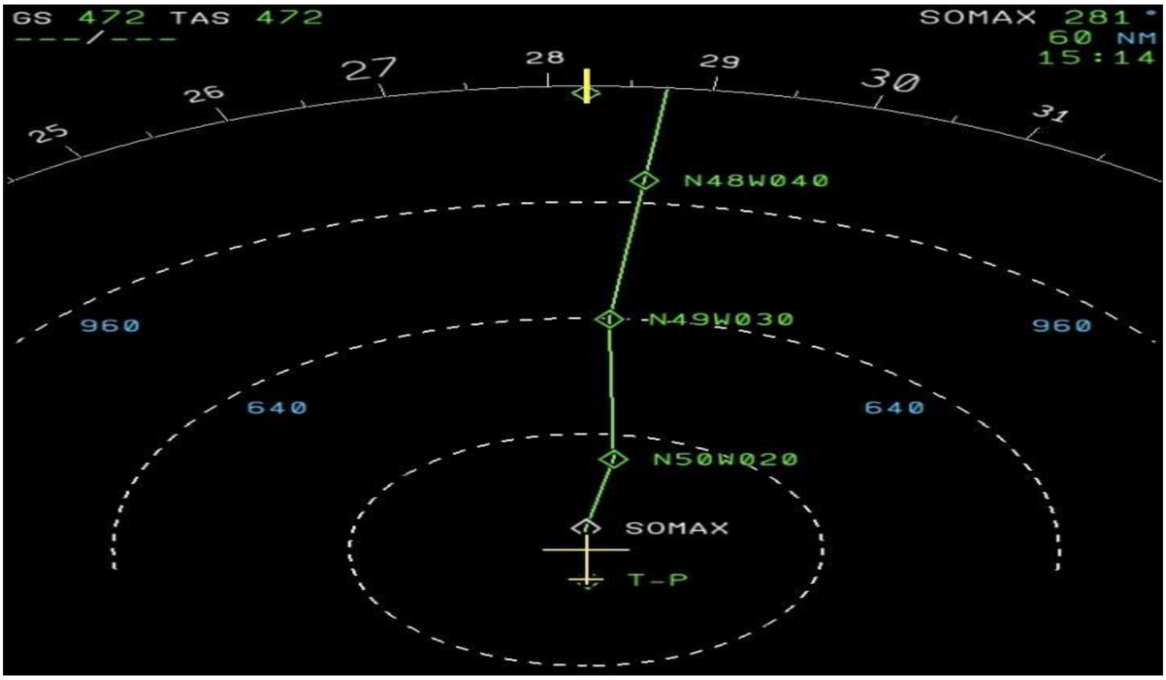
Before entering the NAT, the flight crew should ensure that:

a) the aircraft is logged on for data link capability (J5, J7, D1) filed in the FPL; and

b) RNP 4 is inserted into the Flight Management Computer (FMC), when RNP4 capability (L1) has been filed in the FPL. This is necessary to enable aircraft navigation system monitoring and alerting against the required RNP 4 navigation specification.

Verification of Waypoint Degrees and Minutes

Track spacing for RLatSM may involve the use of waypoints comprised of half degree coordinates. Existing cockpit map display limitations result in truncation of waypoints comprised of latitude/longitude to a maximum of seven characters; minutes of latitude are not displayed. In the example below, the representation would be the same if the flight was operating along whole or half degree waypoints (e.g., the N50W020 label in the figure below could represent a whole degree (5000 North) or a half-degree (5030 North) of latitude)



As shown below, full 13-character representations of latitude/longitude waypoints can be viewed via the FMC display. To mitigate the possibility for gross navigation errors resulting from incorrect waypoint insertion, it is imperative that established cockpit procedures are followed whereby each pilot independently displays and verifies the degrees and minutes loaded into the FMC for each oceanic waypoint defining the cleared route of flight.

Flight crews are further advised that, should they be notified that ATC systems indicate the aircraft is not flying the cleared route, they should immediately display of the full degrees and minutes loaded into the FMC for the NEXT and NEXT + 1 waypoints, and verify against the cleared route before responding.

As a precaution against possible waypoint insertion errors, rerouting of flights onto RLatSM identified tracks containing ½ degree coordinates will only be permitted via CPDLC using Uplink Message UM79, UM80 or UM83. Aircraft will therefore not be rerouted onto ½ degree OTS tracks if ARINC 623 data link or voice is used for the issuance of the oceanic clearance.

Current Version

The current, and updated versions of the draft NAT RLatSM plan and associated documents are provided on the ICAO European and North Atlantic Office website:

<www.icao.int/EURNAT/>,
EUR & NAT Documents
NAT Documents
Planning documents supporting separation reductions and other initiatives

Further Information

For further Information, please contact:

- END –

APPENDIX K — NAT OPS BULLETIN – RLATSM SPECIAL EMPHASIS ITEMS (SEI) (SERIAL NO: 2015_003_REVISION 5)

(paragraph 5.2.1 refers)

NAT OPS BULLETIN

Serial Number: **2015_003_ Revision 5**	**Issued: 15 December 2017**
Subject: RLatSM Special Emphasis Items – Phase 2 Update	**Effective: 15 December 2017**
Originator: NAT SPG	

This bulletin updates North Atlantic Operations Bulletin (NAT OPS) Bulletin 2015_003 Revision 4. The purpose of the bulletin is to provide guidance to North Atlantic (NAT) operators on material to be included in pilot and dispatcher training programs and operations manuals to prepare them for operations in the North Atlantic under Reduced Lateral Separation of 25 Nautical Miles. (NAT RLatSM).

Note: Grey shading indicates modifications or additions to NAT OPS Bulletin 2015_003 Rev ~~4~~5 text.

RLatSM Phase 2 start. The RLatSM Phase 2 will expand the introduction of tracks during the trial that are spaced by one-half degree beyond the three core tracks to encompass all the NAT organized track system (OTS) between FL350 and FL390 inclusive. ~~start date has been delayed.~~

RLatSM Phase 2 is expected to begin no earlier than 1130Z on the 4th of January 2018. ~~It will not start on 10 November 2016 as previously planned. At least two months' notice will be given in advance of the new start date.~~ RLatSM Phase 2 is still planned to be implemented in portions of the Gander and Shanwick ~~and Reykjavik~~ Oceanic Control Areas (OCA).

A progressive approach to tactical track design will be adopted to support operators, ATC and neighbouring ANSPs adjust to the changes in demand that transition to RlatSM Phase 2 is expected to bring.

Re-naming NAT Minimum Navigation Performance Specifications (MNPS) Airspace as NAT High Level Airspace (HLA). Operators are reminded that NAT MNPS Airspace was re-named as NAT HLA on 4 February 2016. (See NAT OPS Bulletin 2016_01 (Re-naming of the NAT MNPSA to NAT HLA). It can be found on the ICAO EUR/NAT Office Website. See paragraph 6 below (Websites).

~~This Bulletin may be updated, as necessary, as progress is made toward the start date for **Phase 2** of the RLatSM trial.~~

NOTICE

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

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

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

Roy Grimes: ***rgrimes@cssiinc.com***

NAT OPERATIONS BULLETIN – RLATSM SPECIAL EMPHASIS ITEMS

1. Purpose of Bulletin – RLatSM Phase 2 Update. The purpose of this bulletin is to provide guidance to North Atlantic (NAT) operators on material to be included in pilot and dispatcher training programs and operations manuals to prepare them for operations in the North Atlantic under Reduced Lateral Separation of 25 Nautical Miles (NAT RLatSM operations). It also provides updated information on the start of RLatSM Phase 2 trials.

~~**1.1** This Bulletin may be updated, as necessary, as progress is made toward the start date for Phase 2 of the RLatSM trial. Any necessary updates will be distributed through industry organizations and posted on the ICAO EUR/NAT Website. (See section 6).~~

1.2 Operator attention is directed to Attachment A. It provides a "quick reference" for the RLatSM Special Emphasis Items contained in this bulletin. It is intended to be used as a job aid for operators developing pilot and dispatcher training material.

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

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

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

2. RLatSM Project Plan Overview. Phase 1 of the NAT 25 NM Reduced Lateral Separation Minimum (RLatSM) trial commenced in portions of the Gander and Shanwick oceanic control areas (OCA) in December 2015. The RLatSM Phase 2 trial will not start on 10 November 2016 as previously planned. At least two months' notice will be given in advance of the new start date. RLatSM Phase 2 is still planned to be implemented in portions of the Gander, Shanwick and Reykjavik OCAs.

a) **During the RLatSM Phase 1 trial,** the 25 NM lateral separation minimum is implemented by applying ½ degree track spacing between **<u>three core</u>** NAT Organized Track System (OTS) tracks. 25 NM lateral separation is applied between flight level (FL) 350-390 (inclusive).

b) **During Phase 2 of the RLatSM trial,** the 25 NM lateral separation minimum will be implemented by applying ½ degree track spacing between **all NAT Organized Track System (OTS) tracks (depending on tactical design).** 25 NM lateral separation will be applied between flight level (FL) 350-390 (inclusive).

c) OTS tracks separated using the reduced lateral separation minimum are established by publishing OTS tracks defined by ½ degree waypoints (e.g., 54 degrees-30 minutes NORTH latitude/50 degrees WEST longitude) between two adjacent tracks defined by whole degree waypoints (e.g. 54 degrees NORTH latitude/50 degrees WEST longitude, respectively).

Note: operators are advised that due to pre-tactical considerations, standard laterally separated tracks (60nm) may be contained within the NAT OTS structure. RLatSM tracks will be designated tracks identified in "Remark 3" of the NAT Track Message.

d) Only those operators/aircraft eligible for RLatSM operations are allowed to operate on designated RLatSM tracks between FL 350-390 (inclusive). See Section 3 (Operator/Aircraft Eligibility).

e) Strategic Lateral Offset Procedures (SLOP) are to be used in accordance with NAT Doc 007, paragraph 8.5.

f) Enhanced ATC surveillance and communication is provided via FANS 1/A (or equivalent) data link systems. Automatic Dependent Surveillance (ADS-C) provides route conformance monitoring, periodic aircraft reporting and controller alerts for Lateral Deviation Events (LDE) and vertical deviation events (Level Range Deviation Events (LRDE). Controller-Pilot Data Link Communications (CPDLC) enhances ATC intervention and communication capabilities.

3. Operator/Aircraft Eligibility. Operators do not need to apply to NAT ANSPs to be part of the trial, however, operators should consult with the State authority responsible for their operation prior to starting RLatSM operations. Operators are eligible to flight plan and fly RLatSM tracks provided the flights:

a) Meet Required Navigation Performance 4 (RNP 4) requirements

b) Are ADS-C and CPDLC equipped and, where applicable, authorized; and,

c) Operating required Communications, Navigation and Surveillance (CNS) systems

Note: Job Aids for RNP 4 and Data Link operations authorization are posted on the ICAO European and North Atlantic (EUR/NAT) Office website. See section 6 (**Websites**).

4. Flight Planning Provisions

4.1 Only those operators/aircraft eligible for RLatSM operations are allowed to operate on designated RLatSM tracks between FL 350-390 (inclusive). All RLatSM tracks and FLs are uniquely identified in Remark 3 of the OTS Track Message as shown below:

Westbound NAT Track Message Example: Phase 2 RLatSM Tracks

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

```
FF CYZZWNAT
102151 EGGXZOZX
(NAT-1/3 TRACKS FLS 310/390 INCLUSIVE
FEB 11/1130Z TO FEB 11/1900Z
PART ONE OF THREE PARTS-
A PIKIL 57/20 58/30 59/40 58/50 DORYY
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
B ETARI 5630/20 5730/30 5830/40 5730/50 ENNSO
EAST LVLS NIL
WEST LVLS 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
C RESNO 56/20 57/30 58/40 57/50 HOIST
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
END OF PART ONE OF THREE PARTS)
FF CYZZWNAT
102151 EGGXZOZX
(NAT-2/3 TRACKS FLS 310/390 INCLUSIVE
FEB 11/1130Z TO FEB 11/1900Z
PART TWO OF THREE PARTS-
D VENER 5530/20 5630/30 5730/40 5630/50 IRLOK
EAST LVLS NIL
WEST LVLS 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
E DOGAL 55/20 56/30 57/40 56/50 JANJO
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
END OF PART TWO OF THREE PARTS)
FF CYZZWNAT
102152 EGGXZOZX
(NAT-3/3 TRACKS FLS 310/390 INCLUSIVE
FEB 11/1130Z TO FEB 11/1900Z
PART THREE OF THREE PARTS-
REMARKS.
1. TMI IS 042 AND OPERATORS ARE REMINDED TO
INCLUDE THE
TMI NUMBER AS PART OF THE OCEANIC CLEARANCE
READ BACK.
2. ADS-C AND CPDLC MANDATED OTS ARE AS
FOLLOWS
TRACK A 350 360 370 380 390
TRACK B 350 360 370 380 390
TRACK C 350 360 370 380 390
TRACK D 350 360 370 380 390
TRACK E 350 360 370 380 390
END OF ADS-C AND CPDLC MANDATED OTS
3. RLATSM OTS LEVELS 350-390. RLATSM TRACKS AS
FOLLOWS
TRACK A
TRACK B
TRACK C
TRACK D
TRACK E
END OF RLATSM OTS...
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4.2 Operators must file the correct ICAO Flight Plan annotations in Items 10 and 18 to indicate that RLatSM required CNS systems are operational for the flight.

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

- Inset “X” to indicate that the aircraft meets requirements for NAT HLA operations. (See page 1 for information on accessing NAT OPS Bulletin 2016_1. It contains guidance on NAT HLA requirements);

- Insert “J5” to indicate FANS 1/A (or equivalent) Inmarsat CPDLC SATCOM and/or “J7” to indicate FANS 1/A (or equivalent) CPDLC Iridium SATCOM data link equipage and operation;

- Insert “R” to indicate that aircraft navigation system equipage and operation meet Performance Based Navigation (PBN) levels specified in Item 18. See 4.2 c) below on the related Item 18 entry for RNP 4.

b) Item 10b (Surveillance equipment and capabilities)

- Insert “D1” to indicate FANS 1/A (or equivalent) ADS-C equipage and operation

c) Item 18 (Other information)

- Insert the characters “PBN/” followed by “L1” to indicate RNP 4 authorization.

5. Special Emphasis Items for RLatSM Operators. The Special Emphasis Items (SEI) listed below should be incorporated into operator training programs and operations manuals with the intent of raising pilot and dispatcher awareness of the importance of following procedures in an environment where ½ degree waypoints and a lateral separation minimum of 25 NM are applied. Each SEI is followed by an explanation of the factors leading it to be identified as an RLatSM SEI.

5.1 Requirement to use the CNS equipment that is indicated in the ICAO flight plan:

ATC uses the Flight Plan annotations in Items 10 and 18 to apply the reduced separation between aircraft. Therefore, before entering the NAT, the pilot must ensure that:

1. the aircraft is logged on when data link capability (J5, J7, D1) has been filed in the FPL; and

2. RNP 4 is inserted into the FMC, when RNP4 capability (L1) has been filed in the FPL. This is to enable aircraft navigation system monitoring and alerting against the required RNP 4 Navigation Specification.

5.2 Pilot Training on Map and FMC Displays of ½ Degree and Whole Degree Waypoints:

To mitigate misinterpretation of waypoint coordinates, operator initial and re-current training programs and operations manuals must incorporate training and guidance to enable pilots to understand map and FMC displays of ½ degree and whole degree waypoints regardless of the waypoint format being used for waypoint FMC input. See paragraph 5.3 below.

Explanation

5.2.1 Map displays and certain FMC pages generally do not display full waypoint degrees **and** minutes, e.g. when the full 13 latitude/longitude characters are used to insert ½ degree waypoints. See Figure 1 and Figure 2 in Attachment B.

5.3 Aircraft Navigation Database (NDB) Waypoint Identifiers:

In 2015, Canada, the United Kingdom (UK), and Iceland published Aeronautical Information Circulars (AIC) strongly advocating that aircraft NDB vendors and flight planning services **not** provide operators with half-degree waypoint identifiers in the ARINC 424, paragraph 7.2.5 "N-prefix" format (*e.g., N5250 = 52°30' NORTH 050°00'WEST).* (See Canada AIC 23/15 (23 July 2015, UK AIC 059/2015 (9 July 2015) and Iceland AIC A009/2015 (18 September 2015). The guidance in these circulars will be incorporated into the Aeronautical Information Publications (AIP) of the respective organizations in the future).

NAT operators should use a full latitude/longitude (e.g., 13-character) input for waypoints containing both half-degree and whole degrees of latitude and whole degrees of longitude.

NAT operators **with an operational need to populate the aircraft NDB** with a 5-character waypoint identifier should ensure that the aircraft NDB vendors and flight planning services use an alternate half-degree of latitude 5-character format such as Hxxyy, where xx = degrees and 30 minutes of NORTH latitude and yy = degrees of WEST longitude *(e.g., H5250 = 52°30' NORTH 050°00' WEST).* (It is recognized that, for whole degree waypoint inputs, such operators will likely continue using the ARINC 424, 7.2.5 "N-suffix" format *(e.g., 5250N = 52° 00' NORTH 050°00'WEST)).*

Rerouting of flights onto RLatSM identified tracks containing ½ degree coordinates will only be permitted using a CPDLC route clearance uplink. Aircraft will therefore not be re-routed onto ½ degree OTS tracks if ARINC 623 data link or voice is used for the issuance of the oceanic clearance.

The CPDLC route clearance will be uplinked in a full Lat/Long format that will be unfamiliar to the flight crews using an ARINC 424, 7.2.5 format. Operators **with an operational need to populate the aircraft NDB** with a 5-character waypoint identifier format need to ensure flight crews are properly trained on the use of the full Lat/Long waypoint format in uplink messages. They must also emphasize the necessity for proper waypoint verification procedures.

Explanation

5.3.1 Half-degree waypoint identifiers in the ARINC 424, paragraph 7.2.5 "N-prefix" format have led to a number of Gross Navigation Errors (GNEs) and Lateral Deviations. The guidance for waypoint insertion in paragraph 5.3 above is intended to remove the potential for such errors. They occur when a pilot intending to input a waypoint defined by a half-degree of latitude inadvertently loads a waypoint containing a whole-degree of latitude, or vice versa, because the "N" is not loaded in the correct pre-fix or suffix position.

5.4 Pilot Procedures for Verifying Waypoint Degrees and Minutes Inserted into Aircraft Navigation Systems:

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 oceanic clearance. (The "Sample Oceanic Checklist" NAT OES Bulletin refers).

Regardless of FMC waypoint format and entry method, 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.

- During pre-flight LRNS programming, both pilots 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.

- Upon receipt of a revised oceanic clearance (i.e., one not conforming to the flight planned route), both pilots independently verify the full latitude and longitude coordinates of "un-named" (Lat/Long) waypoints defining the route contained in the revised oceanic clearance.

- Approaching an oceanic waypoint, one pilot should verify the full latitude and longitude coordinates of that waypoint in the FMC, the NEXT and NEXT +1 waypoints, while the other pilot crosschecks the latitude and longitude coordinates against the master flight plan/oceanic clearance.

Explanation

5.4.1 Due to the factors in the map and FMC display of ½ degree and whole degree waypoints, it is imperative that pilots follow the procedure in paragraph 5.4 above to avoid lateral errors caused by incorrect insertion of waypoints. Verification of the full DEGREES and MINUTES of oceanic waypoints loaded into the FMC is a critical step in ensuring a proper navigational load.

5.5 Pilot Track and Distance Check:

It is strongly recommended that pilot pre-flight and in-flight procedures call for the pilot to compare the track and distance between waypoints shown on the Computer Flight Plan (CFP) to those displayed by the FMC. (The NAT "Sample Oceanic Checklist" Bulletin refers).

Pilots should be aware that waypoint insertion errors of ½ degree of latitude may in some cases result in only small differences in track and distance, however, the track and distance check can help prevent waypoint insertion errors of one degree or more that have been observed in oceanic operations.

Note: `the currency of magnetic variation tables loaded into aircraft navigation databases and the point at which the track is measured affect the track displayed on the FMC by as much as ±3 degrees.

Explanation

5.5.1 This check remains valuable for RLatSM operations because waypoint insertion errors are **not** limited to ½ degree errors and waypoint insertion errors of one degree or more have been observed in oceanic operations. Waypoint insertion errors of ½ degree produce a small difference in leg segment track and distance, however, as noted above, waypoint insertion errors are not limited to ½ degree.

5.6 Pilot Action When Notified By ATC of Possible Deviation from Cleared Track:

Flight crews are advised that, should they be notified that ATC systems indicate the aircraft is not flying the cleared route, they should immediately display the full degrees and minutes loaded into the FMC for the NEXT and NEXT + 1 waypoints, and verify against the cleared route before responding.

Voice message example: "SHANWICK CONFIRMS YOUR POSITION REPORT INDICATES INCORRECT ROUTING. CHECK FULL DEGREES AND MINUTES LOADED INTO FMC. YOUR CLEARED ROUTE IS [route]"

CPDLC message example:

YOUR POSITION REPORT INDICATES INCORRECT ROUTING. CHECK FULL DEGREES AND MINUTES LOADED INTO FMC. YOUR CLEARED ROUTE IS [route]

When ATC notifies the pilot that the aircraft has indicated it has already deviated from the cleared track (UM169f: *ADS-C INDICATES OFF ROUTE. ADVISE INTENTIONS*), the pilot shall immediately display the full DEGREES and MINUTES loaded into the FMC for the NEXT waypoint, and verify against the cleared route.

5.7 Policy for Operational Airborne Collision Avoidance System II (ACAS II):

Prior to departure for flight on an NAT OTS track at a flight level where RLatSM is applied, the ACAS II system shall be fully operational for the pilot flying (i.e., the TA and RA visual display and audio function will be operative for the pilot flying). If the ACAS II system is not fully operational for the pilot flying, the operator has the option of requesting clearance to operate on a track and/or at a FL where RLatSM is not applied. **If the ACAS II system fails after departure,** the aircraft may continue on the cleared route.

Note: The ACAS II (TCAS II) system must be a Version 7.0 or more recent version).

Explanation

5.7.1 ACAS II provides a valuable situational awareness tool and safety net for pilots operating in NAT airspace including those where aircraft separation standards have already been reduced in the vertical and longitudinal dimensions. The carriage and operation of ACAS II is emphasized here in the context of RLatSM trials for the following reasons:

a) The introduction of ½ degree OTS waypoints is an operational change that introduces the use of ½ degree waypoints into NAT OTS operations. Although both pilot procedures and ADS-C conformance monitoring capabilities should mitigate the occurrence of lateral deviations related to ½ degree waypoints, ACAS II provides an independent margin of safety should lateral deviations occur during the RLatSM trial period.

b) ACAS II will provide a situational awareness tool that will enable pilots to be better prepared to safely execute weather deviation and contingency procedures necessitating lateral deviations (e.g., diversions and turn-backs). In the RLatSM operational environment, such deviations will occur in airspace where the minimum lateral separation is to be 25 NM.

5.8 Pilot In-flight Contingency Procedures and Weather Deviation Procedures (Diversions, Turn-backs, etc.):

In training and checking programs, operators shall place special emphasis on pilot knowledge of and preparation to execute the *Special Procedures for Inflight Contingencies in Oceanic Airspace* published in ICAO Doc 4444, paragraph 15.2 and *Weather deviation procedures* (paragraph 15.2.3).

Pilots must be aware that when crossing adjacent tracks without an ATC clearance, the potential vertical separation provided by the In-flight Contingency Procedure is 500 ft may not be adequately accounting for the allowed RVSM altimetry system error. Pilots must use all the steps called for in the Contingency Procedures to avoid conflict with other aircraft. Consideration should be given to intercepting the 15 NM lateral offset in the same direction of flight and then descending below FL 280 or climbing above FL 410 prior to crossing adjacent tracks or making a 180° turn back.

Pilots must also be aware that when unable to obtain an ATC clearance, Weather Deviation Procedures call for a climb or descent of 300 ft. based on direction of flight and direction of deviation, and, in addition, guidance to the pilot is to adjust the path of the aircraft, if necessary, to avoid aircraft at or near the same flight level.

Pilots must stringently follow all measures for avoiding conflict with other aircraft provided for in the Doc 4444 Contingency and Weather Deviation Procedures.

Explanation

5.8.1 The implementation of RLatSM (25 NM) separation and ½ degree track spacing significantly reduces the distance and time a diverting aircraft has to manoeuvre when executing a diversion, turn-back or weather deviation without an ATC clearance before approaching adjacent tracks. It also reduces the time that a pilot has to obtain an ATC clearance. (An aircraft deviating from track can be in the proximity of aircraft on an adjacent track within approximately 4 minutes, depending on the angle of deviation from cleared track). In addition, as discussed above, the margin for safety for aircraft crossing adjacent tracks is 150 m (500 ft.) of vertical separation when executing In-flight Contingency Procedures.

5.9 RLatSM Operational policies (aircraft CNS system failure, data link system failure, etc.):

5.9.1 **Objective.** The guidance provided in section 5.9 is intended to apply during the RLatSM trials that started on 12 November 2015. It is intended to supplement the Global Operational Data Link Document (GOLD) guidance to controllers and flight crew on data link service failures and aircraft data link system failures (GOLD paragraphs 4.9.4 and 5.9.4 respectively).

5.9.2 **RLatSM Required CNS System Failure Prior to Departure.** If a flight experiences a failure of an RLatSM required CNS system **PRIOR TO DEPARTURE,** the flight should flight plan so as to remain clear of NAT RLatSM tracks between FL 350-390 (inclusive).

5.9.3 **RLatSM Required CNS System Failure After Departure But Prior to Entering On To RLatSM Tracks Between FL 350-390 (Inclusive).** If a flight experiences a failure of an RLatSM required CNS system **AFTER DEPARTURE BUT PRIOR TO ENTERING RLATSM AIRSPACE,** the flight should contact ATC and request a revised clearance that will keep it clear of NAT RLatSM tracks between FL 350-390 (inclusive).

5.9.4 **RLatSM Required CNS System Failure After Entering On To RLatSM Tracks Between FL 350-390 (Inclusive).** If a flight experiences a failure of an RLatSM required CNS system **WHILE OPERATING IN RLATSM AIRSPACE**, ATC must be immediately advised. Such flights may be re-cleared to exit RLatSM airspace, but consideration will be given to allowing the flight to remain in the airspace, based on tactical considerations. (GOLD paragraph 4.9.4.8 refers).

Note: aircraft may be cleared to climb above FL 390 or descend below FL 350 and remain on half-degree tracks. However, 60 NM lateral separation will then be applied.

5.9.5 **Continuous Climb or Descent of Aircraft Not RLatSM Eligible.** Any aircraft that is not RLatSM eligible may request continuous climb or descent without intermediate level off through the vertical extent of the NAT RLatSM airspace. Such requests will be considered on a tactical basis.

5.9.6 **Altitude Reservation (ALTRV) Requests.** ALTRV requests will be considered on a case by case basis (as is done today regarding NAT High Level Airspace (HLA)), irrespective of the RLatSM eligibility status of the participating aircraft.

5.9.7 **Contingency Situations.** NAT RLatSM airspace restrictions are not applicable to aircraft experiencing a contingency situation.

5.10 Domestic ATC Agency Contact:

Pilots are reminded to ensure that they contact the appropriate **domestic** ATC agency BEFORE exiting oceanic airspace.

6. Websites

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

6.2 **Job Aid Templates**. Click on **EUR & NAT Documents** >> **NAT Documents** >> Job Aid Templates for:

a) RNP 4 Job Aid Template (Application to conduct RNP 4 operations), and,

b) Data Link Job Aid Template (Operator Application to Conduct Data Link Operations).

7. Contacts

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

UK NATS
Martin Donnan
GM Prestwick Operations
Fresson Avenue
PRESTWICK
KA9 2GX

E-mail: **martin.DONNAN@nats.co.uk**

NAV CANADA
Gander Area Control Centre
P.O. Box 328
Gander, NL A1V 1W7
Attn: Jeffrey Edison
Manager, ACC Operations
Direct line: +1 709-651-5223

E-mail: **edisonj@navcanada.ca**

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ATTACHMENT A – SUMMARY OF RLATSM SPECIAL INTEREST ITEMS CONTAINED IN THIS NAT OPS BULLETIN

1. *Operator/Aircraft Eligibility and Flight Planning Provisions:*

Only operators that meet RNP 4 requirements and are equipped with and operating CPDLC and ADS-C will be eligible for RLatSM operations. In addition, the ICAO Flight Plan must be correctly annotated to indicate that RLatSM required CNS systems are operational for the flight (section 4 refers).

2. *Requirement to use the CNS equipment that is indicated in the flight plan:*

The pilot must use that CNS systems indicated on the ICAO Flight Plan because ATC uses the Flight Plan annotations in Items 10 and 18 to apply the reduced separation between aircraft (paragraph 5.1 refers).

The pilot must also confirm that RNP4 is inserted into the FMC to enable aircraft navigation system monitoring and alerting against the required RNP4 Navigation Specification (paragraph 5.1 refers).

3. *Aircraft Navigation Database (NDB) Waypoint Identifiers:*

Canadian AIC 23/15, UK AIC 059/2015 and Iceland AIC A009/2015 strongly advocate that aircraft NDB vendors and flight planning services **not** provide operators with **half-degree** waypoint identifiers in the ARINC 424, paragraph 7.2.5 “N-prefix” format (e.g., *N5250 = 52°30’ NORTH 050°00’WEST).* (These AICs will be incorporated into State AIPs in the future).

NAT operators should use a full latitude/longitude (e.g., 13-character) input for waypoint coordinates. NAT operators **with an operational need to populate the aircraft NDB** with a 5-character waypoint identifier should ensure that the aircraft NDB vendors and flight planning services use an alternate half-degree of latitude 5-character format e.g., H5250 = *52°30’ NORTH 050°00’ WEST* (paragraph 5.3 refers)

4. *Pilot Training on Map and FMC Displays of ½ Degree and Whole Degree Waypoints:*

Operator initial and re-current training programs and operations manuals must have incorporated training and guidance to enable pilots to understand map and FMC displays of ½ degree and whole degree waypoints (paragraph 5.2 and **Attachment B** Figure 1 and Figure 2 refer).

5. *Pilot Procedures for Verifying Waypoint Degrees and Minutes Inserted into Aircraft Navigation Systems:*

Pilot Pre-flight and In-flight procedures must call for each pilot to independently display and verify the DEGREES **and** MINUTES loaded into the Flight Management Computer (FMC) for the “un-named (Lat/Long) waypoints defining the cleared route of oceanic flight. This procedure is necessary regardless of the FMC waypoint input format being used. Procedures must call for both pilots to independently verify the waypoint coordinates inserted and concur on their accuracy prior to route activation (paragraph 5.4 refers).

6. *Pilot Track and Distance Check:*

It is strongly recommended that pilot pre-flight and in-flight procedures call for the pilot to compare the track and distance between waypoints shown on the Computer Flight Plan (CFP) to those displayed by the FMC.

Pilots should be aware that waypoint insertion errors of ½ degree of latitude may in some cases result in only small differences in track and distance, however, the track and distance check can help prevent waypoint insertion errors of one degree or more that have been observed in oceanic operations.

Note: the currency of magnetic variation tables loaded into aircraft navigation databases and the point at which the track is measured affect the track displayed on the FMC by as much as +/- 3 degrees (paragraph 5.5 refers)

7. *Pilot Action When Notified By ATC of Possible Deviation From Cleared Track:*

When ATC notifies the pilot that ATC systems indicate that the aircraft is not flying the cleared track, the pilot shall immediately display the full DEGREES and MINUTES loaded into the FMC for the NEXT waypoint, and verify against the oceanic clearance.

8. *Policy for Operational Airborne Collision Avoidance System II (ACAS II):*

Prior to departure for flight on in airspace where RLatSM is applied, the ACAS II system shall be fully operational for the pilot flying (i.e., the TA and RA visual display and audio function will be operative for the pilot flying). If the ACAS II system is not fully operational for the pilot flying, the operator has the option of requesting clearance to operate on a track and/or at a FL where RLatSM is not applied. **If the ACAS II system fails after departure,** the aircraft may continue on the cleared route.

Note: The ACAS II (TCAS II) system must be a Version 7.0 or more recent version) (paragraph 5.7 refers)

9. *Pilot In-flight Contingency Procedures and Weather Deviation Procedures (Diversions, Turn-backs, etc.):*

In training and checking programs, operators shall place special emphasis on pilot knowledge of and preparation to execute the *Special Procedures for Inflight Contingencies in Oceanic Airspace* published in ICAO Doc 4444, paragraph 15.2 and *Weather deviation procedures* (PANS-ATM, paragraph 15.2.3).

Pilots must be aware that when crossing adjacent tracks without an ATC clearance, the potential vertical separation provided by the In-flight Contingency Procedure is 500 ft may not be adequately accounting for the allowed RVSM altimetry system error. Pilots must use all the steps called for in the Contingency Procedures to avoid conflict with other aircraft. Consideration should be given to intercepting the 15 NM lateral offset in the same direction of flight and then descending below FL 280 or climbing above FL 410 prior to crossing adjacent tracks or making a 180° turn back.

Pilots must also be aware that when unable to obtain an ATC clearance, Weather Deviation Procedures call for a climb or descent of 300 ft. based on direction of flight and direction of deviation, and, in addition, guidance to the pilot is to adjust the path of the aircraft, if necessary, to avoid aircraft at or near the same flight level.

Pilots must stringently follow all measures for avoiding conflict with other aircraft provided for in the Doc 4444 contingency procedures (paragraph 5.8 refers).

10. *RLatSM Operational policies (aircraft CNS system failure, data link system failure, etc.):*

Operators must be aware of the RLatSM operational policies posted in paragraph 5.9 In particular, operators must be aware that all RLatSM required aircraft CNS systems must be operational PRIOR TO DEPARTURE and PRIOR TO ENTRY on to RLatSM tracks between FL 350-390 (inclusive). In addition, if RLatSM required aircraft systems fail WHILE OPERATING IN RLATSM AIRSPACE, ATC must be advised immediately so that an appropriate course of action can be determined (paragraph 5.9 refers).

11. *Domestic ATC Agency Contact:*

Pilots are reminded to ensure that they contact the appropriate **domestic** ATC agency BEFORE exiting oceanic airspace (paragraph 5.10 5.11 refers).

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ATTACHMENT B – EXAMPLE FMC AND MAP DISPLAYS (paragraph 5.2 refers)

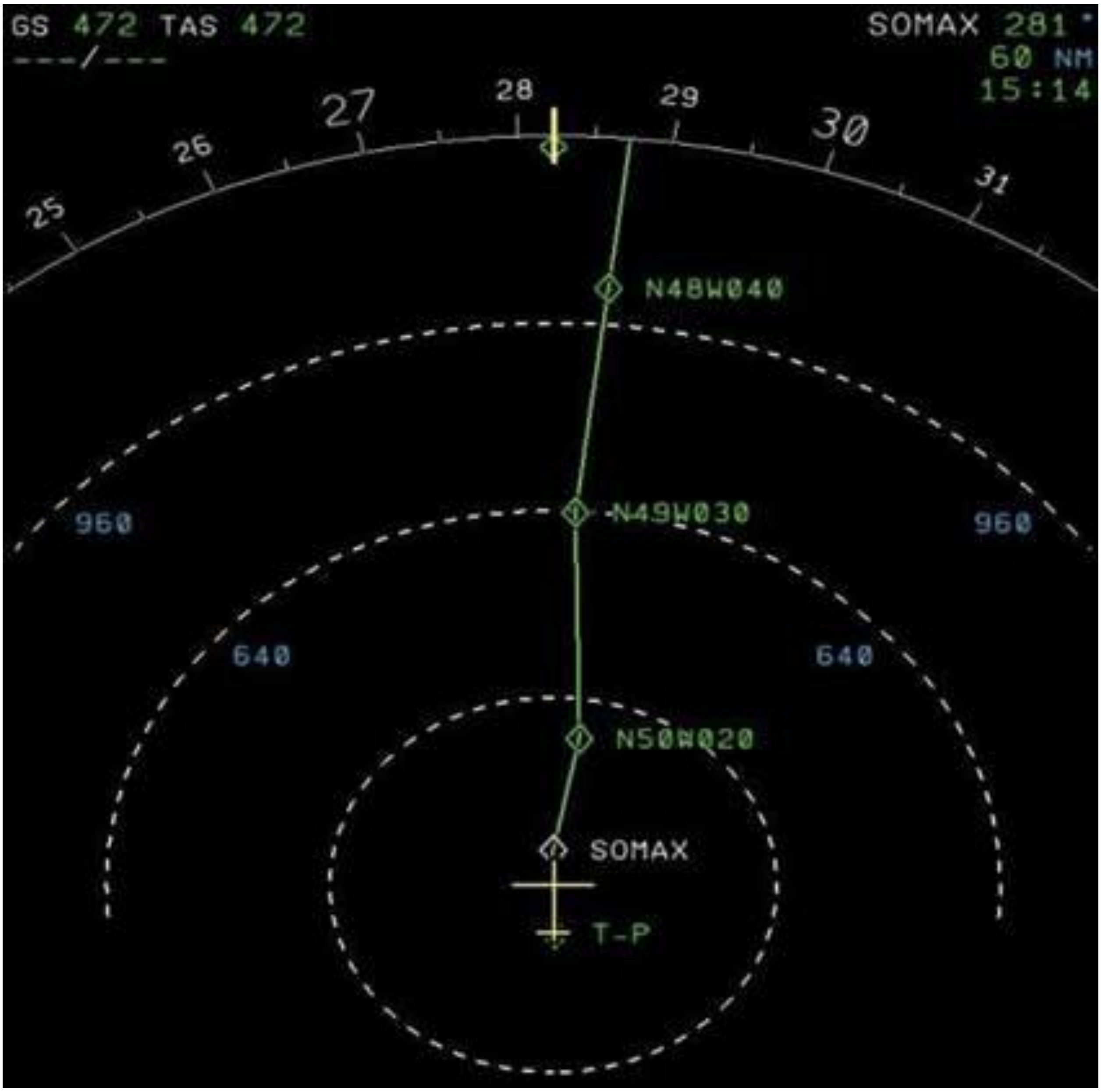
Note: Figure 1 and Figure 2 are intended to support paragraph 5.2 (Pilot training on Map and FMC Displays of ½ and Whole Degree Waypoints). **The figures emphasize that for a large number of aircraft, the input of waypoints containing whole degrees of latitude and waypoints containing half-degrees of latitude will result in identical 7-character FMC and waypoint map displays.**

Figure 1. Example FMC Display: Full Waypoint Latitude and Longitude (13-characters) inserted into FMC

1. 52 degrees-30 minutes North latitude, 20 degrees West longitude inserted into the FMC using full latitude and longitude degrees, minutes and seconds (i.e., 13 characters)

2. The waypoint IDENT is truncated to 7 characters with **<u>no display of minutes of latitude.</u>**

Figure 2. Example Map Display: 13-characters Inserted into FMC (Full Waypoint Latitude and Longitude)



1. 50 degrees-<u>30 minutes</u> North, 20 degrees West is displayed in <u>7 characters</u> (N50W020).
2. **Minutes of latitude <u>are not displayed.</u>**
3. The Map display <u>would be the same</u> for 50 degrees-<u>00 minutes</u> North, 20 degrees West.

— END —

APPENDIX L — NAT TASK LIST SUPPORTING A TRIAL APPLICATION OF RLATSM IN THE NAT (V2017_2)

(*paragraph 5.2.1 refers*)

Note: The "Task List Supporting the Trial Implementation of RLatSM in the ICAO NAT Region" is managed under the umbrella of the NAT POG, with input from the NAT SPG working structure (NAT IMG/36 Summary of Discussions, paragraph 4.6 refers).

Editorial Note: *Completed tasks or sub-tasks are shown with greyed out background, with white background kept on the part of the task where changes have been made compared to the last published version. In cases where only part of a Task is completed, only the associated sub-task will be shown in a greyed out box.*
Compared to the previously published version, text deleted uses strikeout (~~text deleted~~), and text added is with grey shading (text inserted).

	SUBJECT	**COMPLETION DATE**	**LEAD(S)** *NOTE: leads will coordinate with groups identified in next column*	**COORDINATION**	**KEY IMPLEMENTATION TASKS**
1	**Task List and Schedule**		NAT SARSIG	All contributory groups	Develop a Task List and schedule for completion of individual tasks.
2	**Concept of Operations**	At least 2 years prior to start of Trial, to support other activities Phase 1 - complete Phase 2 - complete Phase 3 -	NAT POG	NAT OPS/AIR (½ degree waypoints) - **COMPLETED**	Develop and coordinate Concept of Operations (CONOPS) and incorporate into appropriate operational policy and procedures documents (e.g., ICAO State Letters, State AIP Supplements, AIC's) The concept of operations shall include a Concept of Use, an impact assessment on the domestic interface, safety assessment of use of ½ degree waypoints and development of related mitigation. CONOPS for Phase 2 **completed** (NAT IMG Decision 43/04 refers). Note: This relates to Task 12
3	**Cost/Benefit Analysis (CBA)**	Phase 1 - complete Phase 2 - complete Phase 3 -	NAT EFG		Complete CBA/Business Case. **Completed** for Phase 1 (NAT EFG/24 SoD, para.3.4, 5.5 & 5.16 refer. **Completed** for Phase 2 (NAT EFG/28 SoD para 5.2 to 5.18 refers

	SUBJECT	**COMPLETION DATE**	**LEAD(S)** *NOTE: leads will coordinate with groups identified in next column*	**COORDINATION**	**KEY IMPLEMENTATION TASKS**
4	**ICAO SARPS and Guidance & NAT SPG Documents**	Post-trial	NAT POG/NAT TIG	NAT SOG	Review related ICAO SARPS and guidance documents – **Completed** NAT SPG documents –**Completed**
5	**RNP and Data Link authorization criteria**	**COMPLETED**	NAT SARSIG, NAT OPS/AIR	NAT SOG	**1.** Review ICAO Performance Based Navigation (PBN) Manual (ICAO Doc 9613) for current criteria for RNP authorization. (Third Edition – 2008 is current). **2.** Review GOLD for data link authorization criteria. **COMPLETED (**NAT SARSIG/19 SoD para. 3.7 a))
6	**Role of RCP and Surveillance Specifications**	May 2011 Phase 1 - complete **COMPLETED**	NAT SARSIG, NAT CNSG	NAT SOG	Establish role of RCP and RSP in RLatSM implementation plan. To be documented in NAT Performance Based Communication and Surveillance (PBCS) Implementation Plan. **COMPLETED** (NAT SPG Conclusions 48/07 & 49/05, and RLatSM Plan paragraph 8.1.5 refer)
7	**Coordination with ICAO HQ/SASP**	**COMPLETED**	NAT IMG		NAT SPG/50 Report para 1.6.3 and 7.1.11 refers
8	**Recommend target implementation dates for 25 NM lateral separation**	Phase 1 – complete Phase 2 – complete Phase 3 -	NAT IMG	NAT ATMG, NAT SARSIG, NAT CNSG	Establish target implementation dates for RLatSM implementation. Phase 1 – 12 November 2015, harmonized to NAT MNPS to PBN transition plan. Phase 2 approximately one year after commencement of Phase 1 provided approval by NAT IMG. Phase 3 – to be determined.

	SUBJECT	**COMPLETION DATE**	**LEAD(S)** *NOTE: leads will coordinate with groups identified in next column*	**COORDINATION**	**KEY IMPLEMENTATION TASKS**
9	**Recommend conditions required to proceed to each implementation phase**	Phase 1 – complete Phase 2 – complete Phase 3 –unnecessary **COMPLETED**	NAT ATMG	NAT IMG	Develop a recommendation for the approximate percentage of flights to be conducted by RLatSM eligible aircraft to proceed with Phase 1, Phase 2 and Phase 3 implementations. Assess airspace to be included and aircraft that would be consequently affected to determine whether to proceed to each implementation phase **COMPLETED** (NAT ATMG/43 SoD, para. 3.1 b))
10	**Operator/aircraft fleet readiness projection**	Phase 1 – Complete Phase 2 – ~~ongoing~~ Completed Phase 3 -	NAT TIG		Status of percentage of flights that filed RNP4 in the NAT. Communication and surveillance equipage is routinely monitored by NAT TIG
11	**ATC system modification**	End of 2011 **COMPLETED**	NAT ATMG and NAT CNSG		Identify the time schedule required to modify ATS provider ATC systems for RLatSM, including modifications necessary to take account of revised domestic route structures (see Task 17). See Table of ATC system changes arising from RLatSM implementation for details.

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
12	**NAT Safety Assessment**	Prior to trial Phase 1 – Complete Phase 2 – Complete Phase 3 -	NAT POG	NAT SOG	Complete the NAT Safety Management System (SMS) required documents (e.g., Safety Assessment/Collision Risk Modelling) to be available prior to trial. Confirmation of the basic CRM parameter assumptions as stated in the RLatSM analysis for the area of expected application under current /proposed conditions required for Phase 2 *SARSIG/20 SoD*, para 3.5 to 3.11, *SARSIG/21 SoD*, para 3.12 Task 13 also refers
13	**Coordination with NAT Safety Oversight Group**	Prior to trial Phase 1 – Complete Phase 2 - Phase 3 -	NAT IMG	NAT POG	As they develop (Task 12 refers), coordinate safety cases with SOG and present completed safety cases to SOG to support changes to the NAT air navigation system. Meeting in Iceland in February 2015 (NAT SPG/51 Report, para 4.1.8)

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
14	**Data Link System Performance**	Prior to trial **COMPLETED**	NAT SARSIG, NAT CNSG	NAT SOG	NAT SARSIG determine requirement for data link system performance and NAT CNSG establish whether or not it is being met, and if not, determine what measures should be taken. NAT Performance Based Communication and Surveillance Implementation Plan, Task 13 and **Task 17** refer. System is being measured against RCP240 and RSP180 and the 95% safety requirement is being met (NAT SPG Conclusion 49/05 refers). **COMPLETED**
15	**FANS 1/A or equivalent Over Iridium**	**COMPLETED**	NAT CNSG	NAT SARSIG, NAT SOG	Determine acceptability for FANS 1/A or equivalent CPDLC and ADS-C to be conducted over Iridium. Measure performance against RCP240 and RSP180 **COMPLETED - NAT IMG/40 confirmed acceptability of FANS 1/A over IRIDIUM for current separations. Performance acceptability for reduced separations for Iridium as well as all other data link media will be monitored as component of Task 14 and Task 36.**

	SUBJECT	**COMPLETION DATE**	**LEAD(S)** *NOTE: leads will coordinate with groups identified in next column*	**COORDINATION**	**KEY IMPLEMENTATION TASKS**
16	**Safety Management System (SMS) Document**(s)		NAT ANSPs	NAT PROVIDER STATES NAT SOG	**ATS provider requirement:** complete and submit SMS documents for Providers State approval approx 1 month prior. **Completed** for Gander and Shanwick pending approval 1 month prior trial from CAA. ~~Iceland pending~~
17	**Airspace structure redesign**	At least 2 AIRAC cycles prior to commencement of Trial	NAT ATMG	NAT SARSIG	Identify steps necessary to introduce ½ degree track spacing: Steps identified: Task considered **COMPLETED** (NAT IMG Decision 45/01 refers) Consider accommodations necessary at the domestic interfaces; consider steps necessary to incorporate changes into ATC systems (see also Task 11). This Task is linked to Task 18 and Task 32.

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
18	**Plan and schedule for aeronautical chart data publication**	Complete	NAT ATMG	NAT PROVIDER STATES NAT CNSG (OPS/AIR), NAT SOG	**1.** Develop plan and schedule for publication of revised aeronautical charts. Boundary fixes between Canada domestic airspace and Gander OCA approved, and published Boundary fixes between Shanwick and Scottish/Brest Domestic airspace approved and published Common AIRAC date 12 November 2015 for final publication between Shanwick, Gander and Brest, **2.** Work with Provider States and industry chart providers to revise chart panels, etc. to include services (data link, SATCOM, etc), frequencies and communication switching boundaries to charts. Coordination should be limited only to the coordination process as ICAO and State documents are the source material for aeronautical charts: third party commercial service providers and operators/users of this information are responsible for the accuracy of information on these charts. *Note* – this prepares the work plan for Task 32. This Task is linked to Task 17.

	SUBJECT	**COMPLETION DATE**	**LEAD(S)** *NOTE: leads will coordinate with groups identified in next column*	**COORDINATION**	**KEY IMPLEMENTATION TASKS**
19	**Information Dissemination Program**		AS DIRECTED BY NAT IMG	NAT SOG	**1.** Create RLatSM area in NAT Documentation section of ICAO EUR/NAT web site. **Complete**: included in "EUR & NAT Documents", "NAT Documents", under "Planning documents supporting separation reductions and other initiatives" **2.** Develop distribution list for State and industry organizations and key individuals. **3.** Distribute ICAO State letters, as necessary. (Include Training Centers). EUR/NAT 14-0098.TEC (10 February 2014) EUR/NAT 14-0078.TEC (10 February 2014) EUR/NAT 14-0263.TEC (15 April 2014) Support expected form States (*IMG/46 SoD*, para 4.22)

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
20	**Job Aids for ADS-C, CPDLC, RNP 4 Authorization Process**	Phase 1 – Complete **COMPLETED**	NAT SARSIG, NAT OPS/AIR	NAT SOG	**1.** Develop Job Aids (a repository for how-to guides or summaries to help understand and comply with policies and standards), as necessary, based on ICAO and NAT guidance. **2.** Post in RLatSM area on ICAO EUR/NAT web site. **3.** Ensure current PBN Manual and GOLD references incorporated. **COMPLETED** (NAT IMG Decisions 43/02 and 43/03 refer) No other official RCP/RSP other than GOLD publication to base job aids on: **Fully COMPLETED** Update to RNP 4 Job Aid provided endorsed by NAT IMG Decision 46/2 (*IMG/46 SoD, para 4.20 &* App. E).
21	**Advance notice to User States and Operators**	1 year prior to expected start date of Trial Phase 1 – Complete Phase 2 – Complete Phase 3 -	NAT POG	NAT IMG, NAT SOG	Develop suggested common language for Provider State AIC's and AIP Supplements) for NAT IMG approval showing intent to implement (key dates, basic plan and operating policy, etc.). This is advance notification of intent, ahead of the more detailed "finalized" material, which is addressed at Task 24). This Task is also closely related to Task 22 and Task 23 **COMPLETED for phase 1** (NAT IMG Decision 43/05 and EUR/NAT SL 14-0098.TEC refer) AIC from Canada to inform of delay in Phase 1 trial date, published on 16 October 2014 AIRAC date

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
22	**Publication of Advance Notice**	Phase 1 - complete Phase 2-	NAT PROVIDER STATES DOMESTIC INTERFACE STATES NAT IMG	NAT SOG	Publish State AIC's or AIP Supps developed in above Task 21 To be updated with the new date (no sooner than 12 November 2015).
23	**Draft ICAO State Letter**	1 year prior to expected start date of Trial Phase 1 - complete Phase 2 - Complete Phase 3 -	NAT POG	NAT IMG, NAT SOG	Draft ICAO State letter for NAT IMG approval to: outline project and advocate use of Job Aids and other guidance posted in the RLatSM area on the ICAO EUR/NAT web site. The purpose is to inform the NAT User States so they may prepare for the implementation. Note: this Task is closely related to Task 21 **COMPLETED for phase 1** (NAT IMG Decision 43/05 and EUR/NAT SL 14-0078.TEC refer)
24	**Operational Policy & Procedures documents (AICs, AIP Supps, NAT OPS Bulletins)**	At least 2 AIRAC cycles prior to commencement of Trial for AICs AIPs Approximately. 1 year prior for NAT OPS Bulletins	NAT POG	NAT TIG	Develop suggested common language for Provider State AIC's or AIP Supplements containing applicable operational policy and procedures for Provider State distribution. AIC completed (NAT ATMG/45 SoD para. 3.4 This task follows Task 21 This task is closely related to Task 25 Include NAT OPS bulletin with Special Emphasis Item Phase 1 – Complete Phase 2 – Complete

	SUBJECT	**COMPLETION DATE**	**LEAD(S)** ***NOTE:*** *leads will coordinate with groups identified in next column*	**COORDINATION**	**KEY IMPLEMENTATION TASKS**
25	**Publication of Operational Policy & Procedures documents**	At least 2 AIRAC cycles prior to commencement of Trial	NAT PROVIDER STATES DOMESTIC INTERFACE STATES	NAT SOG	Publish Provider State AIC's or AIP Supps developed in task 24 above. This task is closely related to Task 24
26	**Provider State ATS policy documents**		NAT PROVIDER STATES DOMESTIC INTERFACE STATES NAT SOG		Provider States revise or develop Air Traffic Services policy documents, as necessary.
27	**Pre-implementation Safety Assessment & Implementation Decision**	No later than 2 months before implementation date Phase 1 – Complete Phase 2 - Phase 3 -	NAT IMG	NAT SOG	Update and complete final Safety Assessment and Implementation Readiness Review. Make a Go/No go decision for each Phase. No further work to be contributed from SARSIG (SARSIG/21 SoD para 3.24c)) Update the status of the basic Collision Risk Modelling parameter estimates as compared to the RLatSM safety analyses for the area of expected application under current/proposed conditions: (SARSIG/21 SoD para 3.12) NAT SPG/51 Rpt para 4.1.9 & Conclusion 51/05

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
28	**Plan for Post Implementation Performance Monitoring**	Pre-trial No later than NAT SARSIG/22	NAT SARSIG, NAT CNSG	NAT SOG	Development of a set of initial critical system performance parameters (RLatSM Implementation Plan, Chapter 11: success criteria) that, if met, will yield confidence that the foundations for the safe application of RLatSM are met. The plan shall include roles of NAT DLMA, NAT CMA and NAT Provider States and any special data recollection requirement necessary to support the operational trial. **COMPLETE**
29	**Final Notice of decision to implement**	After NAT SPG/51 Phase 2 - TBD	NAT SPG, NAT IMG	NAT SOG	Provide notification to Provider and User States and operators of decision to implement. NAT IMG agreed to proceed with Phase 1 (*IMG/46 SoD*, para 4.23) Follows Task 27 **COMPLETE (**NAT SPG/51 Rpt para 4.1.9 & Conclusion 51/05)
30	**Operator Notification of decision to implement**	Phase 2- TBD	NAT PROVIDER STATES	NAT SOG	Announce decision to implement. See Task 29 **COMPLETE**: AIC published Phase 1
31	**State controller training**	Pre-trial	NAT PROVIDER STATES DOMESTIC INTERFACE STATES	NAT SOG	States train controllers. Gander- completed ~~Brest~~ ~~Shannon~~ Shanwick- completed ~~Reykjavík – Fall 2017~~ ~~Santa-Maria~~

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
32	**Aeronautical chart and navigation databases**	At least 2 AIRAC cycles prior to commencement of Trial	NAT PROVIDER STATES DOMESTIC INTERFACE STATES	NAT POG NAT TIG NAT SOG	**1.** Publish and distribute revised aeronautical chart and navigation information. **2.** Coordinate with industry chart providers. Coordination should be limited only to the coordination process as ICAO and State documents are the source material for aeronautical charts: third party commercial service providers and operators/users of this information are responsible for the accuracy of information on these charts. Note – Task 18 prepares the work plan for this task. This Task is linked to Task 17. **COMPLETED**
33	**Provider State ATC automation systems**	Pre-trial	NAT PROVIDER STATES DOMESTIC INTERFACE STATES	NAT SOG	Modify ATC automation systems and programs, as necessary. **COMPLETED**
34	**Operator readiness**	**DELETED**	OPERATORS NAT SOG	NAT OPS/AIR	Operators should plan to be ready by one month in advance of implementation. Note: Detailed check list/Job Aid to be developed by the NAT OPS/AIR sub-group Task **deleted** (NAT IMG/43 SoD, para.4.18 refers) and merged with Task 10

	SUBJECT	COMPLETION DATE	LEAD(S) *NOTE: leads will coordinate with groups identified in next column*	COORDINATION	KEY IMPLEMENTATION TASKS
35	**Formally agree target Implementation Dates**	Phase 1 –Complete Phase 2 – ongoing. 4/01/2018 TBC Phase 3 -	NAT SPG	NAT IMG, NAT SOG	Target date for implementation of each Phase of RLatSM. Phase 2 target date to be determined no later than NAT SPG/52, proposed date 10 November 2016 AIRAC (NAT ATMG/46 SoD, para 3.7)
36	**Post implementation monitoring**	Commencement of trial	NAT POG, NAT TIG, NAT DLMA, NAT CMA, NAT PROVIDER STATES	NAT SOG	ONGOING Conduct post-implementation monitoring of success criteria and convene specialists as necessary for monitoring. Task 28 refers Note: GOLD performance monitoring is carried out as part of the NAT PBCS plan and NAT DLMA
37	**½ degree regulatory requirements**	**DELETED**	NAT SOG	NAT SOG	Consider State's regulatory requirements to be established for operational approval to use ½ degree track spacing This Task is related to Task 17 Task **deleted** (NAT IMG/44 SoD, para.4.35 & 4.36 refer)

APPENDIX M — PROPOSAL FOR AMENDMENT TO NAT SUPPS, CONCERNING LATERAL AND LONGITUDINAL SEPARATION MINIMUM BETWEEN PBCS COMPLIANT ADS-C EQUIPPED AIRCRAFT IN THE SANTA MARIA OCEANIC FIR

(*paragraph 5.3.3 refers*)

1. *Insert* the following in NAT SUPPs, Chapter 6, AIR TRAFFIC SERVICES, 6.2 SEPARATION, Section 6.2.1.1, a); and
2. *Delete* the following in NAT SUPPs, Chapter 6, AIR TRAFFIC SERVICES, 6.2 SEPARATION, Section 6.2.1.1, b) and Section 6.2.2.3 a):

6.2.1 Lateral
(P-ATM – Chapter 5)

6.2.1.1 Minimum lateral separation shall be:

a) 42.6 km (23 NM) between aircraft operating within the control area of the Gander Oceanic FIR, Reykjavik Oceanic FIR, Santa Maria Oceanic FIR and Shanwick Oceanic FIR. This minima is applied in accordance with 5.4.1.2.1.6 b) 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.

b) 55.5 km (30NM) between aircraft operating within the control area of the New York Oceanic East 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 – RNP4 in accordance with of 4.1.2.1; and

3) surveillance – ADS-C RSP 180 in accordance with 5.1.1.1.

6.2.2 Longitudinal
(P-ATM – Chapter 5)

. . .

6.2.2.2 Minimum longitudinal separation based on time between non-turbo-jet aircraft shall be 30 minutes.

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 ~~and Santa Maria Oceanic 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.

APPENDIX N — PROPOSAL FOR AMENDMENT TO NAT SUPPS, CONCERNING NAT REGION RCF PROCEDURE

(*paragraph 5.4.1 refers*)

1. *Delete* the following in NAT SUPPs, Chapter 3 – Communications, Section 3.5.2:

3.5.2 HF operations
(A10, Vol. II – Chapter 5)

…

~~**3.5.2.3 Procedures to follow when unable to obtain an oceanic clearance using HF communications**~~
~~(P-ATM – Chapter 15)~~

~~3.5.2.3.1 Aircraft experiencing radio communication failure shall maintain their current flight level, route and speed to the Oceanic exit point. Thereafter, it shall follow the radio communication failure procedure applicable for that airspace.~~

~~*Note.— In this context, the current flight level is the last cleared level unless the preceding units' radio communication failure procedure dictates otherwise. In all cases, aircraft should stay in level flight in the oceanic area. Current speed should be the initial oceanic Mach number in the flight plan, if the aircraft does not have a speed clearance.*~~

2. *Insert* the following in NAT SUPPs, Chapter 9 – Special Procedures, Section 9.3:

9.3 AIR-GROUND COMMUNICATION FAILURE
(A2 – Chapter 3; P-ATM – Chapter 15; P-OPS, Vol. I)

Note.— The following procedures are intended to provide general guidance for aircraft operating into or from the NAT Region experiencing a communications failure. These procedures are intended to complement and not supersede Annex 2, the PANS-ATM and State procedures/regulations. It is not possible to provide guidance for all situations associated with a communications failure.

General

9.3.1 The pilot shall attempt to contact either another aircraft or any ATC facility and inform it of the difficulty and request that information be relayed to the ATC facility with whom communications are intended.

Communications failure prior to entering NAT Region

9.3.2 If operating with a received and acknowledged oceanic clearance, the pilot shall enter oceanic airspace at the cleared oceanic entry point, level and speed and proceed in accordance with the received and acknowledged oceanic clearance. Any level or speed changes required to comply with the oceanic clearance shall be completed within the vicinity of the oceanic entry point.

9.3.3. If operating without a received and acknowledged oceanic clearance, the pilot shall enter oceanic airspace at the first oceanic entry point, level and speed, as contained in the filed flight plan, and proceed via the filed flight plan route to landfall. That first oceanic level and speed shall be maintained to landfall.

Communications failure prior to exiting NAT Region – Cleared on filed flight plan route

9.3.4 The pilot shall proceed in accordance with the last received and acknowledged oceanic clearance, including level and speed, to the last specified oceanic route point, normally landfall, and then continue on the filed flight plan route. The pilot shall maintain the last assigned oceanic level and speed to landfall and, after passing the last specified oceanic route point, shall conform with the relevant State procedures/regulations.

Communications failure prior to exiting NAT Region – Cleared on other than filed flight plan route

9.3.5 The pilot shall 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 pilot shall conform with the relevant State procedures/regulations and rejoin the filed flight plan route by proceeding, via the published ATS route structure where possible, to the next significant point ahead as contained in the filed flight plan.

Note.— The relevant State procedures/regulations to be followed by aircraft in order to rejoin its filed flight plan route are specified in detail in the appropriate national Aeronautical Information Publication.

Procedures to follow when unable to obtain an oceanic clearance using HF communications

9.3.6 Aircraft experiencing radio communication failure shall maintain their current flight level, route and speed to the Oceanic exit point. Thereafter, it shall follow the radio communication failure procedure applicable for that airspace.

Note.— In this context, the current flight level is the last cleared level unless the preceding units' radio communication failure procedure dictates otherwise. In all cases, aircraft should stay in level flight in the oceanic area. Current speed should be the initial oceanic Mach number in the flight plan, if the aircraft does not have a speed clearance.

…

APPENDIX O — AIR NAVIGATION PLAN – NORTH ATLANTIC REGION, VOLUME III (NAT EANP, VOL III, DOC 9634, VERSION JUNE 2017)

(paragraphs 5.5.1 and 5.5.3 refer)

NORTH ATLANTIC (NAT) AIR NAVIGATION PLAN

VOLUME III

29 June 2018

ENDORSED BY NAT SPG/54

TABLE OF CONTENTS

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 (KPA)					
	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	Not 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.	

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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 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 (KPAs) and are interrelated and cannot be considered in isolation since all are necessary for the achievement of the objectives 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, 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 Y (Yes) or N (No). The impact assessment could be extended to more than five KPAs mentioned above if maturity of the national system allows and the process is available within the State to collect the data.

4. **Planning Targets 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 metric in this section allows to asses benefits accrued as a result of implementation of the module. The benefits or expectations, also known as Key Performance Areas (KPAs), are interrelated and cannot be considered in isolation since all are necessary for the achievement of the objectives 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 experience is 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.

Appendix B - Main Planning Table Template

	Objectives					Priorities and targets			Reference
Block	ASBU modules and elements Enablers	Performance Improvement Area	Applicable or not in [Region] (Yes/No)	Regional planning elements	Enablers	Priority allocated in [Region]	Target(s) in [Region]	Indicator(s) / Metric(s)	Supporting Planning Document (ANRF, other)

NAT ANP, VOLUME III

PART II – AIR NAVIGATION SYSTEM/ASBU IMPLEMENTATION

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

~~**1. INTRODUCTION**~~

~~1.1 The GANP and the ASBU concept and documents were developed to provide the framework and strategic direction for a global and harmonized aviation system. They provide strategic direction and define measurable operational improvements and include key civil aviation policy principles to assist ICAO Regions and States with the preparation and implementation of their air navigation plans.~~

~~1.2 The planning and implementation of required elements of selected ASBU Modules in the ICAO NAT Region should be undertaken within the framework of the NAT SPG with the participation and support of all stakeholders, including regulatory personnel so as to ensure global interoperability and harmonization of the aviation system.~~

~~1.3 The NAT GANP ASBU implementation status report is presented to the NAT SPG on an annual basis and, after NAT SPG endorsement, issued as a companion document to Volume III.~~

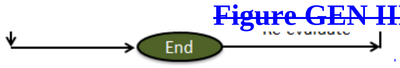
~~1.4 Figure GEN III-1 depicts the workflow for analysing and implementing ASBU Module elements. This same method can be applied with respect to Regional Aviation System Improvements or national aviation system improvements.~~

~~1.5 The significance of each step in the workflow as it pertains to regional planning is as follows:~~

- ~~Analysis Not Started – The requirement to implement this ASBU Module element has not yet been assessed by any State in the Region~~
- ~~Analysis In Progress – A Need Analysis as to whether or not this ASBU Module element is required is in progress by at least one State in the Region~~
- ~~N/A – The Region has decided not to implement this ASBU Module element~~
- ~~Need - One or more States in the Region have determined the ASBU Module element is required, but none have begun planning for the implementation~~
- ~~Planning – Implementation of this ASBU Module element is planned, but not started~~
- ~~Developing – Implementation of this ASBU Module element is in the development phase, but not yet operational~~
- ~~Partially Implemented – Implementation of this ASBU Module element is partially completed and/or operational in at least one area of the Region~~
- ~~Implemented - Implementation of this ASBU Module element has been completed and/or is fully operational in all areas of the Region where the need was identified~~

~~1.6 The analysis and implementation status determined in accordance with the above is reflected in the applicable ASBU Implementation Status Tables (Tables ASBU III-NAT-1 and 2).~~

~~Figure GEN III-1 – Analysis and Implementation Workflow~~



~~2. MONITORING OF ASBU MODULES IMPLEMENTATION~~

~~2.1 The monitoring of the regional implementation progress andshould be done by the NAT SPG for all planned elements. Due to the level of effort required, development of, and monitoring of, performance metrics/indicators should only be done for highest priority implementations.~~

~~3.32.2 The NAT SPG has determined the mechanisms and tools for the monitoring and collection of necessary data at regional levels.~~

~~Table ASBU-III-NAT-1 –NAT Region Implementation Status of Block 0 Module Elements~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
~~Performance Improvement Area 1: Airport Operations~~									
~~ACDM~~	~~1. Airport CDM procedures~~	~~PO~~		~~ISL~~	~~DK,NO,CAN,UK~~			~~US~~	
	~~2. Airport CDM tools~~	~~PO~~		~~ISL~~	~~DK,NO,CAN,UK~~				~~US~~
	~~3.Collaborative departure queue management~~	~~PO~~	~~ISL~~		~~DK,NO,UK~~	~~CAN~~	~~US~~		
~~APTA~~	~~1. PBN Approach Procedures with vertical guidance (LPV, LNAV/VNAV minima, using SBAS and Baro VNAV)~~	~~PO~~	~~DK~~		~~CAN,UK~~			~~ISL~~	~~NO,US~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
	~~2. PBN Approach Procedures without vertical guidance (LP, LNAV minima; using SBAS)~~	~~PO~~	~~DK~~		~~CAN,UK~~			~~ISL~~	~~NO,US~~
	~~2. GBAS Landing System (GLS) Approach procedures~~	~~ISL, PO~~	~~DK~~		~~NO,CAN,UK~~				~~US~~
~~RSEQ~~	~~1. AMAN via controlled time of arrival to a reference fix~~	~~ISL, PO~~			~~DK,NO,CAN,UK~~				~~US~~
	~~2. AMAN via controlled time of arrival at the aerodrome~~	~~ISL, PO~~			~~DK,NO,CAN,UK~~				~~US~~
	~~3. Departure management~~	~~ISL, PO~~			~~NO,CAN,UK~~			~~US~~	

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
	~~4. Departure flow management~~	~~ISL~~			~~DK,NO,CAN,UK~~		~~US~~	~~PO~~	
	~~5. Point merge~~				~~ISL,DK,NO,US,CAN,UK~~				
~~SURF~~	~~1. A-SMGCS with at least one cooperative surface surveillance system~~	~~PO~~			~~DK,NO,CAN,UK~~		~~ISL~~		~~US~~
	~~2. Including ADS-B APT as an element of A-SMGCS~~	~~PO~~			~~DK,NO,CAN,UK~~		~~ISL~~		~~US~~
	~~3. A-SMGCS alerting with flight identification information~~	~~ISL, PO~~			~~DK,NO,CAN,UK~~				~~US~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
	~~4. Airport vehicles equipped with transponders~~	~~ISL, PO~~			~~DK,NO,CAN,UK~~				~~US~~
~~WAKE~~	~~1. New PANS-ATM wake turbulence categories and separation minima~~	~~ISL,NO,CAN, PO~~	~~DK~~		~~US,UK~~				
	~~2. Dependent diagonal paired approach procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~				~~ISL,DK,NO,CAN,UK, PO~~				~~US~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status~~ ~~(if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
	~~3. Wake independent departure and arrival procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~				~~ISL,DK,NO,CAN,UK, PO~~			~~US~~	
	~~4. Wake turbulence mitigation for departures procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~	~~DK~~			~~ISL,NO,CAN,UK, PO~~				~~US~~
	~~5. 6 wake turbulence categories and separation minima~~	~~ISL,DK,NO, CAN,PO~~			~~UK~~				~~US~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status~~ ~~(if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
~~Performance Improvement Area 2: Globally Interoperable Systems and Data~~									
~~AMET~~	~~1. WAFS~~				~~DK,IRL,NO,CAN,UK~~				~~ISL,US,PO~~
	~~2. IAVW~~				~~DK,IRL,NO,CAN,UK~~				~~ISL,US,PO~~
	~~3. TCAC forecasts~~				~~ISL,DK,IRL,NO,CAN,UK~~				~~US,PO~~
	~~4. Aerodrome warnings~~	~~ISL,PO~~			~~DK,NO,CAN,UK~~				~~IRL,US~~
	~~5. Wind shear warnings and alerts~~	~~ISL,PO~~			~~CAN,UK~~				~~DK,IRL,US,NO~~
	~~6. SIGMET~~				~~CAN~~				~~ISL,DK,IRL,US,NO, UK,PO~~
	~~7. Other OPMET information (METAR, SPECI and/or TAF)~~		~~DK~~		~~CAN~~				~~ISL,IRL,US,NO,UK, PO~~
	~~8. QMS for MET~~				~~CAN~~				~~ISL,DK,IRL,US,NO, UK,PO~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
~~DATM~~	~~1. Aeronautical Information Exchange Model (AIXM)~~				~~DK,NO,UK~~	~~CAN ,PO~~		~~ISL~~	~~US,IRL~~
	~~2. eAIP~~						~~CAN~~		~~ISL,US,IRL,DK,NO, UK,PO~~
	~~3. Digital NOTAM~~	~~ISL,NO~~	~~CAN~~			~~PO~~			~~US,IRL,DK,UK~~
	~~4. eTOD~~				~~DK,NO,UK~~		~~ISL,PO~~	~~CAN~~	~~US,IRL~~
	~~5. WGS-84~~				~~DK,UK~~	~~CAN~~			~~ISL,US,IRL,NO,PO~~
	~~6. QMS for AIM~~				~~DK,UK~~				~~ISL,US,IRL,NO,CAN,PO~~
~~FICE~~	~~1. AIDC to provide initial flight data to adjacent ATSUs~~				~~DK,IRL,NO~~			~~ISL~~	~~US,CAN,UK,PO~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
	~~2. AIDC to update previously coordinated flight data~~				~~DK,IRL,NO~~	~~ISL~~		~~CAN~~	~~US,UK,PO~~
	~~3. AIDC for control transfer~~	~~ISL,CAN,UK, PO~~			~~DK,IRL,NO~~				~~US~~
	~~4. AIDC to transfer CPDLC logon information to the Next Data Authority~~	~~ISL,UK,PO~~			~~DK,IRL,NO~~	~~US~~			~~CAN~~
~~Performance Improvement Area 3: Optimum Capacity and Flexible Flights~~									
~~ACAS~~	~~1. ACAS II (TCAS version 7.1)~~				~~US,DK,CAN,UK~~				~~ISL,IRL, NO,PO~~
	~~2. Auto Pilot/Flight Director (AP.FD) TCAS~~	~~ISL,PO~~			~~US,IRL,DK,NO,CAN,UK~~				
	~~3. TCAS Alert Prevention (TCAP)~~	~~ISL,PO~~			~~US,IRL,DK,NO,CAN,UK~~				

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
~~ASEP~~	~~1. ATSA-AIRB~~	~~ISL,PO~~			~~IRL,DK,NO,CAN,UK~~				~~US~~
	~~2. ATSA-VSA~~	~~ISL,CAN,PO~~			~~IRL,DK,NO,UK~~				~~US~~
~~ASUR~~	~~1. ADS-B~~				~~DK,UK~~	~~IRL~~	~~NO~~		~~ISL,US,CAN,PO~~
	~~2.Multilateration (MLAT)~~				~~DK,NO,CAN~~		~~ISL~~	~~IRL~~	~~US,PO~~
~~FRTO~~	~~1. CDM incorporated into airspace planning~~	~~PO~~			~~DK,UK~~	~~IRL~~			~~ISL,US,NO,CAN~~
	~~2. Flexible Use of Airspace (FUA)~~				~~DK,UK~~			~~PO~~	~~ISL,IRL,US,NO,CAN~~
	~~3. Flexible route system~~				~~DK,UK~~				~~ISL,IRL,US,NO,CAN,PO~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
	~~4. CPDLC used to request and receive re-route clearances~~				~~DK~~		~~IRL,CAN~~	~~ISL,NO~~	~~US,UK,PO~~
~~NOPS~~	~~1. ATFM~~				~~DK,UK~~	~~ISL~~		~~PO~~	~~US,IRL,NO,CAN~~
~~OPFL~~	~~1. ITP using ADS-B~~	~~IRL,PO~~			~~ISL,DK,NO,CAN,UK~~				~~US~~
~~SNET~~	~~1. Short Term Conflict Alert implementation (STCA)~~				~~DK,UK~~			~~ISL,NO~~	~~US,IRL,CAN,PO~~
	~~2. Area Proximity Warning (APW)~~	~~ISL~~			~~DK,UK~~			~~PO~~	~~US,IRL,NO,CAN~~
	~~3. Minimum Safe Altitude Warning (MSAW)~~	~~ISL~~			~~DK,NO,CAN,UK~~			~~PO~~	~~US,IRL~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
	~~4. Medium Term Conflict Alert (MTCA)~~				~~DK,NO,UK~~		~~ISL,PO~~		~~US,IRL,CAN~~
~~Performance Improvement Area 4: Efficient Flight Paths~~									
~~CCO~~	~~1. Procedure changes to facilitate CCO~~				~~DK,NO,CAN,UK~~			~~ISl,IRL, PO~~	~~US~~
	~~2. Route changes to facilitate CCO~~				~~DK,NO,CAN,UK~~			~~ISL,IRL ,PO~~	~~US~~
	~~3. PBN SIDs~~				~~DK,CAN,UK~~			~~ISL,PO~~	~~IRL,US,NO~~
~~CDO~~	~~1. Procedure changes to facilitate CDO~~				~~DK,NO,CAN,UK~~			~~ISL,IRL ,PO~~	~~US~~
	~~2. Route changes to facilitate CDO~~				~~DK,NO,CAN,UK~~			~~ISL,IRL ,PO~~	~~US~~
	~~3. PBN STARs~~				~~DK,CAN,UK~~			~~ISL,PO~~	~~US,IRL,NO~~

~~Module~~	~~Elements~~	~~Need Analysis~~				~~Implementation Status (if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
~~TBO~~	~~1. ADS-C over oceanic and remote areas~~				~~DK,UK~~				~~ISL,IRL,US,NO,CAN,PO~~
	~~2. Continental CPDLC~~				~~DK,CAN,UK,PO~~	~~NO~~			~~ISL,IRL,US~~

~~Table ASBU-III-NAT-2 – NAT Region Implementation Status of Block 1 Module Elements~~

	~~Elements~~	~~Need Analysis of Elements~~				~~Implementation Status~~ ~~(if Element is needed)~~			
		~~Not Started~~	~~In Progress~~	~~Need~~	~~N/A~~	~~Planning~~	~~Developing~~	~~Partially Implemented~~	~~Implemented~~
~~Performance Improvement Area 1: Airport Operations~~									
~~ACDM~~	~~1. Airport Operations Plan (AOP) which encompasses local airport information and information that is shared with the ATM system/ATM network manager~~	~~ISL,US,NO,PO~~			~~CAN,UK~~				~~DK~~
	~~2. Airport performance framework integrated into AOP~~	~~ISL,US,NO,PO~~			~~CAN,UK~~				~~DK~~
	~~3. Airport performance framework aligned with regional/national performance framework(s)~~	~~ISL,US,NO~~		~~PO~~	~~CAN,UK~~				~~DK~~

	~~4. Decision making support to facilitate communication and coordination between airport stakeholders for joint planning~~	~~ISL,US,NO,PO~~			~~UK~~			~~CAN~~	~~DK~~
	~~5. Accessible information on airport resource availability and planned aircraft operations for use by airport operators and ATM system/network managers~~	~~ISL,US,NO,PO~~			~~DK,UK~~			~~CAN~~	
	~~6. Real time monitoring and alerting to activate collaborative airside/landside airport operations to respond to specific conditions, such as specified meteorological conditions/events~~	~~ISL,US,NO,PO~~			~~DK,CAN,UK~~				
~~APTA~~	~~1. CAT II PBN approach procedures~~	~~ISL,US,NO,PO~~	~~DK~~		~~CAN,UK~~				

	~~2. CAT III PBN approach procedures~~	~~ISL,US,NO,PO~~	~~DK~~		~~CAN,UK~~					
	~~3. CAT II GLS approach procedures~~	~~ISL,US,NO,PO~~	~~DK~~		~~CAN,UK~~					
	~~4. CAT III GLS approach procedures~~	~~ISL,US,NO,PO~~	~~DK~~		~~CAN,UK~~					
	~~5. PBN STARs directly integrated to approaches with vertical guidance~~	~~ISL,US,NO,PO~~			~~DK,CAN,UK~~					
~~RATS~~	~~1. Provision of tower control (TWR) or aerodrome flight information service (AFIS) for single aerodrome(s) by remotely located air traffic controllers (ATCO) or aerodrome flight information service officers (AFISO)~~	~~US,PO~~	~~ISL~~		~~DK,NO,CAN,UK~~					

	~~2. Provision of TWR or AFIS for multiple aerodromes by a single ATCO or AFISO~~	~~US,PO~~	~~ISL~~		~~NO,CAN,UK~~				~~DK~~
	~~3. Remote provision of ATS for contingency situations~~	~~US, NO~~	~~ISL~~		~~DK,CAN,UK~~	~~PO~~			
~~RSEQ~~	~~1. Surface management of runway demand and sequencing aircraft on the ground to support departure operations based on precise surface movement tracking~~	~~ISL,US,PO~~			~~NO,CAN,UK~~				~~DK~~
	~~2. Integration of departure sequencing and surface management~~	~~ISL,US,PO~~			~~DK,NO,CAN,UK~~				
	~~3. Arrival metering extended across FIR boundaries~~	~~ISL,US,CAN,PO~~			~~DK,NO,UK~~				

	~~4. Assignment of RNAV/RNP routes linked to controlled time of arrival at metering fixes~~	~~ISL,US,CAN,PO~~			~~NO,UK~~				~~DK~~
~~SURF~~	~~1. Basic surface situation awareness (SURF) through display of other aerodrome traffic to aircraft via ADS-B or TIS-B~~	~~US,PO~~	~~ISL~~		~~DK,NO,CAN,UK~~				
	~~2. SURF with Indications and Alerts (SURF-IA) for aircraft~~	~~US,PO~~	~~ISL~~		~~DK,NO,CAN,UK~~				
	~~3. SURF for airport vehicles~~	~~US,PO~~	~~ISL~~		~~DK,NO,CAN,UK~~				
	~~4. SURF-IA for airport vehicles~~	~~US,ISL,PO~~			~~DK,NO,CAN,UK~~				
	~~5. Enhanced vision systems for taxi operations~~	~~US,ISL,PO~~			~~DK,NO,CAN,UK~~				
~~WAKE~~	~~1. PANS-ATM aircraft leader/follower pair-wise wake turbulence separation minima~~	~~ISL,US,NO~~			~~DK,CAN,UK~~				

	~~2. Wake Turbulence Mitigation for Arrivals (WTMA) on parallel runways with runway centre lines spaced less than 760 m (2 500 feet) apart or on a single runway through variable application of wake turbulence separation dependant on the crosswinds present along the approach corridor~~	~~US~~			~~ISL,DK,NO,CAN,UK,PO~~				
	~~3. Wake Turbulence Mitigation for Departures (WTMD) on parallel runways with runway centre lines spaced less than 760 m (2 500 feet) through reduction of separation between departures when runway crosswinds are of sufficient strength and persistence~~	~~US~~			~~ISL,DK,NO,CAN,UK,PO~~				

~~Performance Improvement Area 2: Globally Interoperable Systems and Data~~										
~~AMET~~	~~1. Producing meteorological information elements that can be ingested by automated decision support tools~~	~~ISL,US,UK~~	~~DK~~		~~NO,CAN~~			~~PO~~	~~IRL~~
	~~2. Automated processing of meteorological information to derive predicted effects on airspace capacity~~	~~ISL,US,IRL,UK,PO~~			~~DK,NO,CAN~~				
	~~3. Automated processing of meteorological information to derive predicted effects on aerodrome capacity~~	~~ISL,US,IRL,UK,PO~~			~~DK,NO,CAN~~				
	~~4. Comparison of predicted meteorological airspace capacity constraints to projected demand~~	~~ISL,US,IRL,UK,PO~~			~~DK,NO,CAN~~				

	~~5. Comparison of predicted meteorological aerodrome capacity constraints to projected demand~~	~~ISL,US,IRL,UK,PO~~			~~DK,NO,CAN~~				
	~~6. Meteorological information integrated decision support that creates ranked mitigation strategies~~	~~ISL,US,IRL,UK,PO~~	~~DK~~		~~NO,CAN~~				
~~DATM~~	~~1. Implementation of digital information management using WXXM for meteorological information~~	~~ISL,US,UK,PO~~			~~DK, NO~~	~~IRL,CAN~~			
	~~2. Implementation of digital information management using FIXM for flight and flow information~~	~~ISL,US,IRL,UK,PO~~			~~DK, NO~~	~~CAN~~			

	~~3. Implementation of digital information management for aircraft performance-related data~~	~~ISL,US,IRL,UK,PO~~			~~DK, NO~~	~~CAN~~			
~~FICE~~	~~1. Ability for ATS to receive early flight intention information~~	~~ISL,US,IRL,UK~~			~~DK, NO~~	~~PO~~			~~CAN~~
	~~2. Ability for AOC and ATS to exchange 4D trajectory information~~	~~ISL,US,IRL,UK~~			~~DK, NO~~	~~PO~~	~~CAN~~		
	~~3. Implementation of a flight and flow information format using internet protocol and XML.~~	~~ISL,US,IRL,UK~~			~~DK, NO~~	~~CAN~~		~~PO~~	
	~~4. Allocation and use of globally unique flight identifiers (GUFI)~~	~~ISL,US,IRL,PO~~			~~DK, NO,UK~~	~~CAN~~			

	~~5. Ability for ATS to receive FF-ICE information elements~~	~~ISL,US,IRL,PO~~			~~DK, NO,UK~~	~~CAN~~			
~~SWIM~~	~~1. Implement structure/protocols for sharing information within communities of interest~~	~~ISL,US,NO,PO~~			~~DK,UK~~		~~CAN~~		~~IRL~~
	~~2. PANS-AIM~~	~~ISL,US,NO,UK, PO~~			~~DK~~		~~CAN~~		~~IRL~~
~~Performance Improvement Area 3: Optimum Capacity and Flexible Flights~~									
~~ASEP~~	~~1. Implementation of procedures for aircraft to be cleared to maintain a specified distance from a preceding aircraft from top of descent to the initial or final approach fix~~	~~ISL,US,PO~~			~~DK,IRL,NO,CAN,UK~~				

	~~2. Implementation of procedures for aircraft to be cleared to maintain a specified time interval between it and a preceding aircraft from top of descent to the initial or final approach fix~~	~~ISL,US,PO~~			~~DK,IRL,NO,CAN,UK~~				
~~FRTO~~	~~1. Free routing, including within defined airspace and/or at defined times and/or within defined flows.~~	~~US~~			~~DK,UK~~		~~PO~~	~~ISL, NO~~	~~IRL,CAN~~
	~~2. Maintaining same PBN route spacing between straight and turning segments~~	~~US~~			~~IRL,DK,NO,CAN,UK,PO~~			~~ISL~~	
	~~3. Publishing PBN holding procedures~~	~~US~~			~~DK,NO,CAN,UK~~			~~ISL,PO~~	~~IRL~~
	~~4. Dynamic sectorization~~				~~DK~~	~~NO~~			~~IRL,CAN,UK, PO~~

~~NOPS~~	~~1. Improving ATFM algorithms and techniques~~	~~ISL,US~~			~~DK,NO,UK~~			~~CAN,PO~~	~~IRL~~
	~~2. Integrating ATFM and Airspace Organization and Management (AOM) in the design of alternative route options for ATFM~~	~~ISL,US~~			~~DK,NO,UK~~			~~PO~~	~~IRL,CAN~~
	~~3. Using trajectory projections as soon as possible after departure to update ATFM requirements and perform additional ATFM smoothing for single flows~~	~~ISL,US~~			~~DK,IRL,NO,UK~~			~~PO~~	~~CAN~~
	~~4. Using trajectory projections as soon as possible after departure to update ATFM requirements and perform additional ATFM smoothing for converging flows~~	~~ISL,US~~			~~DK,IRL,NO,UK~~			~~PO~~	~~CAN~~

	~~5. Initial User Driven Prioritization Process (UDPP) whereby operators affected by ATFM measures can collaborate with each other and ATFM to devise alternative measures that serve ATFM requirements while at the same time taking account of operators' priorities~~	~~ISL,US~~			~~DK,NO,UK~~			~~PO~~	~~IRL,CAN~~
~~SNET~~	~~1. Implementation of Approach Path Monitor (APM), which generates timely alerts to ATCOs if aircraft are in unsafe proximity to obstacles or terrain during final approach~~	~~ISL,US,PO~~			~~DK,NO,CAN,UK~~				

	~~2. Implementation of accurate approach path model in APM which minimizes nuisance alerts~~	~~ISL,US,PO~~			~~DK,NO,CAN,UK~~				
~~Performance Improvement Area 4: Efficient Flight Paths~~									
~~CDO~~	~~1. CDO procedures defined as vertical paths to be followed within specified tolerances~~	~~US,PO~~			~~DK,NO,CAN,UK~~			~~ISL,IRL~~	
~~RPAS~~	~~1. Streamlined process for RPA access to non-segregated airspace~~	~~US,PO~~			~~DK,NO,CAN,UK~~	~~ISL~~			~~IRL~~
	~~2. Defined airworthiness certification for RPA~~	~~US,PO~~			~~DK,NO,CAN,UK~~	~~ISL~~			~~IRL~~
	~~3. Defined operator certification for RPA operators~~	~~US,PO~~			~~DK,NO,CAN,UK~~	~~ISL~~			~~IRL~~

	~~4. Defined communication performance requirements for Command and Control (C2) links and for ATC communications~~	~~US,PO~~			~~DK,IRL,NO,CAN,UK~~	~~ISL~~			
	~~5. Defined remote pilot licencing requirements~~	~~US,PO~~			~~DK,NO,CAN,UK~~	~~ISL~~			~~IRL~~
	~~6. Defined detect and avoid technology performance requirements~~	~~US,PO~~			~~DK,NO,CAN,UK~~	~~ISL~~	~~IRL~~		
~~TBO~~	~~1. Ability to download trajectory information via air/ground data link~~	~~ISL,US,UK~~			~~DK,IRL,NO~~			~~CAN~~	~~PO~~
	~~2. Ability to exchange complex route clearances via ground/ground data link from one ANSP to another~~	~~ISL,US,CAN~~			~~DK,IRL,NO~~			~~PO~~	~~UK~~

	~~3. Ability to exchange complex route clearances via ground/ground data link across multiple airspace boundaries~~	~~ISL,US,CAN~~			~~DK,NO,UK~~		~~IRL~~	~~PO~~	
	~~4. Initial 4D operations by specifying Required Time of Arrival (RTA)~~	~~ISL,US,PO~~			~~DK,NO,UK~~		~~IRL~~		~~CAN~~
	~~5. Data Link Operational Terminal Information Service (D-OTIS)~~	~~ISL,US,PO~~			~~DK,NO,CAN,UK~~			~~IRL~~	
	~~6. Departure clearances via data link (DCL)~~	~~US,PO~~	~~ISL~~		~~DK,NO,CAN,UK~~				~~IRL~~
	~~7. Data Link Taxi (D-TAXI)~~	~~ISL,US,PO~~			~~DK,IRL,NO,CAN,UK~~				

~~**NAT ASBU Air Navigation Reporting Forms**~~

~~*NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)*~~					
~~**PIA**~~	~~4 Efficient Flight Path~~	~~**Block - Module**~~	~~B0 - TBO~~	~~**Date**~~	~~Sep 2016~~
~~**Module Description**~~ ~~Improved Safety and Efficiency through the initial application of Data Link En-Route~~					
~~**Element Implementation Status**~~					
~~**1**~~	~~**Element Description**~~ ~~*ADS-C over oceanic and remote areas*~~		~~**Date Planned/Implemented**~~ ~~*Phased implementation from Feb 2013 to Jan 2020*~~		~~**Status**~~ ~~*Partially implemented*~~
	~~**Status Details**~~ ~~*Feb 2013 - Implemented on 3 core tracks FL350-390*~~ ~~*Feb 2015 - Implemented on all NAT OTS FL350-390*~~ ~~*Dec 2017 – Planned in all NAT HLA FL350-390*~~ ~~*Jan 2020 – Planned in all NAT above FL290*~~				
~~**2**~~	~~**Element Description**~~ ~~*Continental CPDLC*~~		~~**Date Planned/Implemented**~~		~~**Status**~~ ~~*N/A*~~
	~~**Status Details**~~				
~~**3**~~	~~**Element Description**~~		~~**Date Planned/Implemented**~~		~~**Status**~~
	~~**Status Details**~~				
~~**4**~~	~~**Element Description**~~		~~**Date Planned/Implemented**~~		~~**Status**~~
	~~**Status Details**~~				
~~**Achieved Benefits**~~					
~~*Access and Equity*~~ ~~Improved~~					
~~*Capacity*~~ ~~Increased~~					
~~*Efficiency*~~ ~~Increased access to the most fuel efficient flight profile~~					
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~					
~~*Safety*~~ ~~Lateral, longitudinal and vertical risk is reduced. Reduction of coordination errors~~ ~~More timely detection of errors, supporting reduced time at unprotected profile~~ ~~More accurate position reports and automated processing of position reports. Support normal flight tracking capability.~~					
~~**Implementation Challenges**~~					
~~*Ground system Implementation*~~					

~~*Avionics Implementation*~~ ~~FANS 1/A equipage is required~~
~~*Procedures Availability*~~
~~*Operational Approvals*~~ ~~Operators need to obtain PBCS and data link approvals, where applicable~~
~~**Notes**~~

~~*NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)*~~					
~~**PIA**~~	~~2-Globally interoperable system and data~~	~~**Block - Module**~~	~~B0-FICE~~	~~**Date**~~	~~Sep 2016~~
~~**Module Description**~~ ~~*Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration*~~					
~~**Element Implementation Status**~~					
~~**1**~~	~~**Element Description**~~ ~~*AIDC to provide initial flight data to adjacent ATSUs*~~		~~**Date Planned/Implemented**~~ ~~*2013*~~		~~**Status**~~ ~~*implemented*~~
	~~**Status Details**~~				
~~**2**~~	~~**Element Description**~~ ~~*AIDC to update previously coordinated flight data*~~		~~**Date Planned/Implemented**~~ ~~*2013*~~		~~**Status**~~ ~~*implemented*~~
	~~**Status Details**~~				
~~**3**~~	~~**Element Description**~~ ~~*AIDC for control transfer*~~		~~**Date Planned/Implemented**~~ ~~*Note 1*~~		~~**Status**~~ ~~*Note 1*~~
	~~**Status Details**~~				
~~**4**~~	~~**Element Description**~~ ~~*AIDC to transfer CPDLC logon information to the Next Data Authority*~~		~~**Date Planned/Implemented**~~ ~~*Note 1*~~[1]		~~**Status**~~ ~~*Note 1*~~
	~~**Status Details**~~				
~~**Achieved Benefits**~~					
~~*Access and Equity*~~ ~~Improved~~					
~~*Capacity*~~ ~~Increased~~					
~~*Efficiency*~~ ~~Increased access to the most fuel efficient flight profile~~					
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~					
~~*Safety*~~ ~~*Reduction of coordination errors*~~ ~~More timely detection of errors, supporting reduced time at unprotected profile~~					
~~**Implementation Challenges**~~					
~~*Ground system Implementation*~~ ~~Automation upgrades for full AIDC capability~~					
~~*Avionics Implementation*~~					

~~*Procedures Availability*~~
~~*Operational Approvals*~~
~~**Notes**~~

~~*NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)*~~					
~~**PIA**~~	~~3 Optimum capacity and flexible flights~~	~~**Block – Module**~~	~~B0 –ASUR~~	~~**Date**~~	~~Sep 2016~~
~~**Module Description**~~ ~~*Initial capability for ground surveillance*~~					
~~**Element Implementation Status**~~					
~~**1**~~	~~**Element Description**~~ ~~*-ADS-B*~~			~~**Date Planned/Implemented**~~ ~~*Phased implementation from 2010 to 2018*~~	~~**Status**~~ ~~*Partially implemented*~~
	~~**Status Details**~~ ~~*2010-Ground based ADS-B services provided from 6 sites in Canada and 4 sites in Greenland*~~ ~~*2011- 8 ADS-B stations installed in Iceland at 8 sites, 4 ADS-B stations installed in the Faroe Islands at two sites, 10 ADS-B stations installed in Greenland at 5 sites. 11 ADS-B stations installed in the central group of the Azores Islands at 11 sites*~~ ~~*2014 – ADS-B services implemented in Iceland.6 ADS-B stations installed in the western group of the Azores Islands at 6 sites*~~ ~~*2018 – 1 ADS-B station to be installed in the eastern group of the Azores Islands at 1 site*~~ ~~*2018 - Space based ADS-B services to be implemented*~~				
~~**2**~~	~~**Element Description**~~ ~~*Multilateration(MLAT)*~~			~~**Date Planned/Implemented**~~	~~**Status**~~
	~~**Status Details**~~ ~~*2011- 11 MLAT stations installed in the central group of the Azores Islands at 11 sites*~~ ~~*2014 - 6 MLAT stations installed in the western group of the Azores Islands at 6 sites*~~				
~~**3**~~	~~**Element Description**~~			~~**Date Planned/Implemented**~~	~~**Status**~~
	~~**Status Details**~~				
~~**4**~~	~~**Element Description**~~			~~**Date Planned/Implemented**~~	~~**Status**~~
	~~**Status Details**~~				
~~**5**~~	~~**Element Description**~~			~~**Date Planned/Implemented**~~	~~**Status**~~
	~~**Status Details**~~				
~~**Achieved Benefits**~~					
~~*Access and Equity*~~ ~~Improved~~					
~~*Capacity*~~ ~~Increased~~					
~~*Efficiency*~~ ~~Increased access to the most fuel efficient flight profile~~					
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~					

~~*Safety*~~ ~~Provide for surveillance capability in oceanic airspace. Provides for normal flight tracking capability and location of aircraft in distress.~~
~~**Implementation Challenges**~~
~~*System Implementation*~~ ~~Timely availability of SB ADS-B system and completion of standardisation work~~
~~*Avionics Implementation*~~
~~*Procedures Availability*~~
~~*Operational Approvals*~~
~~**Notes**~~

~~*NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)*~~					
~~**PIA**~~	~~2-Globally interoperable system and data~~	~~**Block Module**~~	~~B0-ATM~~	~~**Date**~~	~~Sep 2016~~
~~**Module Description**~~ ~~*Service Improvement through Digital Aeronautical Information Management.*~~					
~~**Element Implementation Status**~~					

~~**1**~~	~~**Element Description**~~ ~~*Aeronautical Information Exchange Model (AIXM)*~~	~~**Date Planned/Implemented**~~ ~~*Dec 2018*~~	~~**Status**~~ ~~*Partially implemented*~~
	~~**Status Details**~~ ~~*Iceland plans to be fully compliant by end of 2017.*~~ ~~*Portugal plans to be fully compliant by end of 2020*~~		
~~**2**~~	~~**Element Description**~~ ~~*eAIP*~~	~~**Date Planned/Implemented**~~ ~~*Dec 2018*~~	~~**Status**~~ ~~*Partially implemented*~~
	~~**Status Details**~~ ~~*Iceland plans to be fully compliant by end of 2017.*~~ ~~*Portugal eAIP fully implemented*~~		
~~**3**~~	~~**Element Description**~~ ~~*Digital NOTAM*~~	~~**Date Planned/Implemented**~~ ~~*Dec 2016*~~	~~**Status**~~ ~~*Partially implemented*~~
	~~**Status Details**~~ ~~*Iceland planned to be fully compliant by end of 2017.*~~ ~~Portugal plans to be fully compliant by end of 2020~~		
~~**4**~~	~~**Element Description**~~ ~~*eTOD*~~	~~**Date Planned/Implemented**~~ ~~*Dec 2018*~~	~~**Status**~~ ~~*Need Analysis Not Started*~~
	~~**Status Details**~~ ~~*Iceland fully compliant.*~~ ~~*Portugal plans to be fully compliant by end of 2017*~~		
~~**5**~~	~~**Element Description**~~ ~~*WGS-84*~~	~~**Date Planned/Implemented**~~ ~~Sep 2015~~	~~**Status**~~ ~~*Implemented*~~
	~~**Status Details**~~ ~~Portugal fully compliant~~		
~~**6**~~	~~**Element Description**~~ ~~*QMS for AIM*~~	~~**Date Planned/Implemented**~~ ~~Sep 2015~~	~~**Status**~~ ~~*Implemented*~~
	~~**Status Details**~~ ~~Portugal QMS implemented~~		

~~**Achieved Benefits**~~
~~*Access and Equity*~~ ~~Improved~~
~~*Capacity*~~ ~~Increased~~
~~*Efficiency*~~ ~~Increased~~
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~
~~*Safety*~~ ~~*Improved*~~
~~**Implementation Challenges**~~
~~*System Implementation*~~

~~*Avionics Implementation*~~
~~*Procedures Availability*~~
~~*Operational Approvals*~~
~~**Notes**~~

~~*NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)*~~					
~~**PIA**~~	~~2-Globally interoperable system and data~~	~~**Block - Module**~~	~~B0- AMET~~	~~**Date**~~	~~Sep 2016~~
~~**Module Description**~~ ~~*Meteorological information supporting enhanced operational efficiency and safety*~~					
~~**Element Implementation Status**~~					
~~**1**~~	~~**Element Description**~~ ~~*WAFS*~~		~~**Date Planned/Implemented**~~ ~~*SADIS FTP*~~ ~~*(1 September 2015)*~~		~~**Status**~~ ~~*Implemented*~~
	~~**Status Details**~~ ~~*Secure SADIS FTP is implemented*~~				
~~**2**~~	~~**Element Description**~~ ~~*IAVW*~~		~~**Date Planned/Implemented**~~ ~~*Sep 2015*~~		~~**Status**~~ ~~*Implemented*~~
	~~**Status Details**~~ ~~• *(Canada, France United Kingdom, United States) All VAACS issue fully compliant volcanic ash advisory (VAA) and volcanic ash advisory information in graphical format (VAG)*~~ ~~• *(Iceland, Portugal) All volcanic observatories issue fully compliant volcano observatory notice for aviation (VONA)*~~				
~~**3**~~	~~**Element Description**~~ ~~*TCAC forecasts*~~		~~**Date Planned/Implemented**~~ ~~*Sep 2015*~~		~~**Status**~~ ~~*Implemented*~~
	~~**Status Details**~~ ~~*The TCAC issues fully compliant tropical cyclone advisory (TCA) and tropical cyclone advisory in graphical format (TCG).*~~				
~~**4**~~	~~**Element Description**~~ ~~*Aerodrome warnings*~~		~~**Date Planned/Implemented**~~		~~**Status**~~ ~~*Need Analysis Not Started*~~
	~~**Status Details**~~				
~~**5**~~	~~**Element Description**~~ ~~*Wind shear warnings and alerts*~~		~~**Date Planned/Implemented**~~		~~**Status**~~ ~~*Need Analysis Not Started*~~
	~~**Status Details**~~				
~~**6**~~	~~**Element Description**~~ ~~*SIGMET*~~		~~**Date Planned/Implemented**~~ ~~Nov 2018~~		~~**Status**~~ ~~*Partially Implemented*~~
	~~**Status Details**~~ ~~Not all States issue fully compliant SIGMET~~ ~~For the NAT, the target level of performance is:~~ ~~- 98% of SIGMETs coded in compliance with Annex 3 SARPs~~				

~~**7**~~	~~**Element Description**~~ ~~*Other OPMET information (METAR, SPECI and/or TAF)*~~	~~**Date Planned/Implemented**~~	~~**Status**~~ ~~*Partially Implemented*~~
	~~**Status Details**~~ ~~For the NAT, the target level of performance is:~~ ~~- 95% of required METAR disseminated within 5 minutes of METAR observation time~~ ~~- 95% of required TAF disseminated within 35 minutes (30 minutes lead time plus 5 minutes transit time)~~		
~~**8**~~	~~**Element Description**~~ ~~*QMS for MET*~~	~~**Date Planned/Implemented**~~ ~~Sep 2015~~	~~**Status**~~ ~~*Implemented*~~
	~~**Status Details**~~		
~~**Achieved Benefits**~~			
~~*Access and Equity*~~ ~~Improved~~			
~~*Capacity*~~ ~~Increased~~			
~~*Efficiency*~~ ~~*Increased*~~			
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~			
~~*Safety*~~ ~~Improved~~			
~~**Implementation Challenges**~~			
~~*System Implementation*~~			
~~*Avionics Implementation*~~			
~~*Procedures Availability*~~			
~~*Operational Approvals*~~			
~~**Notes**~~			

~~*NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)*~~					
~~**PIA**~~	~~3-Optimum capacity and flexible flights~~	~~**Block - Module**~~	~~B1- FRTO~~	~~**Date**~~	~~Sep 2016~~
~~**Module Description**~~ ~~*Implementation of reduced longitudinal separation minima*~~					
~~**Element Implementation Status**~~					
~~**1**~~	~~**Description**~~ ~~*RLongSM Validation Trial*~~	~~**Date Planned/Implemented**~~ ~~*2010*~~	~~**Status**~~ ~~*Implemented*~~		
	~~**Status Details**~~ ~~*Applied between eligible pairs (FANS 1/A CPDLC /ADS-C (RCP240/RSP180 measured)) in Gander, Shanwick and Reykjavik OCA)*~~				

~~**2**~~	~~**Element Description**~~ ~~*PBCS*~~	~~**Date Planned/Implemented**~~ ~~*March 2018*~~	~~**Status**~~ ~~*Partially implemented*~~
	~~**Status Details**~~ ~~*Upgrade ground automation systems to process PBCS designators- ongoing*~~ ~~*Establish and implement the PBCS approval process-ongoing*~~		
~~**3**~~	~~**Element Description**~~ ~~*5 minutes longitudinal separation*~~	~~**Date Planned/Implemented**~~ ~~*March 2018*~~	~~**Status**~~ ~~*Developing*~~
	~~**Status Details**~~ ~~*To be implemented in accordance with the new PANS-ATM separation minima applicable from Nov 2016. Awaiting the successful completion of the transition strategy for States and airspace users to finalise PBCS approval processes, and for ANSPs to upgrade their automation systems to process PBCS flight plan designators*~~		
~~**4**~~	~~**Element Description**~~	~~**Date Planned/Implemented**~~	~~**Status**~~
	~~**Status Details**~~		
~~**5**~~	~~**Element Description**~~	~~**Date Planned/Implemented**~~	~~**Status**~~
	~~**Status Details**~~		
~~**Achieved Benefits**~~			
~~*Access and Equity*~~ ~~Improved~~			
~~*Capacity*~~ ~~Increased~~			
~~*Efficiency*~~ ~~Increased access to the most fuel efficient flight profile~~			
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~			
~~*Safety*~~ ~~Lateral, longitudinal and vertical risk do not increase~~			
~~**Implementation Challenges**~~			
~~*Ground system Implementation*~~ ~~Ground automation systems need to be updated~~			
~~*Avionics Implementation*~~ ~~FANS 1/A is required for longitudinal reduction of separation minima~~			
~~*Procedures Availability*~~			
~~*Operational Approvals*~~ ~~Operators need to obtain PBCS and PBN approvals~~			
~~**Notes**~~ ~~*Detailed information is provided in the NAT RlongSM and RLatSM implementation plans and tasks list. Visit http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx?RootFolder=%2FEURNAT%2FEUR%20and%20NAT%20Documents%2FNAT%20Documents%2FPlanning%20documents%20supporting%20separation%20reductions%20and%20other%20initiatives&FolderCTID=0x012000DAF95319EADD9946B510C5D7B595637D00AA5EB47B299B9A4BAD1968B24E18655C&View={2666E7DD-5F4E-4E64-B16A-CF142A1E5BC9}*~~			

~~*NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)*~~					
~~**PIA**~~	~~3 Optimum capacity and flexible flights~~	~~**Block - Module**~~	~~B1- FRTO~~	~~**Date**~~	~~Sep 2016~~
~~**Improvement Description**~~ ~~*Implementation of reduced lateral separation minima*~~					
~~**Element Implementation Status**~~					
~~**1**~~	~~**Element Description**~~ ~~*RLatSM validation trial Phase 1*~~		~~**Date Planned/Implemented**~~ ~~*Dec 2015*~~		~~**Status**~~ ~~*Implemented*~~
	~~**Status Details**~~ ~~*Applied on 3 core tracks in Gander, Shanwick and Reykjavik OCA. RNP 4 and FANS 1/A CPDLC /ADS-C (RCP240/RSP180 measured) are required*~~				
~~**2**~~	~~**Element Description**~~ ~~*RLatSM validation trial Phase 2*~~		~~**Date Planned/Implemented**~~ ~~*Nov 2016*~~		~~**Status**~~ ~~*Developing*~~
	~~**Status Details**~~ ~~*Applied on all NAT OTS in Gander, Shanwick and Reykjavik OCA. RNP 4 and FANS 1/A CPDLC /ADS-C (RCP240/RSP180 measured) are required*~~				
~~**3**~~	~~**Element Description**~~ ~~*23 NM reduced lateral separation*~~		~~**Date Planned/Implemented**~~ ~~*March 2018*~~		~~**Status**~~ ~~*Developing*~~
	~~**Status Details**~~ ~~*Upgrade ground automation systems to process PBCS designators- ongoing*~~ ~~*Establish and implement the PBCS approval process- ongoing*~~				
~~**4**~~	~~**Element Description**~~ ~~*23 NM reduced lateral separation*~~		~~**Date Planned/Implemented**~~ ~~*March 2018*~~		~~**Status**~~ ~~*Partially implemented*~~
	~~**Status Details**~~ ~~*Obtaining RNP 4 approvals ongoing. Equipage is increasing*~~				
~~**5**~~	~~**Element Description**~~ ~~*23 NM reduced lateral separation*~~		~~**Date Planned/Implemented**~~ ~~*March 2018*~~		~~**Status**~~ ~~*Developing*~~
	~~**Status Details**~~ ~~*Applied in New York Eats and Santa Maria OCAs, and on all NAT OTS in Gander, Shanwick and Reykjavik OCAs. RNP 4 and FANS 1/A CPDLC /ADS-C (RCP240/RSP180) are required*~~				
~~**Achieved Benefits**~~					
~~*Access and Equity*~~ ~~Improved~~					
~~*Capacity*~~ ~~*Increased*~~					
~~*Efficiency*~~ ~~Increased access to the most fuel efficient flight profile~~					
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~					
~~*Safety*~~ ~~Lateral, longitudinal and vertical risk do not increase~~					
~~**Implementation Challenges**~~					

~~*Ground system Implementation*~~ ~~Ground automation systems need to be updated~~
~~*Avionics Implementation*~~ ~~RNP 4 and FANS 1/A equipage is required for the lateral reduction of separation minima.~~
~~*Procedures Availability*~~
~~*Operational Approvals*~~ ~~Operators need to obtain PBCS and PBN approvals~~
~~**Notes**~~ ~~*Detailed information is provided in the NAT RlongSM and RLatSM implementation plans and tasks list. Visit http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx?RootFolder=%2FEURNAT%2FEUR%20and%20NAT%20Documents%2FNAT%20Documents%2FPlanning%20documents%20supporting%20separation%20reductions%20and%20other%20initiatives&FolderCTID=0x012000DAF95319EADD9946B510C5D7B595637D00AA5EB47B299B9A4BAD1968B24E18655C&View={2666E7DD-5F4E-4E64-B16A-CF142A1E5BC9}*~~

NAT ANP, VOLUME III

PART III - AIR NAVIGATION SYSTEM/REGIONAL AVIATION SYSTEM IMPROVEMENT (RASI) IMPLEMENTATION

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

~~**1. INTRODUCTION**~~

~~1.1 Part III indicates the implementation status of planned improvements to the NAT Region aviation system which are not covered in Part II.~~

~~1.2 Figure RASI III-1, the *NAT Service Development Roadmap* (NAT SDR) provides a high-level view of the plans for aviation system improvement in the NAT Region. The associated ANRFs provide the implementation status and indicate linkages to the ASBU Elements, if applicable.~~

~~NAT RASI Air Navigation Reporting Forms~~

~~**NAT RASI Air Navigation Reporting Form (NAT ANRF-RASI)**~~			
~~**RASI # - Title**~~	~~Greenland ATM Improvement Program~~	~~**Date**~~	~~Sep 2016~~

~~**Improvement Description**~~

~~The Greenland ATM Improvement Program applies to the airspace in the Sondreström FIR north of 6330N between F195 and F285. Traffic in this airspace is mostly domestic traffic in Greenland as well as international traffic to/from airports in Greenland. The applicable separation standards have for the most part been 120 NM lateral separation and 30 minutes longitudinal separation which has precluded efficient operations in the airspace.~~

~~The aim of the Greenland ATM Improvement Program is implementation of new and improved procedural separation standards, introduction of ADS-B surveillance services and Direct Controller Pilot (DCPC) VHF voice communications.~~

~~**Element Implementation Status**~~

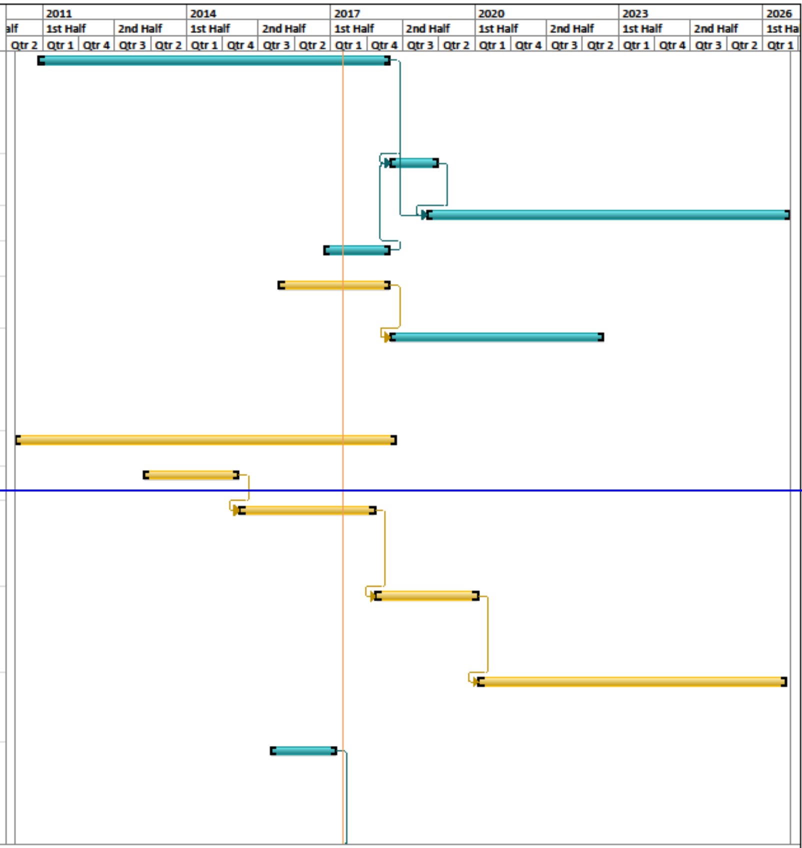
~~**1**~~	~~**Description**~~ ~~Operational trial of 20 NM lateral separation between GNSS equipped aircraft climbing/descending through the level of other GNSS equipped aircraft.~~	~~**Date Planned/Implemented**~~ ~~2013~~	~~**Status**~~ ~~Implemented~~
	~~**Status Details**~~		
~~**2**~~	~~**Description**~~ ~~Implementing 15 minutes longitudinal separation between other than turbojet aircraft using third party VHF communication.~~	~~**Date Planned/Implemented**~~ ~~2013~~	~~**Status**~~ ~~Implemented~~
	~~**Status Details**~~		
~~**3**~~	~~**Description**~~ ~~Implementing 15 minutes longitudinal separation between other than turbojet aircraft using DCPC VHF communication.~~	~~**Date Planned/Implemented**~~ ~~2015~~	~~**Status**~~ ~~Implemented~~
	~~**Status Details**~~		
~~**4**~~	~~**Description**~~ ~~Implementing 15 NM lateral separation between GNSS equipped aircraft in DCPC VHF voice communication.~~	~~**Date Planned/Implemented**~~ ~~2015~~	~~**Status**~~ ~~Implemented~~
	~~**Status Details**~~		
~~**5**~~	~~**Description**~~ ~~Implementing 7 NM lateral separation between GNSS equipped aircraft in DCPC VHF voice communication and climbing/descending through the level of other GNSS equipped aircraft~~	~~**Date Planned/Implemented**~~ ~~2015~~	~~**Status**~~ ~~Implemented~~
	~~**Status Details**~~		

~~**6**~~	~~**Description**~~ ~~Implementing ADS-B surveillance separation of 10 NM~~	~~**Date Planned/Implemented**~~ ~~2015~~	~~**Status**~~ ~~Implemented~~
	~~**Status Details**~~		
~~**7**~~	~~**Description**~~ ~~Application of "traditional" PANS-ATM procedural separation between aircraft in DCPC VHF voice communication.~~	~~**Date Planned/Implemented**~~ ~~2016~~	~~**Status**~~ ~~Implemented~~
	~~**Status Details**~~		
~~**Achieved Benefits**~~			
~~*Access and Equity*~~ ~~Improved~~			
~~*Capacity*~~ ~~Increased~~			
~~*Efficiency*~~ ~~Increased access to the most fuel efficient flight profile~~			
~~*Environment*~~ ~~Less fuel burn, reduced GHG emissions~~			
~~*Safety*~~ ~~No increase in safety risk~~			
~~**Implementation Challenges**~~			
~~*Ground system Implementation*~~			
~~*Avionics Implementation*~~			
~~*Procedures Availability*~~			
~~*Operational Approvals*~~			
~~**Notes**~~			

~~NAT Service Development Roadmap (NAT SDR)~~

~~Figure RASI III-1~~

ID		Task Mode	Task Name	Duration	Start	Finish	Predecessors
1			RLongSM Trial - Initial phase applied between eligible pairs (Gander & Shanwick, all HLA levels, FANS 1/1 CPDLC & ADS-C required (IMP Plan Ref.)	1912 days	Wed 12/1/10	Thu 3/29/18	
2			5 min LongSM (Doc 4444.RCP240/RSP180 reqd)	262 days	Thu 3/29/18	Fri 3/29/19	1,4
3			5 min LongsSM Next Phase (TBD)	1980 days	Tue 1/1/19	Sat 8/1/26	1,2
4			RLongSM Trial - Initial phase - Reykjavik	361 days	Thu 11/10/16	Thu 3/29/18	
5			UM137/DM40 automated impl + CPDLC route clearance	607 days	Wed 12/2/15	Thu 3/29/18	
6			Discontinuation of OCL	1162 days	Fri 3/30/18	Mon 9/12/22	5
7			Implementation SATVOICE	2076 days	Wed 6/2/10	Wed 5/16/18	
8			FANS 1/A DLM Phase 1 - 2 core tracks FL360 - 390	521 days	Thu 2/7/13	Thu 2/5/15	
9			FANS 1/A DLM Phase 2a - All OTS FL350 - 390 (areas of ATS surv & VHF voice, above 80N and New York excl)	741 days	Thu 2/5/15	Thu 12/7/17	8
10			FANS 1/A DLM Phase 2b - all HLA FL350 - 390 (areas of ATS surv & VHF voice, above 80N and New York excl)	561 days	Thu 12/7/17	Thu 1/30/20	9
11			FANS 1a DLM - all HLA above 290 (areas of ATS surv & VHF voice, above 80N excl)	1677 days	Thu 1/30/20	Fri 7/3/26	10
12			RLatSM Ph 1 (Gander & Shanwick) - 3 core tracks, FL350 - 390, FANS 1/A+RNP4, RCP240/RSP180 monitored	360 days	Thu 10/1/15	Wed 2/15/17	



Project: NAT SDR
Date: Fri 4/7/17

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Deadline | Progress

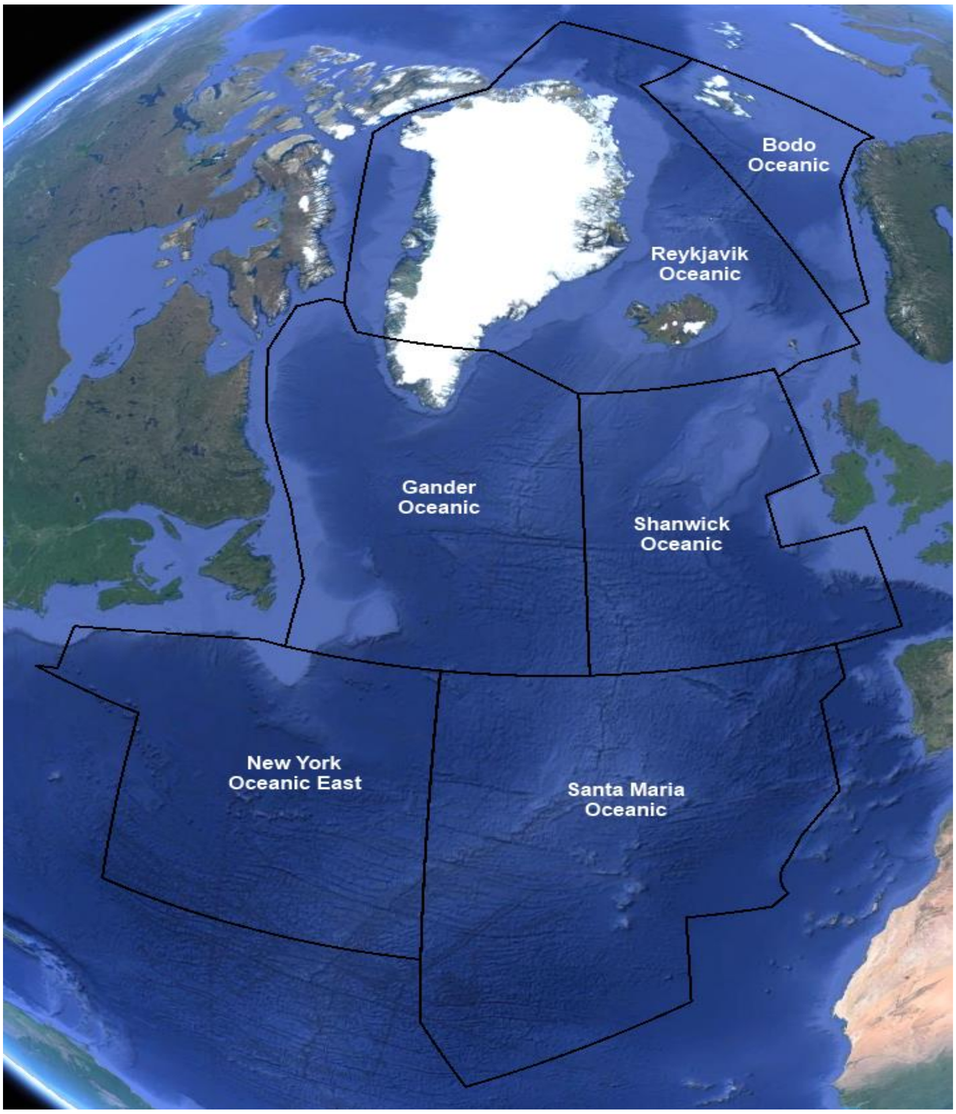
Page 1

- END -

APPENDIX P — 2017 GANP/ASBU IMPLEMENTATION STATUS REPORT – NAT REGION

(paragraphs 5.5.1 and 5.5.3 refer)

~~NORTH ATLANTIC (NAT)~~ GLOBAL AIR NAVIGATION PLAN (GANP)/AVIATION SYSTEM BLOCK UPGRADES (ASBU) IMPLEMENTATION STATUS REPORT - NORTH ATLANTIC (NAT) REGION



2017~~6~~

1. INTRODUCTION

1.1 NAT eANP 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) and.is used as a tool for monitoring and reporting the status of implementation of the above-mentioned elements, through the use of specific tables by appropriate NAT working groups as endorsed by North Atlantic Systems Planning Group (NAT SPG). The status of implementation is updated on a regular basis as endorsed by the NAT SPG.

1.2 The management of Volume III is the responsibility of 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.

2.3. The latest 5th Edition of the GANP was endorsed by the 39th Assembly of ICAO in October 2016.

3. PLANNING METHODOLOGY

3.1 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. Available technologies and ASBU Modules are evaluated to identify which of them best provide the needed operational improvements. Depending on the complexity of the selected technology or module element, 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 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.

4. REVIEW AND EVALUATION OF AIR NAVIGATION PLANNING

4.1 The progress and effectiveness against the priorities set out in the NAT air navigation plan is periodically reported, using an agreed reporting format, to ICAO.

4.2 NAT IMG agreed (NAT IMG Decision 48/15) that the monitoring and reporting will be carried out by NAT IMG contributory groups by using the following tools:

a) NAT ASBU implementation status forms;

b) NAT Air Navigation Reporting Form-ASBU (NAT ANRF-ASBU) and NAT ANRF - Regional Aviation System Improvements (RASI) forms.

4.3 For those modules that are related to and applicable in the aerodrome areas, e.g AMAN/WAKE/A-SMGCS, the status information is provided only for those aerodromes that are listed in the NAT AOP Table.

4.4 For those modules that are applicable to the en-route phase of flight for operations in the NAT, the status is provided at the State level.

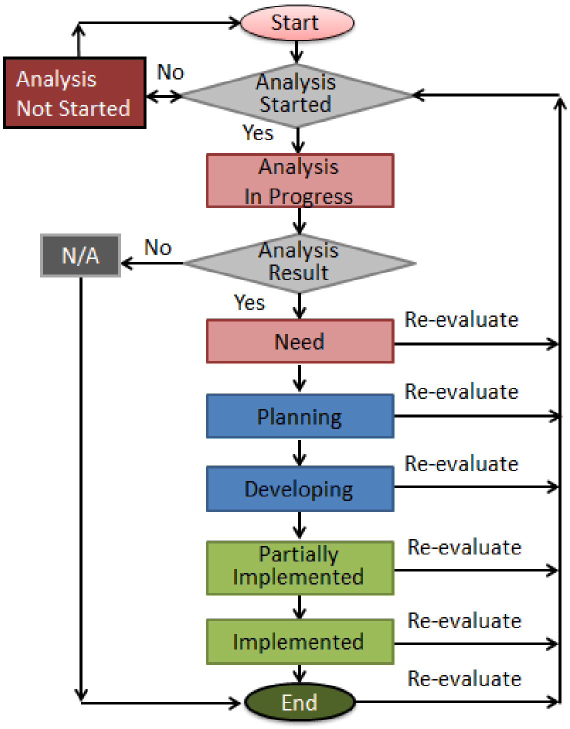
4.5 Depiction of the general planning and timelines is provided through the NAT Service Development Roadmap, which is also maintained by appropriate NAT working groups.

4.6 Figure 1 depicts the workflow for analysing and implementing ASBU Module elements.

4.7 The significance of each step in the workflow is as follows:

- **Analysis Not Started** – The requirement to implement this ASBU Module element has not yet been assessed
- **Analysis In Progress** – A Need Analysis as to whether or not this ASBU Module element is required is in progress
- **N/A** – The ASBU Module element is not required
- **Need -** The Need Analysis concluded that the ASBU Module element is required, but planning for the implementation has not yet begun
- **Planning** – Implementation of this ASBU Module element is planned, but not started
- **Developing** – Implementation of this ASBU Module element is in the development phase, but not yet operational
- **Partially Implemented** – Implementation of this ASBU Module element is partially completed and/or operational but all planned implementations are not yet complete
- **Implemented -** Implementation of this ASBU Module element has been completed and/or is fully operational where the need was identified

FIGURE 1 – ANALYSIS AND IMPLEMENTATION WORKFLOW



5. REPORTING AND MONITORING RESULTS

5.1 Reporting and monitoring results are analyzed by the NAT SPG, States and ICAO 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.

5.2 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.

6. NAT ASBU planning and implementation forms

6.1 Block 0

NAT Region Implementation Status of Block Elements – Block 0 Modules

Data provided by Canada, Denmark, Iceland, Ireland, Norway, Portugal, United States and United Kingdom

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
Performance Improvement Area 1: Airport Operations									
ACDM	~~1. Airport CDM procedures~~	~~PO~~		~~ISL~~	~~DK,NO,CAN,UK~~			~~US~~	
	~~2. Airport CDM tools~~	~~PO~~		~~ISL~~	~~DK,NO,CAN,UK~~				~~US~~
	1~~3~~. implement collaborative applications that will allow the sharing of surface operations data among the different stakeholders on the airport.~~Collaborative departure queue management~~	PO	~~ISL~~	ISL	DK,NO,UK CAN	~~CAN~~	~~US~~	IRL, US	
APTA	1. PBN Approach Procedures ~~with vertical guidance (LPV, LNAV/VNAV minima, using SBAS and Baro VNAV)~~	PO	DK		CAN,UK			ISL	IRL, NO,US
	~~2. PBN Approach Procedures without vertical guidance (LP, LNAV minima; using SBAS)~~	~~PO~~	~~DK~~		~~CAN,UK~~			~~ISL~~	~~NO,US~~
	2~~3~~. GBAS Landing System (GLS) Approach procedures	ISL, PO	DK		NO,CAN,UK				US
RSEQ	1. AMAN and time-based metering ~~via controlled time of arrival to a reference fix~~	~~ISL,~~ PO			DK,NO,CAN,UK			ISL	US
	~~2. AMAN via controlled time of arrival at the aerodrome~~	~~ISL, PO~~			~~DK,NO,CAN,UK~~				~~US~~
	2~~3~~. Departure management	ISL, PO			NO,CAN,UK			US	

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
	~~4. Departure flow management~~	~~ISL~~			~~DK,NO,CAN,UK~~		~~US~~	~~PO~~	
	35. Point merge				ISL,DK,NO,US,CAN,UK				IRL
SURF	1. Surveillance ~~A-SMGCS with at least one cooperative surface surveillance system~~	PO			DK,NO,CAN,UK		ISL	IRL	US
	2. ~~Including ADS-B APT as an element of A-SMGCS~~Alerting	PO			DK,NO,CAN,UK		ISL		US
	3. Enhanced vision systems for taxi operations ~~A-SMGCS alerting with flight identification information~~	ISL~~, PO~~			~~DK,NO,CAN,UK~~				~~US~~
	~~4. Airport vehicles equipped with transponders~~	~~ISL, PO~~			~~DK,NO,CAN,UK~~				~~US~~
WAKE	~~1. New PANS-ATM wake turbulence categories and separation minima~~	~~ISL,NO,CAN, PO~~	~~DK~~		~~US,UK~~				
	2. Increasing aerodrome arrival operational capacity~~Dependent diagonal paired approach procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~	ISL			~~ISL,~~DK,NO,CAN,UK, PO				US
	3. Increasing aerodrome departure operational capacity ~~Wake independent departure and arrival procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~	ISL			~~ISL,~~DK,NO,CAN,UK, PO			~~US~~	US

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
	~~4. Wake turbulence mitigation for departures procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~	~~DK~~			~~ISL,NO,CAN,UK, PO~~				~~US~~
	~~5. 6 wake turbulence categories and separation minima~~	~~ISL,DK,NO, CAN,PO~~			~~UK~~				~~US~~
Performance Improvement Area 2: Globally Interoperable Systems and Data									
AMET	1. WAFS				DK,IRL,NO,CAN,UK				ISL,US,PO
	2. IAVW				DK,IRL,NO,CAN,UK				ISL,US,PO
	3. TCAC forecasts				ISL,DK,IRL,NO,CAN,UK				US,PO
	4. Aerodrome warnings	ISL,PO			DK,NO,CAN,UK				IRL,US
	5. Wind shear warnings and alerts	ISL,PO			CAN,UK				DK,IRL,US,NO
	6. SIGMET				CAN				ISL,DK,IRL,US,NO, UK,PO
	7. Other OPMET information (METAR, SPECI and/or TAF)		DK		CAN				ISL,IRL,US,NO,UK, PO
	8. QMS for MET				CAN				ISL,DK,IRL,US,NO, UK,PO
DATM	1. Aeronautical Information Exchange Model (AIXM)				DK,NO,UK	CAN ,PO		ISL	US,IRL
	2. eAIP						CAN		ISL,US,IRL,DK,NO, UK,PO
	3. initial introduction of digital processing and management of information, through aeronautical information service (AIS)/aeronautical information management (AIM) implementation ~~Digital NOTAM~~	ISL,~~NO~~	~~CAN~~			~~PO~~			~~US,IRL,DK,UK~~
	~~4. eTOD~~				~~DK,NO,UK~~		~~ISL,PO~~	~~CAN~~	~~US,IRL~~

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
	~~5. WGS-84~~				~~DK,UK~~	~~CAN~~			~~ISL,US,IRL,NO,PO~~
	46. QMS for AIM				DK,UK				ISL,US,IRL,NO,CAN,PO
FICE	1. improve coordination between air traffic service units (ATSUs) by using ATS interfacility data communication (AIDC) defined by the ICAO Manual of Air Traffic Services Data Link Applications (Doc 9694).~~AIDC to provide initial flight data to adjacent ATSUs~~				DK,~~IRL,~~NO			ISL	US,CAN,UK,PO, IRL (OLDI)
	~~2. AIDC to update previously coordinated flight data~~				~~DK,IRL,NO~~	~~ISL~~		~~CAN~~	~~US,UK,PO~~
	~~3. AIDC for control transfer~~	~~ISL,CAN,UK,PO~~			~~DK,IRL,NO~~				~~US~~
	~~4. AIDC to transfer CPDLC logon information to the Next Data Authority~~	~~ISL,UK,PO~~			~~DK,IRL,NO~~	~~US~~			~~CAN~~
Performance Improvement Area 3: Optimum Capacity and Flexible Flights									
ACAS	1. ACAS II (TCAS version 7.1)				US,DK,CAN,UK				ISL,IRL, NO,PO
	~~2. Auto Pilot/Flight Director (AP.FD) TCAS~~	~~ISL,PO~~			~~US,IRL,DK,NO,CAN,UK~~				
	~~3. TCAS Alert Prevention (TCAP)~~	~~ISL,PO~~			~~US,IRL,DK,NO,CAN,UK~~				
ASEP	1. ATSA-AIRB	ISL,PO			IRL,DK,NO,CAN,UK				US
	2. ATSA-VSA	ISL,CAN,PO			IRL,DK,NO,UK				US
ASUR	1. ADS-B				DK,UK	IRL	NO		ISL,US,CAN,PO
	2.Multilateration (MLAT)				DK,NO,CAN		ISL	IRL	US,PO
FRTO	1. ~~CDM incorporated into a~~Airspace planning	PO			DK,UK	~~IRL~~			ISL,US,NO,CAN, IRL
	2. Flexible Use of Airspace (FUA)				DK,UK			PO	ISL,IRL,US,NO,CAN

Module	Elements	Need Analysis				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
	3. Flexible routing~~e system~~				DK,UK				ISL,IRL,US,NO,CAN ,PO
	~~4. CPDLC used to request and receive re-route clearances~~				~~DK~~		~~IRL,CAN~~	~~ISL,NO~~	~~US,UK,PO~~
NOPS	1. ATFM				DK,UK	ISL		PO	US,IRL,NO,CAN
OPFL	1. ITP using ADS-B	~~IRL,~~PO			ISL,DK,NO,CAN,UK, IRL				US
SNET	1. Short Term Conflict Alert implementation (STCA)				DK,UK			ISL,NO	US,IRL,CAN,PO
	2. Area Proximity Warning (APW)	ISL			DK,UK			PO	US,IRL,NO,CAN
	3. Minimum Safe Altitude Warning (MSAW)	ISL			DK,NO,CAN,UK			PO	US,IRL
	~~4. Medium Term Conflict Alert (MTCA)~~				~~DK,NO,UK~~		~~ISL,PO~~		~~US,IRL,CAN~~
Performance Improvement Area 4: Efficient Flight Paths									
CCO	1. Implement continuous climb operations in conjunction with performance-based navigation (PBN)~~Procedure changes to facilitate CCO~~				DK,~~NO,~~CAN,UK			ISL~~I~~,IRL,PO	US, NOR
	~~2. Route changes to facilitate CCO~~				~~DK,NO,CAN,UK~~			~~ISL,IRL ,PO~~	~~US~~
	~~3. PBN SIDs~~				~~DK,CAN,UK~~			~~ISL,PO~~	~~IRL,US,NO~~
CDO	1. Use performance-based airspace and arrival procedures allowing an aircraft to fly its optimum profile using continuous descent operations (CDOs).~~Procedure changes to facilitate CDO~~				DK,~~NO,~~CAN,UK			ISL,~~IRL~~ ~~,~~PO	US,IRL, NO
	~~2. Route changes to facilitate CDO~~				~~DK,NO,CAN,UK~~			~~ISL,IRL ,PO~~	~~US~~
	~~3. PBN STARs~~				~~DK,CAN,UK~~			~~ISL,PO~~	~~US,IRL,NO~~

Module	Elements	Need Analysis: Not Started	Need Analysis: In Progress	Need Analysis: Need	Need Analysis: N/A	Implementation Status (if Element is needed): Planning	Implementation Status (if Element is needed): Developing	Implementation Status (if Element is needed): Partially Implemented	Implementation Status (if Element is needed): Implemented
TBO	1. Implement a set of data link applications supporting surveillance and communications in air traffic services~~ADS-C over oceanic and remote areas~~				DK,UK				ISL,IRL,US,NO,CAN ,PO
	~~2. Continental CPDLC~~				~~DK,CAN,UK,PO~~	~~NO~~			~~ISL,IRL,US~~

6.2 Block 1

NAT Region Implementation Status of Block Elements – Block 1 Modules

	Elements	Need Analysis of Elements				Implementation Status (if Element is needed)			
		Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
Performance Improvement Area 1: Airport Operations									
ACDM	1. enhance the planning and management of airport operations and allow their full integration in the air traffic management using performance targets compliant with those of the surrounding airspace~~Airport Operations Plan (AOP) which encompasses local airport information and information that is shared with the ATM system/ATM network manager~~	ISL,US,NO,PO			CAN,UK			IRL	DK
	~~2. Airport performance framework integrated into AOP~~	~~ISL,US,NO,PO~~			~~CAN,UK~~				~~DK~~
	~~3. Airport performance framework aligned with regional/national performance framework(s)~~	~~ISL,US,NO~~		~~PO~~	~~CAN,UK~~				~~DK~~
	~~4. Decision making support to facilitate communication and coordination between airport stakeholders for joint planning~~	~~ISL,US,NO,PO~~			~~UK~~			~~CAN~~	~~DK~~
	~~5. Accessible information on airport resource availability and planned aircraft operations for use by airport operators and ATM system/network managers~~	~~ISL,US,NO,PO~~			~~DK,UK~~			~~CAN~~	
	~~6. Real time monitoring and alerting to activate collaborative airside/landside airport operations to respond to specific conditions, such as specified meteorological conditions/events~~	~~ISL,US,NO,PO~~			~~DK,CAN,UK~~				

APTA	1. Progress further with the universal implementation of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) approaches. PBN and GLS (CAT II/III) procedures~~CAT II PBN approach procedures~~	ISL,US,NO,PO	DK		CAN,UK				
	~~2. CAT III PBN approach procedures~~	~~ISL,US,NO,PO~~	~~DK~~		~~CAN,UK~~				
	~~3. CAT II GLS approach procedures~~	~~ISL,US,NO,PO~~	~~DK~~		~~CAN,UK~~				
	~~4. CAT III GLS approach procedures~~	~~ISL,US,NO,PO~~	~~DK~~		~~CAN,UK~~				
	~~5. PBN STARs directly integrated to approaches with vertical guidance~~	~~ISL,US,NO,PO~~			~~DK,CAN,UK~~				
RATS	1. Provision of tower control (TWR) or aerodrome flight information service (AFIS) for single aerodrome(s) by remotely located air traffic controllers (ATCO) or aerodrome flight information service officers (AFISO)	US,PO	ISL		DK,NO,CAN,UK			IRL	
	2. Provision of TWR or AFIS for multiple aerodromes by a single ATCO or AFISO	US,PO	ISL		NO,CAN,UK			IRL	DK
	3. Remote provision of ATS for contingency situations	US, NO	ISL		DK,CAN,UK	PO		IRL	
RSEQ	1. Surface management of runway demand and sequencing aircraft on the ground to support departure operations based on precise surface movement tracking	ISL,US,PO			NO,CAN,UK				DK
	2. Integration of departure sequencing and surface management	ISL,US,PO			DK,NO,CAN,UK				
	3. Arrival metering extended across FIR boundaries	ISL,US,CAN, PO			DK,NO,UK			IRL	
	4. Assignment of RNAV/RNP routes linked to controlled time of arrival at metering fixes	ISL,US,CAN, PO			NO,UK				DK

SURF	1. Basic surface situation awareness (SURF) through display of other aerodrome traffic to aircraft via ADS-B or TIS-B	US,PO	ISL		DK,NO,CAN,UK				
	~~2. SURF with Indications and Alerts (SURF-IA) for aircraft~~	~~US,PO~~	~~ISL~~		~~DK,NO,CAN,UK~~				
	~~3. SURF for airport vehicles~~	~~US,PO~~	~~ISL~~		~~DK,NO,CAN,UK~~				
	~~4. SURF-IA for airport vehicles~~	~~US,ISL,PO~~			~~DK,NO,CAN,UK~~				
	~~5. Enhanced vision systems for taxi operations~~	~~US,ISL,PO~~			~~DK,NO,CAN,UK~~				
WAKE	1. PANS-ATM aircraft leader/follower pair-wise wake turbulence separation minima	ISL,US,NO			DK,CAN,UK				
	2. Wake Turbulence Mitigation for Arrivals (WTMA) on parallel runways with runway centre lines spaced less than 760 m (2 500 feet) apart or on a single runway through variable application of wake turbulence separation dependant on the crosswinds present along the approach corridor	US			ISL,DK,NO,CAN,UK,PO				
	3. Wake Turbulence Mitigation for Departures (WTMD) on parallel runways with runway centre lines spaced less than 760 m (2 500 feet) through reduction of separation between departures when runway crosswinds are of sufficient strength and persistence	US			ISL,DK,NO,CAN,UK,PO				
Performance Improvement Area 2: Globally Interoperable Systems and Data									
AMET	1. Producing meteorological information elements that can be ingested by automated decision support tools	ISL,US,UK	DK		NO,CAN			PO	IRL

	2. Automated processing of meteorological information to derive predicted effects on airspace capacity	ISL,US,IRL, UK,PO			DK,NO,CAN				
	3. Automated processing of meteorological information to derive predicted effects on aerodrome capacity	ISL,US,IRL, UK,PO			DK,NO,CAN				
	4. Comparison of predicted meteorological airspace capacity constraints to projected demand	ISL,US,IRL, UK,PO			DK,NO,CAN				
	5. Comparison of predicted meteorological aerodrome capacity constraints to projected demand	ISL,US,IRL, UK,PO			DK,NO,CAN				
	6. Meteorological information integrated decision support that creates ranked mitigation strategies	ISL,US,IRL, UK,PO	DK		NO,CAN				
DATM	1. Implementation of digital information management using WXXM for meteorological information	ISL,US,UK,PO			DK, NO	IRL,CAN			
	2. Implementation of digital information management using FIXM for flight and flow information	ISL,US,IRL, UK,PO			DK, NO	CAN			
	3. Implementation of digital information management for aircraft performance-related data	ISL,US,IRL, UK,PO			DK, NO	CAN			
FICE	~~1. Ability for ATS to receive early flight intention information~~	~~ISL,US,IRL, UK~~			~~DK, NO~~	~~PO~~			~~CAN~~
	~~2. Ability for AOC and ATS to exchange 4D trajectory information~~	~~ISL,US,IRL, UK~~			~~DK, NO~~	~~PO~~	~~CAN~~		
	~~3. Implementation of a flight and flow information format using internet protocol and XML.~~	~~ISL,US,IRL, UK~~			~~DK, NO~~	~~CAN~~		~~PO~~	
	~~4. Allocation and use of globally unique flight identifiers (GUFI)~~	~~ISL,US,IRL,PO~~			~~DK, NO,UK~~	~~CAN~~			

	1~~5~~. introduce FF-ICE, Step 1 providing ground-ground exchanges before departure using common flight information exchange model (FIXM) and extensible markup language (XML) standard formats. FIXM~~Ability for ATS to receive FF-ICE information elements~~	ISL,US,IRL,PO			DK, NO,UK	CAN			
SWIM	1. Implementation of system-wide information management (SWIM) services (applications and infrastructure) creating the aviation intranet based on standard data models, and internet-based protocols to maximize interoperability.~~Implement structure/protocols for sharing information within communities of interest~~	ISL,US,NO,PO			DK,UK		CAN	IRL	~~IRL~~
	~~2. PANS-AIM~~	~~ISL,US,NO,UK,PO~~			~~DK~~		~~CAN~~		~~IRL~~
Performance Improvement Area 3: Optimum Capacity and Flexible Flights									
ASEP	1. Increased capacity and efficiency through interval management~~Implementation of procedures for aircraft to be cleared to maintain a specified distance from a preceding aircraft from top of descent to the initial or final approach fix~~	ISL,US,PO			DK,IRL,NO,CAN,UK				
	~~2. Implementation of procedures for aircraft to be cleared to maintain a specified time interval between it and a preceding aircraft from top of descent to the initial or final approach fix~~	~~ISL,US,PO~~			~~DK,IRL,NO,CAN,UK~~				
FRTO	1. Free routing, ~~including within defined airspace and/or at defined times and/or within defined flows~~.	US			DK,UK		PO	~~ISL,~~ NO	IRL,ISL, CAN

	2. Reduced route spacing~~Maintaining same PBN route spacing between straight and turning segments~~	~~US~~			~~IRL,DK,NO,CAN,UK,PO~~			~~ISL~~	ISL
	~~3. Publishing PBN holding procedures~~	~~US~~			~~DK,NO,CAN,UK~~			~~ISL,PO~~	~~IRL~~
	3~~4~~. Dynamic sectorization	ISL			DK	NO			IRL,CAN,UK,PO
NOPS	1~~1~~. ~~Improving ATFM algorithms and techniques~~ Integrating ATFM and Airspace Organization and Management (AOM) in the design of alternative route options for ATFM	ISL,US			DK,NO,UK			~~CAN,~~PO	IRL,CAN
	2~~2~~. Using trajectory projections as soon as possible after departure to update ATFM requirements and perform additional ATFM smoothing for single and converging flows ~~Integrating ATFM and Airspace Organization and Management (AOM) in the design of alternative route options for ATFM~~	ISL,US			DK,~~IRL,~~NOR,UK			PO	IRL,CAN
	3~~3~~. Initial User Driven Prioritization Process (UDPP) whereby operators affected by ATFM measures can collaborate with each other and ATFM to devise alternative measures that serve ATFM requirements while at the same time taking account of operators' priorities~~Using trajectory projections as soon as possible after departure to update ATFM requirements and perform additional ATFM smoothing for single flows~~	ISL,US			DK,~~IRL~~,NOR,UK			PO	CAN, IRL

	4~~4~~. Full FUA ~~Using trajectory projections as soon as possible after departure to update ATFM requirements and perform additional ATFM smoothing for converging flows~~	ISL~~,US~~			~~DK,IRL,NO,UK~~			~~PO~~	~~CAN~~
	5~~5~~. Complexity management ~~Initial User Driven Prioritization Process (UDPP) whereby operators affected by ATFM measures can collaborate with each other and ATFM to devise alternative measures that serve ATFM requirements while at the same time taking account of operators' priorities~~	ISL~~,US~~			~~DK,NO,UK~~			~~PO~~	~~IRL,CAN~~
SNET	1. Enhance safety by reducing the risk of controlled flight into terrain accidents on final approach and the risk of unstable approach through the use of approach path monitor (APM). ~~Implementation of Approach Path Monitor (APM), which generates timely alerts to ATCOs if aircraft are in unsafe proximity to obstacles or terrain during final approach~~	ISL,US,PO			DK,NO,CAN,UK				
	~~2. Implementation of accurate approach path model in APM which minimizes nuisance alerts~~	~~ISL,US,PO~~			~~DK,NO,CAN,UK~~				
Performance Improvement Area 4: Efficient Flight Paths									
CDO	1. CDO procedures defined as vertical paths to be followed within specified tolerances	US,PO			DK,NO,CAN,UK, IRL			ISL~~,IRL~~	
RPAS	1. Streamlined process for RPA access to non-segregated airspace	US,PO			DK,NO,CAN,UK	ISL			IRL
	2. Defined airworthiness certification for RPA	US,PO			DK,NO,CAN,UK	ISL			IRL

	3. Defined operator certification for RPA operators	US,PO			DK,NO,CAN,UK	ISL			IRL
	4. Defined communication performance requirements for Command and Control (C2) links and for ATC communications	US,PO			DK,IRL,NO,CAN,UK, IRL	ISL			
	5. Defined remote pilot licencing requirements	US,PO			DK,NO,CAN,UK	ISL			IRL
	6. Defined detect and avoid technology performance requirements	US,PO			DK,NO,CAN,UK, IRL	ISL	~~IRL~~		
TBO	~~1. Ability to download trajectory information via air/ground data link~~	~~ISL,US,UK~~			~~DK,IRL,NO~~			~~CAN~~	~~PO~~
	~~2. Ability to exchange complex route clearances via ground/ground data link from one ANSP to another~~	~~ISL,US,CAN~~			~~DK,IRL,NO~~			~~PO~~	~~UK~~
	~~3. Ability to exchange complex route clearances via ground/ground data link across multiple airspace boundaries~~	~~ISL,US,CAN~~			~~DK,NO,UK~~		~~IRL~~	~~PO~~	
	1~~4~~. Initial 4D operations by specifying Required Time of Arrival (RTA)	ISL,US,PO			DK,NO,UK, IRL		~~IRL~~		CAN
	2~~5~~. Data Link Operational Terminal Information Service (D-OTIS)	ISL,US,PO			DK,NO,CAN,UK			IRL	
	3~~6~~. Departure clearances via data link (DCL)	US,PO	ISL		DK,NO,CAN,UK				IRL
	4~~7~~. Data Link Taxi (D-TAXI)	ISL,US,PO			DK,IRL,NO,CAN,UK				

7. NAT ASBU planning and implementation analysis

7.1 Provisional implementation indicators

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	
B0-RSEQ	Improve Traffic flow through Runway Sequencing (AMAN/DMAN)	% of applicable international aerodromes having implemented AMAN / DMAN	
B0-SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	% of applicable international aerodromes having implemented A-SMGCS Level 2	
B0-ACDM	Improved Airport Operations through Airport-CDM	% of applicable international aerodromes having implemented improved airport operations through airport-CDM	
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	
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.	
B0-ASEP	Air Traffic Situational Awareness (ATSA)	% of States having implemented air traffic situational awareness	
B0-OPFL	Improved access to optimum flight levels through climb/descent procedures using ADS-B	% of FIRs having implemented in-trail procedures	
B0-ACAS	ACAS Improvements	% of States requiring carriage of ACAS (with TCAS 7.1 evolution)	

Module Code	Module Title	Implementation Indicator	Remarks
1	**2**	**3**	**4**
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	

7.2 Implementation progress assessment for B0 modules

Module	Elements	Number of fully or partially implemented	Number of N/A	% of implemented with N/A excluded
ACDM	1. ~~i~~Implement collaborative applications that will allow the sharing of surface operations data among the different stakeholders on the airport ~~Airport CDM procedures~~	~~1~~2	4	~~25~~50
	~~2. Airport CDM tools~~	~~1~~	~~4~~	~~25~~
	~~3.Collaborative departure queue management~~	~~0~~	~~3~~	~~0~~
APTA	1. PBN Approach Procedures~~ with vertical guidance (LPV, LNAV/VNAV minima, using SBAS and Baro VNAV~~)	~~3~~4	2	~~50~~66.7
	~~. PBN Approach Procedures without vertical guidance (LP, LNAV minima; using SBAS)~~	~~3~~	~~2~~	~~50~~
	2~~3~~. GBAS Landing System (GLS) Approach procedures	~~1~~2	3	~~20~~40
RSEQ	1. AMAN and time-based metering via controlled time of arrival to a reference fix~~AMAN via controlled time of arrival to a reference fix~~	~~1~~2	4	~~25~~50
	~~2. AMAN via controlled time of arrival at the aerodrome~~	~~1~~	~~4~~	~~25~~
	2. Departure management	1	3	20
	~~4. Departure flow management~~	~~1~~	~~4~~	~~25~~
	3. Point merge	~~0~~1	6	~~0~~50
SURF	1. Surveillance~~A-SMGCS with at least one cooperative surface surveillance system~~	~~1~~2	4	~~25~~50
	2. Alerting~~Including ADS-B APT as an element of A-SMGCS~~	1	4	25
	3. Enhanced vision systems for taxi operations~~A-SMGCS alerting with flight identification information~~	~~1~~0	~~4~~	~~25~~0
	~~4. Airport vehicles equipped with transponders~~	~~1~~	~~4~~	~~25~~
WAKE	~~1. New PANS-ATM wake turbulence categories and separation minima~~	~~0~~	~~2~~	~~0~~
	1~~2~~. Increasing aerodrome arrival operational capacity~~Dependent diagonal paired approach procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~	1	~~6~~5	~~50~~33.3
	~~3~~2. Increasing aerodrome departure operational capacity~~Wake independent departure and arrival procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~	1	~~6~~5	~~50~~33.3
	~~4. Wake turbulence mitigation for departures procedures for parallel runways with centrelines spaced less than 760 meters (2,500 feet) apart~~	~~1~~	~~5~~	~~33~~
	~~5. 6 wake turbulence categories and separation minima~~	~~1~~	~~1~~	~~14~~
AMET	1. WAFS	3	5	100
	2. IAVW	3	5	100
	3. TCAC forecasts	2	6	100

Module	Elements	Number of fully or partially implemented	Number of N/A	% of implemented with N/A excluded
	4. Aerodrome warnings	2	4	50
	5. Wind shear warnings and alerts	4	2	66.7
	6. SIGMET	7	1	100
	7. Other OPMET information (METAR, SPECI and/or TAF)	6	1	85.7~~86~~
	8. QMS for MET	7	1	100
DATM	1. Aeronautical Information Exchange Model (AIXM)	3	3	60
	2. eAIP	7	0	87.~~,~~5
	3. initial introduction of digital processing and management of information, through aeronautical information service (AIS)/aeronautical information management (AIM) implementation~~Digital NOTAM~~	~~4~~0	0	~~50~~0
	~~4. eTOD~~	~~3~~	~~3~~	~~60~~
	~~5. WGS-84~~	~~5~~	~~2~~	~~83~~
	4~~6~~. QMS for AIM	6	2	100
FICE	1. improve coordination between air traffic service units (ATSUs) by using ATS interfacility data communication (AIDC) defined by the ICAO Manual of Air Traffic Services Data Link Applications (Doc 9694).~~AIDC to provide initial flight data to adjacent ATSUs~~	~~5~~6	~~3~~2	100
	~~2. AIDC to update previously coordinated flight data~~	~~4~~	~~3~~	~~80~~
	~~3. AIDC for control transfer~~	~~1~~	~~3~~	~~20~~
	~~4. AIDC to transfer CPDLC logon information to the Next Data Authority~~	~~1~~	~~3~~	~~20~~
ACAS	1. ACAS II (TCAS version 7.1)	4	4	100
	~~2. Auto Pilot/Flight Director (AP.FD) TCAS~~	~~0~~	~~6~~	~~0~~
	~~3. TCAS Alert Prevention (TCAP)~~	~~0~~	~~6~~	~~0~~
ASEP	1. ATSA-AIRB	1	5	33.3
	2. ATSA-VSA	1	4	25
ASUR	1. ADS-B	4	2	66.7
	2.Multilateration (MLAT)	3	3	60
FRTO	1. ~~CDM incorporated into a~~Airspace planning	~~4~~5	2	~~67~~83.3
	2. Flexible Use of Airspace (FUA)	6	2	100
	3. Flexible routing~~e system~~	6	2	100
	~~4. CPDLC used to request and receive re-route clearances~~	~~5~~	~~1~~	~~83~~
NOPS	1. ATFM	5	2	83.3
OPFL	1. ITP using ADS-B	1	~~5~~6	~~33~~50
SNET	1. Short Term Conflict Alert implementation (STCA)	6	2	100
	2. Area Proximity Warning (APW)	5	2	83.3
	3. Minimum Safe Altitude Warning (MSAW)	3	4	75
	~~4. Medium Term Conflict Alert (MTCA)~~	~~3~~	~~3~~	~~60~~
CCO	1. Implement continuous climb operations in conjunction with performance-based navigation (PBN)~~Procedure changes to facilitate CCO~~	~~4~~5	~~4~~3	100
	~~2. Route changes to facilitate CCO~~	~~4~~	~~4~~	~~100~~
	~~3. PBN SIDs~~	~~5~~	~~3~~	~~100~~
CDO	1. Use performance-based airspace and arrival procedures allowing an aircraft to fly its optimum profile using continuous descent operations (CDOs~~Procedure changes to facilitate CDO~~	~~4~~3	~~4~~5	100
	~~2. Route changes to facilitate CDO~~	~~4~~	~~4~~	~~100~~
	~~3. PBN STARs~~	~~5~~	~~3~~	~~100~~
TBO	1. Implement a set of data link applications supporting surveillance and communications in air traffic service~~ADS-C over oceanic and remote areas~~	6	2	100
	~~2. Continental CPDLC~~	~~3~~	~~4~~	~~75~~

8. NAT ANRF-ASBU and ANRF-RASI forms

8.1 NAT ANRF ASBU

NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)					
PIA	4-Efficient Flight Path	**Block - Module**	B0- TBO	**Date**	~~Sep 2016~~June 2018
Module Description Improved Safety and Efficiency through the initial application of Data Link En-Route					
Element Implementation Status					
1	**Element Description** *~~ADS-C~~Data Link Mandate (DLM) over oceanic and remote areas*		**Date Planned/Implemented** *Phased implementation from Feb 2013 to Jan 2020*		**Status** *Partially implemented*
	Status Details *Feb 2013 - Implemented on 3 core tracks FL350-390* *Feb 2015 - Implemented on all NAT OTS FL350-390* *Dec 2017 – ~~Planned~~ Implemented in all NAT HLA FL350-390* *Jan 2020 – Planned in all NAT above FL290*				
2	**Element Description** *~~Continental CPDLC~~ FANS 1/A*		**Date Planned/Implemented**		**Status** *N/A*
	Status Details				
3	**Element Description**		**Date Planned/Implemented**		**Status**
	Status Details				
4	**Element Description**		**Date Planned/Implemented**		**Status**
	Status Details				
Achieved Benefits					
Access and Equity Improved					
Capacity Increased					
Efficiency Increased access to the most fuel efficient flight profile					
Environment Less fuel burn, reduced GHG emissions					
Safety Lateral, longitudinal and vertical risk is reduced. Reduction of coordination errors More timely detection of errors, supporting reduced time at unprotected profile More accurate position reports and automated processing of position reports. Support normal flight tracking capability.					

Implementation Challenges
Ground system Implementation
Avionics Implementation FANS 1/A equipage is required
Procedures Availability
Operational Approvals Operators need to obtain PBCS and data link approvals, where applicable
Notes

NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)					
PIA	2-Globally interoperable system and data	**Block - Module**	B0-FICE	**Date**	~~Sep 2016~~June 2018
Module Description *Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration*					
Element Implementation Status					
1	**Element Description** *AIDC to provide initial flight data to adjacent ATSUs*			**Date Planned/Implemented** *2013*	**Status** *implemented*
	Status Details				
2	**Element Description** *AIDC to update previously coordinated flight data*			**Date Planned/Implemented** *2013*	**Status** *Partly implemented*
	Status Details *Iceland planned implementation 2019.*				
3	**Element Description** *AIDC for control transfer*			**Date Planned/Implemented** *Note 1*	**Status** *Note 1*
	Status Details				
4	**Element Description** *AIDC to transfer CPDLC logon information to the Next Data Authority*			**Date Planned/Implemented** *Note 1*~~[1]~~	**Status** *Note 1*
	Status Details				
Achieved Benefits					
Access and Equity Improved					
Capacity Increased					
Efficiency Increased access to the most fuel efficient flight profile					
Environment Less fuel burn, reduced GHG emissions					
Safety *Reduction of coordination errors* More timely detection of errors, supporting reduced time at unprotected profile					
Implementation Challenges					
Ground system Implementation Automation upgrades for full AIDC capability					
Avionics Implementation					

~~[1] To be clarified at the meeting~~

Procedures Availability
Operational Approvals
Notes 1 Elements 3 and 4 will probably not be implemented.

NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)					
PIA	3-Optimum capacity and flexible flights	**Block - Module**	B0- ASUR	**Date**	~~Sep 2016~~June 2018

Module Description *Initial capability for ground surveillance*			
Element Implementation Status			
1	**Element Description** *ADS-B*	**Date Planned/Implemented** *Phased implementation from 2010 to 2020~~18~~*	**Status** *Partially implemented*
	Status Details *2010-Ground based ADS-B services provided from 6 sites in Canada and 4 sites in Greenland* *2011- 8 ADS-B stations installed in Iceland at 8 sites, 4 ADS-B stations installed in the Faroe Islands at two sites, 10 ADS-B stations installed in Greenland at 5 sites. 11 ADS-B stations installed in the central group of the Azores Islands at 11 sites* *2014 - ADS-B services implemented in Iceland.6 ADS-B stations installed in the western group of the Azores Islands at 6 sites* *2018 - 1 ADS-B station to be installed in the eastern group of the Azores Islands at 1 site* *2019~~8~~ - Space based ADS-B services to be implemented as a trial*		
2	**Element Description** *Multilateration(MLAT)*	**Date Planned/Implemented**	**Status**
	Status Details *2011- 11 MLAT stations installed in the central group of the Azores Islands at 11 sites* *2014 - 6 MLAT stations installed in the western group of the Azores Islands at 6 sites*		
3	**Element Description**	**Date Planned/Implemented**	**Status**
	Status Details		
4	**Element Description**	**Date Planned/Implemented**	**Status**
	Status Details		
5	**Element Description**	**Date Planned/Implemented**	**Status**
	Status Details		
Achieved Benefits			
Access and Equity Improved			
Capacity Increased			
Efficiency Increased access to the most fuel efficient flight profile			
Environment Less fuel burn, reduced GHG emissions			

Safety Provide for surveillance capability in oceanic airspace. Provides for normal flight tracking capability and location of aircraft in distress.
Implementation Challenges
System Implementation Timely availability of SB ADS-B system and completion of standardisation work
Avionics Implementation
Procedures Availability
Operational Approvals
Notes

NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)					
PIA	2-Globally interoperable system and data	**Block - Module**	B0- ATM	**Date**	~~Sep 2016~~June 2018
Module Description *Service Improvement through Digital Aeronautical Information Management.*					

Element Implementation Status			
1	**Element Description** *Aeronautical Information Exchange Model (AIXM)*	**Date Planned/Implemented** *Dec 2018*	**Status** *Partially implemented*
	Status Details *Iceland ~~plans to be~~ fully compliant ~~by end of 2017~~.* *Portugal plans to be fully compliant by end of 2020*		
2	**Element Description** *eAIP*	**Date Planned/Implemented** *Dec 2018*	**Status** *Partially implemented*
	Status Details *Iceland ~~plans to be~~ fully compliant ~~by end of 2017~~.* *Portugal eAIP fully implemented*		
3	**Element Description** *Digital NOTAM*	**Date Planned/Implemented** *Dec 2016*	**Status** *Partially implemented*
	Status Details *Iceland planned to be fully compliant by end of 2023~~17~~.* Portugal plans to be fully compliant by end of 2020		
4	**Element Description** *eTOD*	**Date Planned/Implemented** *Dec 2018*	**Status** *Need Analysis Not Started*
	Status Details *Iceland fully compliant.* *Portugal plans to be fully compliant by end of 2017*		
5	**Element Description** *WGS-84*	**Date Planned/Implemented** Sep 2015	**Status** *Implemented*
	Status Details *Iceland fully compliant.* *Portugal fully compliant*		
6	**Element Description** *QMS for AIM*	**Date Planned/Implemented** Sep 2015	**Status** *Implemented*
	Status Details *Iceland fully compliant.* *Portugal QMS implemented*		
Achieved Benefits			
Access and Equity Improved			
Capacity Increased			
Efficiency Increased			
Environment Less fuel burn, reduced GHG emissions			

Safety *Improved*
Implementation Challenges
System Implementation
Avionics Implementation
Procedures Availability
Operational Approvals
Notes

NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)					
PIA	2-Globally interoperable system and data	**Block - Module**	B0- AMET	**Date**	Sep 2016
Module Description *Meteorological information supporting enhanced operational efficiency and safety*					

Element Implementation Status			
1	**Element Description** *WAFS*	**Date Planned/Implemented** *SADIS FTP* *(1 September 2015)*	**Status** *Implemented*
	Status Details *Secure SADIS FTP is implemented*		
2	**Element Description** *IAVW*	**Date Planned/Implemented** *Sep 2015*	**Status** *Implemented*
	Status Details • *(Canada, France United Kingdom, United States) All VAACS issue fully compliant volcanic ash advisory (VAA) and volcanic ash advisory information in graphical format (VAG)* • *(Iceland, Portugal) All volcanic observatories issue fully compliant volcano observatory notice for aviation (VONA)*		
3	**Element Description** *TCAC forecasts*	**Date Planned/Implemented** *Sep 2015*	**Status** *Implemented*
	Status Details *The TCAC issues fully compliant tropical cyclone advisory (TCA) and tropical cyclone advisory in graphical format (TCG).*		
4	**Element Description** *Aerodrome warnings*	**Date Planned/Implemented**	**Status** *Need Analysis Not Started*
	Status Details		
5	**Element Description** *Wind shear warnings and alerts*	**Date Planned/Implemented**	**Status** *Need Analysis Not Started*
	Status Details		
6	**Element Description** *SIGMET*	**Date Planned/Implemented** Nov 2018	**Status** *Partially Implemented*
	Status Details Not all States issue fully compliant SIGMET For the NAT, the target level of performance is: - 98% of SIGMETs coded in compliance with Annex 3 SARPs		
7	**Element Description** *Other OPMET information (METAR, SPECI and/or TAF)*	**Date Planned/Implemented**	**Status** *Partially Implemented*
	Status Details For the NAT, the target level of performance is: - 95% of required METAR disseminated within 5 minutes of METAR observation time - 95% of required TAF disseminated within 35 minutes (30 minutes lead time plus 5 minutes transit time)		
8	**Element Description** *QMS for MET*	**Date Planned/Implemented** Sep 2015	**Status** *Implemented*

	Status Details
Achieved Benefits	
Access and Equity Improved	
Capacity Increased	
Efficiency *Increased*	
Environment Less fuel burn, reduced GHG emissions	
Safety Improved	
Implementation Challenges	
System Implementation	
Avionics Implementation	
Procedures Availability	
Operational Approvals	
Notes	

NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)					
PIA	3-Optimum capacity and flexible flights	**Block - Module**	B1- FRTO	**Date**	~~Sep 2016~~June 2018
Module Description *Implementation of reduced longitudinal separation minima*					
Element Implementation Status					

1	**Description** *RLongSM Validation Trial*	**Date Planned/Implemented** *2010*	**Status** *Implemented*
	Status Details *Applied between eligible pairs (FANS 1/A CPDLC /ADS-C (RCP240/RSP180 measured)) in Gander, Shanwick and Reykjavik OCA)*		
2	**Element Description** *PBCS*	**Date Planned/Implemented** *March 2018*	**Status** *~~Partially~~ ~~i~~Implemented*
	Status Details *Upgrade ground automation systems to process PBCS designators- ~~ongoing~~Done* *Establish and implement the PBCS approval process-~~ongoing~~Done*		
3	**Element Description** *5 minutes longitudinal separation*	**Date Planned/Implemented** *March 2018*	**Status** *~~Developing~~* *Implemented*
	Status Details *~~To be I~~implemented in accordance with the new PANS-ATM separation minima applicable from Nov 2016. ~~Awaiting the successful completion of the transition strategy for States and airspace users to finalise PBCS approval processes, and for ANSPs to upgrade their automation systems to process PBCS flight plan designators~~*		
4	**Element Description**	**Date Planned/Implemented**	**Status**
	Status Details		
5	**Element Description**	**Date Planned/Implemented**	**Status**
	Status Details		

Achieved Benefits
Access and Equity Improved
Capacity Increased
Efficiency Increased access to the most fuel efficient flight profile
Environment Less fuel burn, reduced GHG emissions
Safety Lateral, longitudinal and vertical risk do not increase
Implementation Challenges

Ground system Implementation Ground automation systems need to be updated
Avionics Implementation FANS 1/A is required for ~~longitudinal reduction of~~ PBCS separation. ~~minima~~
Procedures Availability
Operational Approvals Operators need to obtain PBCS and PBN approvals
Notes *Detailed information is provided in the NAT RlongSM, ~~and~~ RLatSM, PBCS implementation plans and tasks list.* *Visit http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx?RootFolder=%2FEURNAT%2FEUR%20and%20NAT%20Documents%2FNAT%20Documents%2FPlanning%20documents%20supporting%20separation%20reductions%20and%20other%20initiatives&FolderCTID=0x012000DAF95319EADD9946B510C5D7B595637D00AA5EB47B299B9A4BAD1968B24E18655C&View={2666E7DD-5F4E-4E64-B16A-CF142A1E5BC9}*

NAT ASBU Air Navigation Reporting Form (NAT ANRF-ASBU)					
PIA	3-Optimum capacity and flexible flights	**Block - Module**	B1- FRTO	**Date**	~~Sep 2016~~June 2018
Improvement Description *Implementation of reduced lateral separation minima*					
Element Implementation Status					
1	**Element Description** *RLatSM validation trial Phase 1*	**Date Planned/Implemented** *Dec 2015*		**Status** *Implemented*	
	Status Details *Applied on 3 core tracks in Gander, Shanwick and Reykjavik OCA. RNP 4 and FANS 1/A CPDLC /ADS-C (RCP240/RSP180 measured) are required*				
2	**Element Description** *RLatSM validation trial Phase 2*	**Date Planned/Implemented** *Nov 2016*		**Status** *Implemented* ~~*Developing*~~	
	Status Details *Applied on all NAT OTS in Gander, Shanwick and Reykjavik OCA. RNP 4 and FANS 1/A CPDLC /ADS-C (RCP240/RSP180 measured) are required*				
3	**Element Description** *23 NM reduced lateral separation*	**Date Planned/Implemented** *March 2018*		**Status** ~~*Developing*~~ *Implemented*	
	Status Details *Upgrade ground automation systems to process PBCS designators- ongoing* *Establish and implement the PBCS approval process*- ongoing				
4	**Element Description** *23 NM reduced lateral separation*	**Date Planned/Implemented** *March 2018*		**Status** ~~*Partially*~~ *I~~i~~mplemented*	
	Status Details *Obtaining RNP 4 approvals ongoing. Equipage is increasing*				
5	**Element Description** *23 NM reduced lateral separation*	**Date Planned/Implemented** *March 2018*		**Status** ~~*Developing*~~ *Implemented*	
	Status Details *Applied in New York Eats and Santa Maria OCAs, and on all NAT OTS in Gander, Shanwick and Reykjavik OCAs. RNP 4 and FANS 1/A CPDLC /ADS-C (RCP240/RSP180) are required*				
Achieved Benefits					
Access and Equity Improved					
Capacity *Increased*					
Efficiency Increased access to the most fuel efficient flight profile					
Environment Less fuel burn, reduced GHG emissions					

Safety Lateral, longitudinal and vertical risk do not increase
Implementation Challenges
Ground system Implementation Ground automation systems need to be updated
Avionics Implementation RNP 4 and FANS 1/A equipage is required for the lateral reduction of separation minima.
Procedures Availability
Operational Approvals Operators need to obtain PBCS and PBN approvals
Notes *Detailed information is provided in the NAT RlongSM and RLatSM implementation plans and tasks list. Visit http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx?RootFolder=%2FEURNAT%2FEUR%20and%20NAT%20Documents%2FNAT%20Documents%2FPlanning%20documents%20supporting%20separation%20reductions%20and%20other%20initiatives&FolderCTID=0x012000DAF95319EADD9946B510C5D7B595637D00AA5EB47B299B9A4BAD1968B24E18655C&View={2666E7DD-5F4E-4E64-B16A-CF142A1E5BC9}*

8.2 NAT ANRF RASI

NAT RASI Air Navigation Reporting Form (NAT ANRF-RASI)			
RASI # - Title	Greenland ATM Improvement Program	**Date**	~~Sep 2016~~June 2018

Improvement Description

The Greenland ATM Improvement Program applies to the airspace in the ~~Sondreström~~ Nuuk FIR north of 6330N between F195 and F285. Traffic in this airspace is mostly domestic traffic in Greenland as well as international traffic to/from airports in Greenland. The applicable separation standards have for the most part been 120 NM lateral separation and 30 minutes longitudinal separation which has precluded efficient operations in the airspace.

The aim of the Greenland ATM Improvement Program is implementation of new and improved procedural separation standards, introduction of ADS-B surveillance services and Direct Controller Pilot (DCPC) VHF voice communications.

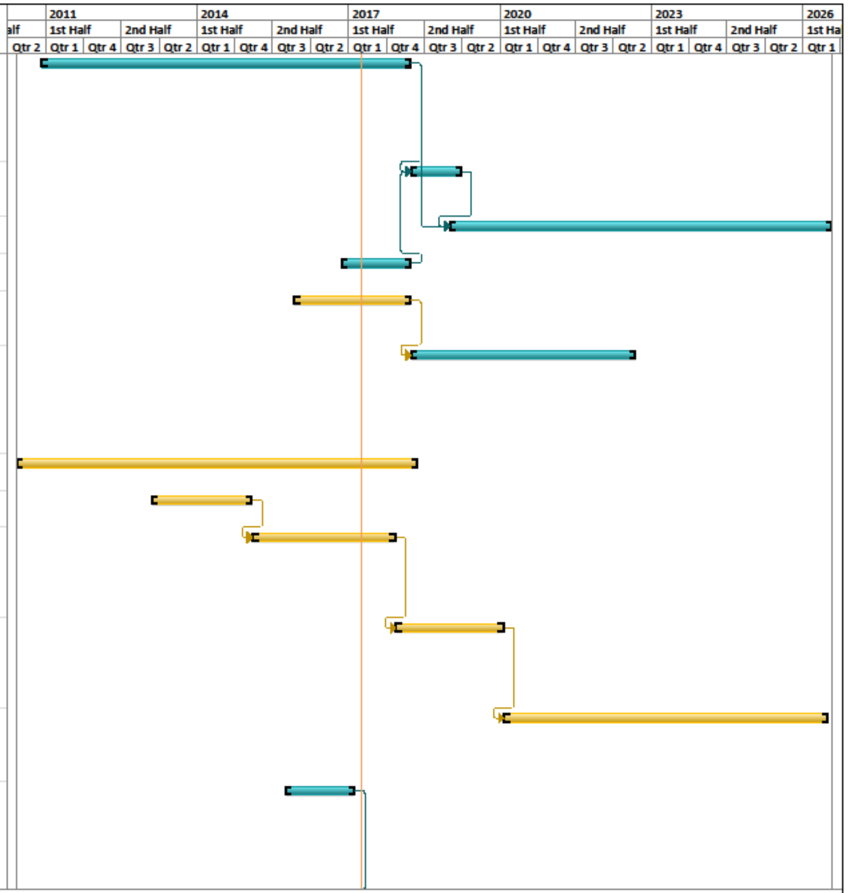
Element Implementation Status

	Description	Date Planned/Implemented	Status
1	Operational trial of 20 NM lateral separation between GNSS equipped aircraft climbing/descending through the level of other GNSS equipped aircraft.	2013	Implemented
	Status Details		
2	Implementing 15 minutes longitudinal separation between other than turbojet aircraft using third party VHF communication.	2013	Implemented
	Status Details		
3	Implementing 15 minutes longitudinal separation between other than turbojet aircraft using DCPC VHF communication.	2015	Implemented
	Status Details		
4	Implementing 15 NM lateral separation between GNSS equipped aircraft in DCPC VHF voice communication.	2015	Implemented
	Status Details		
5	Implementing 7 NM lateral separation between GNSS equipped aircraft in DCPC VHF voice communication and climbing/descending through the level of other GNSS equipped aircraft	2015	Implemented
	Status Details		
6	Implementing ADS-B surveillance separation of 10 NM	2015	Implemented

	Status Details		
7	**Description** Application of "traditional" PANS-ATM procedural separation between aircraft in DCPC VHF voice communication.	**Date Planned/Implemented** 2016	**Status** Implemented
	Status Details		
8	**Description** Implementing all the Greenland ATM Improvement program separation rules, both lateral and longitudinal in BIRD FIR	**Date Planned/Implemented** 2017	**Status** Implemented
	Status Details		
Achieved Benefits			
Access and Equity Improved			
Capacity Increased			
Efficiency Increased access to the most fuel efficient flight profile			
Environment Less fuel burn, reduced GHG emissions			
Safety No increase in safety risk			
Implementation Challenges			
Ground system Implementation			
Avionics Implementation			
Procedures Availability			
Operational Approvals			
Notes			

9. NAT SDR

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		RLongSM Trial - Initial phase applied between eligible pairs (Gander & Shanwick, all HLA levels, FANS 1/1 CPDLC & ADS-C required (IMP Plan Ref.)	1912 days	Wed 12/1/10	Thu 3/29/18	
2		5 min LongSM (Doc 4444.RCP240/RSP180 reqd)	262 days	Thu 3/29/18	Fri 3/29/19	1,4
3		5 min LongsSM Next Phase (TBD)	1980 days	Tue 1/1/19	Sat 8/1/26	1,2
4		RLongSM Trial - Initial phase - Reykjavik	361 days	Thu 11/10/16	Thu 3/29/18	
5		UM137/DM40 automated impl + CPDLC route clearance	607 days	Wed 12/2/15	Thu 3/29/18	
6		Discontinuation of OCL	1162 days	Fri 3/30/18	Mon 9/12/22	5
7		Implementation SATVOICE	2076 days	Wed 6/2/10	Wed 5/16/18	
8		FANS 1/A DLM Phase 1 - 2 core tracks FL360 - 390	521 days	Thu 2/7/13	Thu 2/5/15	
9		FANS 1/A DLM Phase 2a - All OTS FL350 - 390 (areas of ATS surv & VHF voice, above 80N and New York excl)	741 days	Thu 2/5/15	Thu 12/7/17	8
10		FANS 1/A DLM Phase 2b - all HLA FL350 - 390 (areas of ATS surv & VHF voice, above 80N and New York excl)	561 days	Thu 12/7/17	Thu 1/30/20	9
11		FANS 1a DLM Phase 2c - all airspace above 290 (areas of ATS surv & VHF voice, above 80N	1677 days	Thu 1/30/20	Fri 7/3/26	10
12		RLatSM Ph 1 (Gander & Shanwick) - 3 core tracks, FL350 - 390, FANS 1/A+RNP4, RCP240/RSP180 monitored	360 days	Thu 10/1/15	Wed 2/15/17	



Project: NAT SDR
Date: Fri 4/7/17

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Progress

Page 1

- END -

APPENDIX Q — AMENDMENTS TO NAT SPG HANDBOOK (NAT DOC 001, V2.3.0, JUNE 2018)

(paragraph 5.6.3 refers)

European and North Atlantic Office

NAT Doc 001

NAT SPG HANDBOOK

Second Edition

~~***Version 2.2.0 – June 2017***~~***Version 2.3.0 – June 2018***

~~*Draft to be reviewed by NAT SPG/5*~~*Approved by NAT SPG/54*

Prepared by the ICAO European and North Atlantic Office

on behalf of the North Atlantic Systems Planning Group (NAT SPG)

EUROPEAN AND NORTH ATLANTIC OFFICE OF ICAO

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5 — NAT SPG POLICIES

6 — REFERENCE DOCUMENTATION

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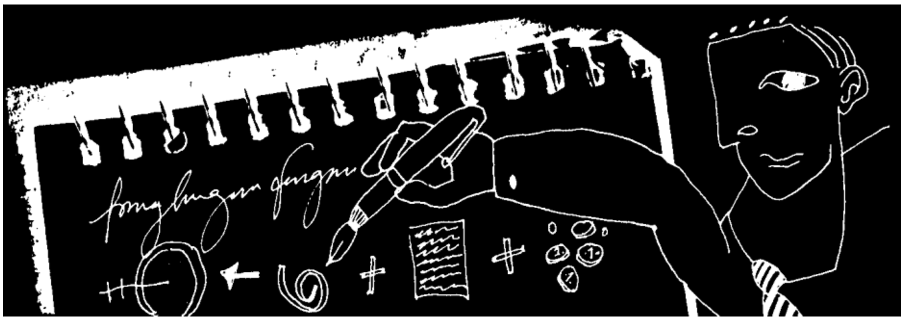

And so while the great ones depart for their dinner
The secretary stays, growing thinner and thinner
Racking his brain to record and report
What he thinks that they think that they ought to have thought.

(Anstey)

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RECORD OF AMENDMENTS

As of July 2011, the *NAT SPG Handbook* is published as

1st Edition, July 2011 introduced the following changes (NAT SPG Conclusion 47/13 refers)

- NAT Fast Track Procedure for Safety Occurrences added, to follow the Safety Policy Statement (NAT SPG Conclusion 47/08 refers)
- Agenda supporting meetings of the NAT SPG updated (*Summary of Discussions and Conclusions of the 47th Meeting of the NAT SPG*, paragraph 6.4.4 refers)
- List of NAT SPG documents updated and moved to the References section (*Summary of Discussions and Conclusions of the 47th Meeting of the NAT SPG*, paragraph 6.4.8 refers)
- Terms of Reference for the NAT SOG, NAT SG, NAT MWG and NAT CMA updated (NAT SPG Conclusion 47/10 refers)
- Policy conclusion regarding the implementation of the NAT Region Data Link Mandate, superseding NAT SPG Conclusion 41/7, added to “Implementation of Data Link” (NAT SPG Conclusion 46/02 refers)
- Policy conclusion regarding the vertical and horizontal limits of the NAT Region Data Link Mandate airspace added to “Implementation of Data Link” (NAT SPG Conclusion 47/01 refers)
- Policy conclusion regarding an ADS-B eligibility list for the ICAO NAT Region added to “Safety Related Policies” (NAT SPG Conclusion 47/06 refers)
- Policy conclusion regarding an updated concept of operations to support RLatSM, superseding NAT SPG Conclusion 45/10, added to “Implementation Planning” (NAT SPG Conclusion 47/02 refers)
- Policy conclusion regarding the TLS to support reductions in lateral separation added to “Implementation Planning” (NAT SPG Conclusion 47/04 refers)
- Policy conclusion regarding the endorsement of the *NAT RCP and ADS-C surveillance performance based operations implementation plan* added to “Implementation Planning” (NAT SPG Conclusion 47/05 refers)
- Policy conclusions 27/22 and 33/6 supporting reductions in vertical and longitudinal separation, respectively, added to “Implementation Planning” (*Summary of Discussions and Conclusions of the 47th Meeting of the NAT SPG*, paragraph 6.4.7 refers)
- Policy conclusions, 41/7, 45/10 and 43/31, which are no longer extant, and policy conclusions 45/13, 45/29 and 45/30, which are no longer considered necessary for inclusion deleted (*Summary of Discussions and Conclusions of the 47th Meeting of the NAT SPG*, paragraph 6.4.5 refers)
- Policy conclusion regarding the adoption of the GOLD added to “NAT Documentation” (NAT SPG Conclusion 46/8 refers)
- Editorial corrections

Amendment 1, June 2012, introduced the following changes (NAT SPG Conclusion 48/23 refers)

- *Record of Amendments* added
  (*Summary of Discussions and Conclusions of the 48th Meeting of the NAT SPG*, paragraph 6.1.1 refers)
- Reference to NAT SPG Conclusion 45/3 added to *Conduct of the meetings of the NAT SPG groups and sub-groups*
- *Formulation of Recommendations to the NAT SPG* added (NAT SPG Conclusion 48/12 refers)
- Ireland and United States NAT SPG representatives updated
- Composition of NAT EFG updated (*Summary of Discussions and Conclusions of the 48th Meeting of the NAT SPG*, paragraph 5.1.20 refers)
- *Inputs from NAT IMG Contributory Groups* added to "The NAT IMG Contributory Groups"
  (NAT IMG Decision 40/24 refers)
- *Terms of Reference for the NAT OPS/AIR sub-group* updated
  (NAT IMG Decision 40/31 refers)
- *Terms of Reference for the NAT SOG* updated
  (NAT SPG Conclusion 48/18 b) refers)
- "The NAT SOG Contributory Groups" added
  (NAT SOG Decision 06/01 refers)
- NAT SPG Conclusion 48/10 added to *Implementation of Data Link*
- NAT SPG Conclusions 48/18 and 48/21 added to *Safety Related Policies*
- NAT SPG Conclusion 47/2 replaced by NAT SPG Conclusion 48/2 in *Implementation Planning*
- Explanatory Notes added to NAT SPG Conclusion 47/5 in *Implementation Planning*
- NAT SPG Conclusion 48/7 added to *Implementation Planning*
- Explanatory Note added to NAT SPG Conclusion 44/38 in *NAT Documentation*
- *List Of Documents Promulgated by the NAT SPG* updated
  (*Summary of Discussions and Conclusions of the 48th Meeting of the NAT SPG*, paragraph 6.1.1 refers)
- *Detailed Oceanic Event Reports Content* added (NAT SPG Conclusion 48/19 refers)

Amendment 2, June 2013, introduced the following changes

- NAT SPG observers *(NAT SPG Conclusion 49/27 & NATSPG/49 Report Appendix Q refer)*
- NAT Doc 008 management *(NAT SPG/49 Report paragraph 6.3.6 refers)*
- Process for the nomination/review of chairmanship/rapporteurship of the NAT SPG and its Contributory Groups and updates to Terms of Reference of NAT SPG and its Contributory Bodies NAT SPG Chairman and Vice-Chairman *(NAT SPG Conclusion 49/27 & NATSPG/49 Report Appendix R refer)*
  - Conduct of the meetings – Vice-Chairman *(NAT SPG Conclusion 49/27 & NATSPG/49 Report Appendix R refer)*
  - Election of Chairmen/vice/chairmen/Rapporteurs of NAT SPG and contributory groups
  - Guidelines for basic requirements for Chairmen/Vice-Chairmen/Rapporteurs
- France, Norway and United Kingdom NAT SPG representatives updated
- Updates to Terms of Reference of the NAT SPG and its Contributory Groups *(NAT SPG Conclusion 49/27 & NATSPG/49 Report App S refer)*
- NAT SPG Conclusion 49/02 – Amendments to the list of safety key performance indicators for the ICAO NAT Region – *added*
- NAT SPG Conclusion 48/18 ,a) – *amended, as a consequence of NAT SPG Conclusion 49/02*
- NAT SPG Conclusion 49/05 –RCP and RSP for RLatSM and RLongSM – *added*
- NAT SPG Conclusion 49/09 – Completion of ½ degree coordinates hazard analysis – *added*
- NAT SPG Conclusion 45/22 – *removed, as a consequence of NAT SPG Conclusion 49/09*
- NAT SPG Conclusion 49/13 – Acceptability of I4 Classic Aero sub-network for FANS 1/A data link services – *added*
- NAT SPG Conclusion 49/19 – Mapping of the NAT SDR with the ICAO GANP/ASBU – *added;* as a consequence, NAT Doc 009, *Service Development Roadmap – North Atlantic Region* has been published and *added to* the list of *NAT documents promulgated by the NAT SPG*
- Satellite Voice Guidance Material (SVGM) – *added to* the list of *NAT documents promulgated by the NAT SPG*
- Editorial corrections

Amendment 3, June 2014, introduced the following changes

- Canada's representative – *updated*
- France's representative – *updated*
- Norway's representative – *mail address updated*
- United Kingdom's CAA representative – *updated*
- Procedure for Processing of PfAs to the SUPPs – *added* (NAT SPG Conclusion 50/15)
- NAT Fast Track Procedure – *updated* (NAT SPG Conclusion 50/16 refers)
- ToRs of the NAT EFG – *updated to include provision of NAT Traffic Forecasts* (NAT SPG Conclusion 50/21 refers)
- Composition of the NAT ATMG – *updated to invite the NAT DMO once a year* (NAT SPG Conclusion 50/22 refers)
- NAT SPG Conclusion 50/23 – *NAT OPS/AIR related updates*
  - *Diagram of the NAT SPG working structure adapted*
  - *NAT OPS/AIR ToRs moved under the NAT CNSG related pages of the document*
  - *NAT OPS/AIR ToRs updated*
  - *Miscellaneous consistency related corrections*
- Reference documentation:
  - *Updated: OESB and SOC to become NAT OES Bulletins and Bulletin Supplements* (NAT SPG Conclusion 50/24 refers)
  - *Removed: North Atlantic International General Aviation Operations Manual –included in NAT Doc 007, since Edition 2013 Amendment 1* (NAT SPG Conclusion 49/23 refers)
- NAT CMA – *updated ToRs* (NAT SPG Conclusion 50/30)
- NAT DLMA – *updated ToRs to include Part I (priority 1) aspects* (NAT SPG Conclusion 50/31)
- Running headers and footers
- Editorial corrections

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 section1 — 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 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 — 13: 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:B — *Safety Related Policies*:
  - Updates to 5:B — [02] *List of safety key performance indicators for the ICAO NAT Region* (*NAT SPG Conclusion 53/15* refers); and
  - Insertion of 5:B — [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:C — *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/xx]

- Section 1: #7 regarding NAT SPG duration and suggested Agenda – *deleted;*
- Section 1: #8 regarding Meeting Documentation – *updated;*
- Section 1: #11 regarding Guidelines for basic requirements for Chairmen/vice-Chairmen/Rapporteurs – *deleted;*
- Section 1: #15 regarding NAT SPG representatives – *updated;*
- Section 2:B: #5 regarding Formulation of recommendations to the NAT IMG – *updated;*
- Section 3:B: #1 regarding Formulation of recommendations to the NAT SOG – *updated;*
- Section 3:C regarding Working Methods of NAT MWG – *updated;*
- Section 4:C regarding Terms of Reference of NAT DMO – *updated;*
- Section 5: 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.

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.

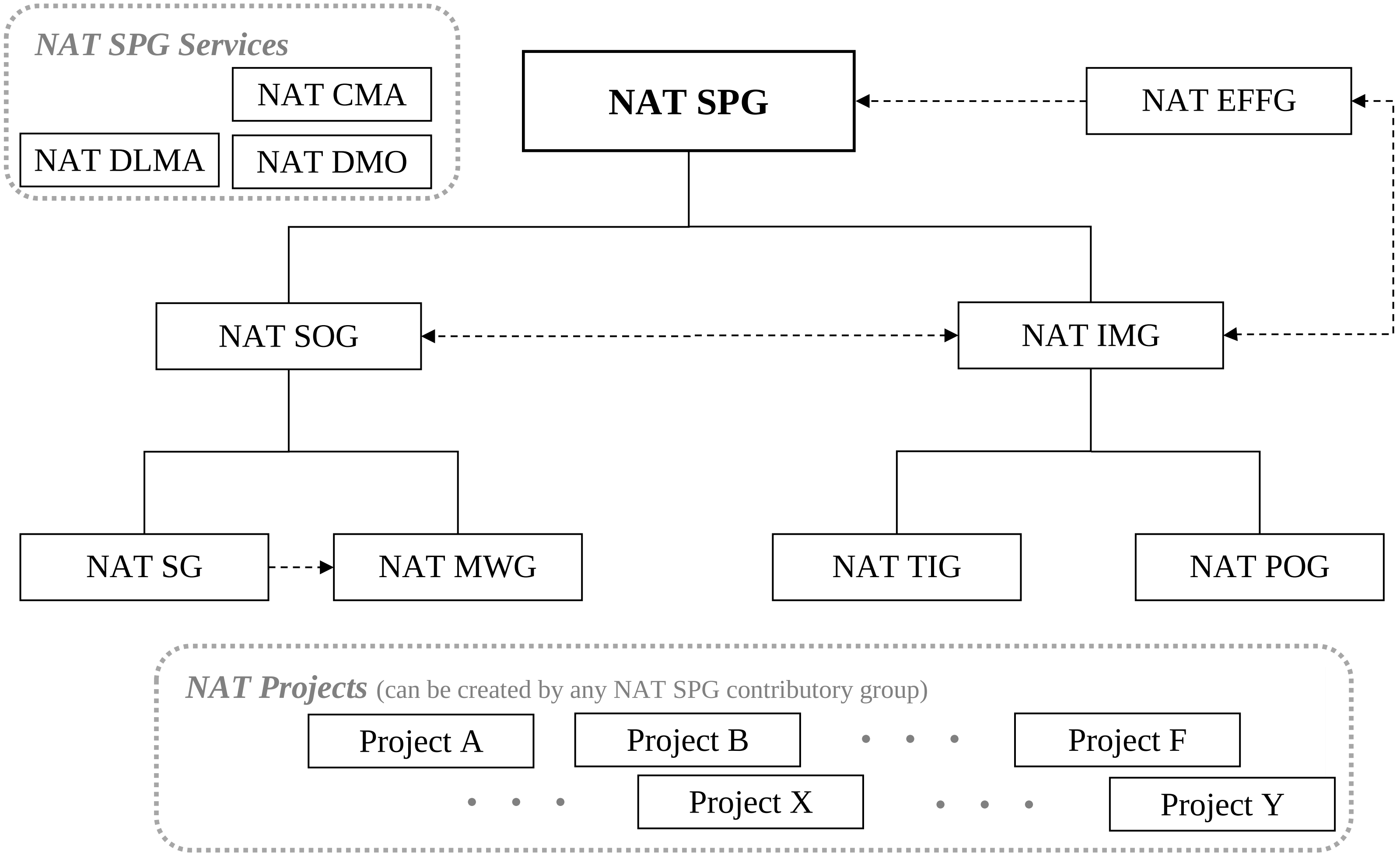
At NAT SPG/45, Paris, 23-26 June 2009, it was agreed to make adjustments to the NAT SPG working structure and to the terms of reference of its contributory bodies to accommodate the change in emphasis to performance based requirements, as driven by the Global ANP, and to take account of the Global Aviation 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 Chairman of the NAT SPG and distributed to all identified Points of Contact in the NAT SPG organization.

Asgeir PALSSON
Chairman 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.

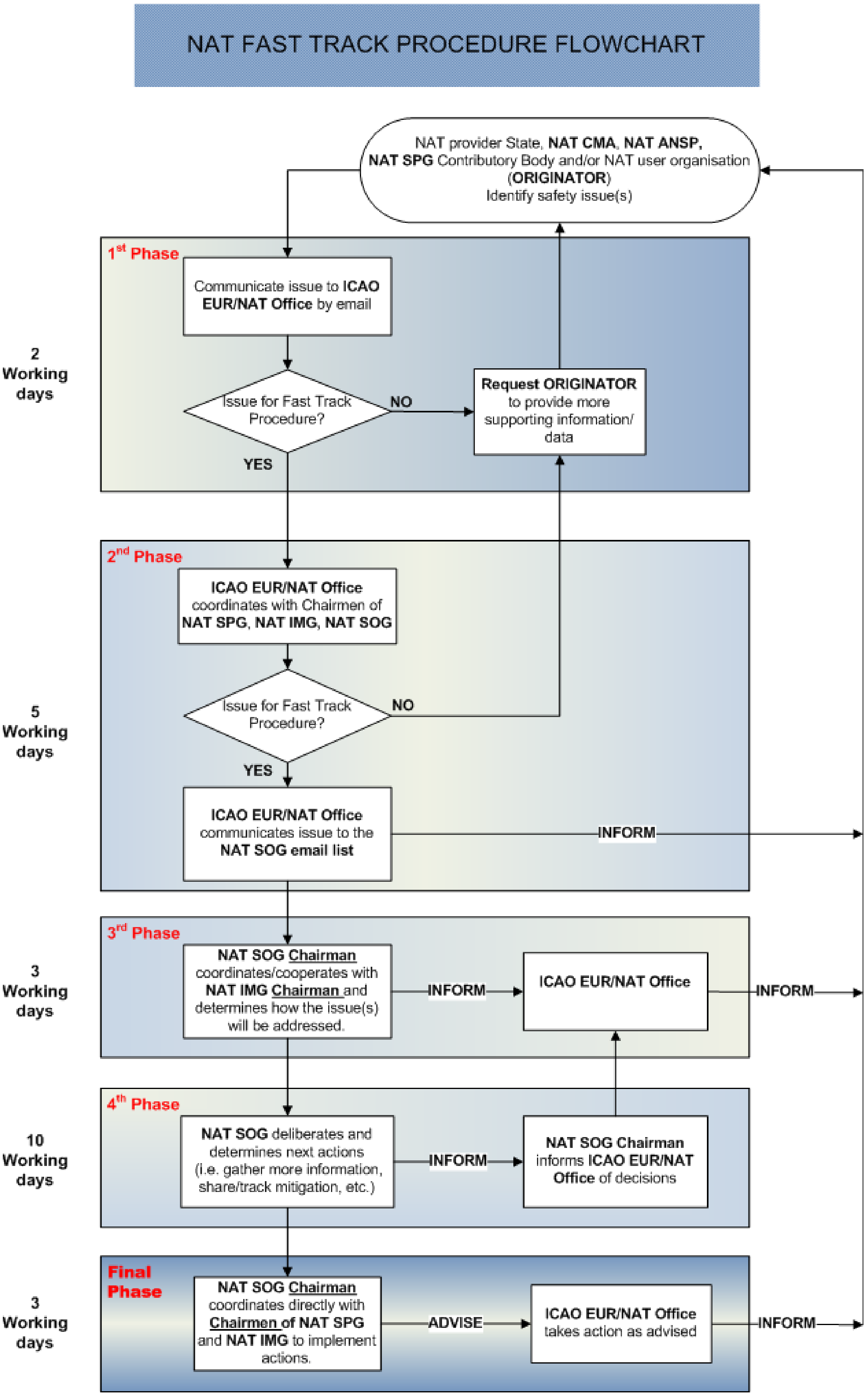
Guiding Principles

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)	*[Indicate here who is at the origin of the NAT Fast Track Procedure (NFTP) request]*
Contact Point: name, email, phone number	*[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]*
Domain(s) affected	*[Indicate here the operational domains/activities affected by the safety issue that triggered this NFTP request, for example: flight plan processing, phraseology etc.]*
Geographical area affected	*[Indicate here the geographical area affected by the issue]*
Description of the case	*[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]*
Supporting data	*[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]*
Evaluated safety impact	*[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 NTFP]*
Proposed solution(s) or corrective/mitigation action(s)	*[Provide here one or several solution(s) or corrective/mitigation action(s)]*

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)

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.

3. Observers

International organizations recognized by the Council may be invited as necessary to attend PIRG meetings as observers.

Representatives from the Russian Federation and Spain as well as Observers from ~~IACA,~~ IATA, IFALPA, IAOPA, IBAC, IFATCA, IFAIMA, 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 Chairman. Such requests must be supported by the appropriate rationale to attend the meeting[1].

4. Chairman

The Chairmanship of the NAT SPG will be reviewed by an election every four years[1].

5. Vice-Chairman

In accordance with NAT SPG Conclusion 49/27, the NAT IMG and NAT SOG Chairmen will serve as NAT SPG Vice-Chairmen[1].

6. Secretary

The ICAO Regional Director, European and North Atlantic Office, serves as the Secretary of the NAT SPG.

~~7. Agenda~~

~~The NAT SPG normally meets for 3 working days once a year, and the following agenda is normally adopted for the Meetings:~~

~~Agenda Item 1: Review of significant international aviation developments~~

~~Agenda Item 2: Proposed air navigation systems performance monitoring and measurement~~

~~Agenda Item 3: NAT planning and implementation management issues~~

~~3.1 Implementation programme updates~~

~~3.2 Performance monitoring~~

~~Agenda Item 4: NAT operational and safety improvements~~

~~Agenda Item 5: Safety Monitoring~~

~~Agenda Item 6: NAT Documentation~~

~~Agenda Item 7: Work programme, including sub-groups~~

[1] *NAT SPG Conclusion 49/27 refers*

~~Agenda Item 8: Any Other Business~~

~~8.~~7. Meeting Documentation

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.

~~Working Papers and Information Papers, presented by States, international organizations or the Secretariat, form the basis of the discussions at the NAT SPG Meetings. Working Papers normally contain material which invites a conclusion by the NAT SPG, while Information Papers are submitted in order to provide the Group with information on which no conclusion is required.~~

~~Following a verbal presentation, the contents of Working Papers are discussed at the NAT SPG Meetings. The contents of Information Papers are presented verbally and discussed on request only and are normally not reflected in the Summary of Discussions.~~

~~Each NAT SPG Meeting is invited to agree on an English version of a Summary of Discussions of the Meeting, and the final version is distributed by the Secretariat in English.~~

~~9.~~8. Conduct of the meetings of the NAT SPG groups and sub-groups[1]

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.

Chairman – In addition to the duties of a Rapporteur, the Chairman may make decisions regarding the conduct of the meeting and, in cases where it is not possible to reach consensus, 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 Chairman.

[1] *NAT SPG Conclusion 45/3 refers*

Vice-Chairman – The vice-Chairmen will be called upon to preside over the meeting should circumstances prevent the Chairmen from being present at the meeting. The vice-Chairmen may also be requested to support the Chairmen in his/her role, taking over some of the Chairmen's work load whenever appropriate. The vice-Chairmen do not automatically succeed as chairmen at the conclusion of the term of the incumbent Chairman. In the NAT SPG working structure, the NAT SPG, NAT IMG and NAT SOG operate with a vice-Chairman. The NAT IMG and NAT SOG Chairmen will serve as NAT SPG vice-Chairmen[1].

~~10.~~9. Election of Chairmen/vice-Chairmen/Rapporteurs of the NAT SPG and its Contributory Groups[2]

Review of chairmanship 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 Chairman is unable to complete a term, another election would be held.

Review of vice chairmanship 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 Chairmen.

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.

Chairman – Nominations and Election for the NAT SPG

1. Candidates for election to the post of Chairman 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 Chairman from the list of candidates by open vote at the NAT SPG meeting and the newly elected Chairman will assume his functions at the conclusion of the meeting.

Chairman – Nominations and Election for the NAT EFFG, NAT IMG, and NAT SOG

1. Candidates for election to the post of Chairman 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 Chairman from the list of candidates by open vote at its meeting.

4. The NAT SPG will confirm the election of the Chairman at its meeting and agree that the newly elected Chairman will assume his functions as Chairman at the next meeting of the Contributory Group concerned.

Note: the election of vice-Chairmen 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 Chairman.

[1] *NAT SPG Conclusion 49/27 refers*
[2] *NAT SPG Conclusion 49/27 refers*

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

~~11. Guidelines for the basic requirements for Chairmen/vice-Chairmen/Rapporteurs of the NAT SPG and its Contributory Groups~~[1]

~~1. Professional background:~~

- ~~extensive experience in a civil aviation authority, airport, airline, air navigation services or similar aviation-related organization;~~
- ~~practical experience in the planning and administration of civil aviation programmes; and~~
- ~~have a good understanding of ICAO's role.~~

~~2. Experience with the NAT SPG and its working groups:~~

- ~~have a clear understanding of and adhere to the terms of reference of the NAT SPG and its Contributory Groups; and~~
- ~~have a sound knowledge of the NAT SPG working and reporting structure by having participated and contributed to the work of the Group concerned (e.g. participation for a minimum of 4 meetings).~~

~~12.~~10. Procedure for processing of Proposals for Amendment to the NAT SUPPs

~~12.1.~~10.1. 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.

~~12.2.~~10.2. The ICAO Secretariat will process the PfA in accordance with the formal procedures immediately after its endorsement by the NAT SPG.

~~12.3.~~10.3. 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.

~~13.~~11. Formulation of recommendations to the NAT SPG[2]

~~13.1.~~11.1. 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 to clarify the intent of contributory group recommendations they are to be formulated in the form of

~~[1] *NAT SPG Conclusion 49/27 refers*~~
[2] *NAT SPG Conclusion 48/12 refers*

"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.

~~13.2.~~11.2. The following Table 1 shall be used to summarize why the NAT SPG should endorse the draft Conclusion ~~by describing,~~ 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	

~~13.3.~~11.3. 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.

~~13.4.~~11.4. 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.

~~14.~~12. Projects and Project Teams for the NAT SPG Working Structure

~~14.1.~~12.1. 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 ~~of~~
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 ~~NAT~~ Secretariat

~~14.2.~~12.2. 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.

~~15.~~13. 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, ~~IACA,~~ 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 Chairmanship of the NAT EFFG will be reviewed by an election every four years and confirmed by the NAT SPG[1].

[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 ~~IACA,~~ 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 Chairmanship and vice-Chairmanship of the NAT IMG will be reviewed by an election every four years and confirmed by the NAT SPG[1].

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[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[1]

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.

~~5.2. The following Table 3Table 3 shall be used to summarize why the NAT IMG should endorse the draft Decision by describing what is expected to fully address the decision, who should carry out the actions required and when the actions should be completed:~~

~~5.3. Table 3:~~

~~Why~~	
~~What~~	
~~Who~~	

~~[1] NAT IMG Decision 40/2 refers~~

~~**When**~~	

~~5.4. Draft NAT IMG Decisions shall be presented in the following format:~~

~~**Draft NAT IMG Decision ##/NATXXXYY/Z TITLE**~~

~~That the NAT(Group designation)/ICAO Regional Director, Europe and North Atlantic:~~

~~a) AA;~~

~~b) BB; and~~

~~c) CC.~~

~~Where:~~

~~## is the designation of the next NAT IMG meeting;~~

~~NATXXXYY is the designation and meeting number of the NAT IMG contributory group proposing the draft Decision;~~

~~Z is a number indicating the sequence of the proposed draft Decision as it appears in the contributory group report; and~~

~~TITLE is a concise description of the subject addressed by the proposed draft Decision.~~

~~5.5. When formulating each NAT IMG Decision, all acronyms except NAT IMG shall be decoded when they are initially used. This shall be true even for acronyms which have appeared in a previous draft Decision. It is acceptable to use an acronym in the title, so long as it is decoded in the body of the draft Decision.~~

~~5.6.~~5.4. ~~If NAT SPG action will be required, the NAT IMG will take the necessary action to draft a proposed NAT SPG Conclusion as appropriate. All recommendations to the NAT IMG, even those which will likely require the endorsement of the NAT SPG, are to be presented as draft 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, IATA, IBAC 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 IMG[1].

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[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, IATA, IBAC 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 IMG[1].

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[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 safety oversight 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.~~;~~
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 safety cases in progress and review completed safety cases prepared to support changes to the NAT air navigation system.
9. Collect data on and monitor safety KPIs.~~;~~
10. Advise the NAT SPG annually on the performance of the ICAO NAT Region in relation to the safety KPIs.~~;~~
11. Address other safety-related issues as necessary.
12. Use the fast track to advance safety concerns between formal meetings.
13. 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, and as necessary regulatory issues related to the conduct of flight operations in the NAT Region. In order to ensure that NAT users' views are represented and to provide valuable operational experience, NAT SOG meetings are also attended by representatives from Spain, IATA, IBAC, IFALPA and IFATCA. The NAT SOG may invite participants from other States or organisations as required.

The Chairmanship and vice-Chairmanship of the NAT SOG will be reviewed by an election every four years and confirmed by the NAT SPG[1].

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[1] *NAT SPG Conclusion 49/27 refers*

3:B — THE NAT SOG CONTRIBUTORY GROUPS

1. Formulation of recommendations to the NAT SOG[1]

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.

~~1.1. The NAT SOG 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 to clarify the intent of contributory group recommendations they are to be formulated in the form of "draft NAT SOG Decisions". Each draft Decision 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 SOG 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 SOG should endorse the draft Decision, what is expected in order to fully address the decision, who should carry out the actions required and when the actions should be completed, using the tabular format described below.~~

~~1.2. The following Table 4Table 4 shall be used to summarize why the NAT SOG should endorse the draft Decision by describing what is expected to fully address the decision, who should carry out the actions required and when the actions should be completed:~~

~~*Table 4:*~~

~~**Why**~~	
~~**What**~~	
~~**Who**~~	
~~**When**~~	

~~1.3. Draft NAT SOG Decisions shall be presented in the following format:~~

~~**Draft NAT SOG Decision ##/NATXXXYY/Z — TITLE**~~

~~That the NAT(Group designation)/ICAO Regional Director, Europe and North Atlantic:~~

~~a) AA;~~

~~b) BB; and~~

~~c) CC.~~

~~[1] *NAT SOG Decision 06/01 refers*~~

~~*Where:*~~

~~TITLE is a concise description of the subject addressed by the proposed draft Decision;~~

~~## is the designation of the next NAT SOG meeting;~~

~~NATXXXYY is the designation and meeting number of the NAT SOG contributory group proposing the draft Decision; and~~

~~Z is a number indicating the sequence of the proposed draft Decision as it appears in the contributory group report.~~

~~1.4. When formulating each NAT SOG Decision, all acronyms except NAT SOG shall be decoded when they are initially used. This shall be true even for acronyms which have appeared in a previous draft Decision. It is acceptable to use an acronym in the title, so long as it is decoded in the body of the draft Decision.~~

~~1.5. If NAT SPG action will be required, the NAT SOG will take the necessary action to draft a proposed NAT SPG Conclusion as appropriate. All recommendations to the NAT SOG, even those which will likely require the endorsement of the NAT SPG, are to be presented as draft 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 and vertical collision risks to show whether the estimated risks meet the respective target levels of safety ~~(TLS)~~.
3. Identify trends that may not be identified within the 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. 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.
8. Report to the NAT SOG.

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~~F~~ 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.

Composition

The NAT SG is composed of nominated experts from the NAT SPG member States, Spain, NAT MWG, NAT CMA, IATA, IBAC, IFALPA and IFATCA.

The Rapporteur of the NAT SG will be reviewed by an election every four years and confirmed by the NAT SOG[1].

Working Methods

The NAT SG conducts its work via correspondence to the extent possible.

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[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 and lateral deviations, from the above errors/actions;

   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 ≥ 90m (300 ft);
   ii. ASE ≥ 75 m (245 ft);
   iii. AAD ≥ 90 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]

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[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 ~~is responsible to the NAT SPG~~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. Track changes to external source or reference documents and ensure that relevant NAT documentation is duly updated.~~

~~2. Apprise NAT Groups of any changes or potential changes to provisions which could impact their work.~~

~~3. Undertake, solicit and/or review changes to NAT documentation which might follow from the work of NAT Groups.~~

1.~~4.~~ Apprise the ~~NAT IMG~~ICAO EUR/NAT Office in matters pertaining to the NAT Region of any need for changes to NAT documentation and seek approval for such work.

~~5. Brief the NAT SPG annually on all changes affecting NAT documentation.~~

~~6. Coordinate/liaise with commercial vendors of NAT-specific data to endeavour to ensure global consistency and currency of information and guidance available to users.~~

~~7. Maintain contact via an established contact point with the ATS and AIS units of NAT Region and NAT bordering states to ensure that planned or effected changes to any services or facilities that affect NAT operations are appropriately reflected in NAT documentation.~~

~~8~~2. ~~Review all relevant ICAO amendment proposals and apprise the NAT IMG of any potential impact on NAT operations.~~Under the ICAO EUR/NAT Office guidance and with expert contributions from the NAT contributory groups, ensure word editing and formatting of all ICAO NAT documents to timely incorporate the appropriately approved within the NAT working structure proposals for amendment to NAT documents.

Composition

The NAT DMO service will be provided by Iceland on behalf of the NAT SPG.

5 — NAT SPG POLICIES

<u>Note</u>: in the title of each policy "C ##/N" *stands for* "NAT SPG Conclusion ##/N"[1]

5:A — IMPLEMENTATION OF DATA LINK POLICIES

~~[01] Vertical and horizontal limits of airspace associated with the ICAO NAT Region Data Link Mandate (C 47/01)~~

~~The limits of the airspace within the ICAO NAT Region where the carriage and operation of data link is mandatory are:~~

~~a) in the vertical plane, flight level 360 to flight level 390 inclusive; and~~

~~b) in the horizontal plane, no more than two tracks within the NAT Organised Track System designated as core tracks in accordance with the rules detailed below and identified as such on the NAT Track Message.~~

~~Designation of Core Tracks~~[2]

~~For the purpose of designating exclusionary airspace associated with the NAT Region Data Link Mandate, the following will apply:~~

~~1. A "split track structure" is an organised track structure with at least two entry points between one group of organised tracks and another.~~

~~2. Core Tracks shall be designated in accordance with the following:~~

~~a) the first basis for determining which organised track would be a "core" organised track, which defines the area of applicability, would be a track whose predicted loading was in the higher percentage of the overall predicted OTS loading, on that day (the core tracks would be identified when the NAT Track message was promulgated);~~

~~b) the method of predicting track loadings would be the same as used today for the creation of the OTS and operational tactical planning purposes;~~

~~c) core organised tracks would have an adjacent non core organised OTS track available one degree north or south to allow for non equipped aircraft;~~

~~d) an adjacent OTS track would be defined as an OTS organised track whose:~~

~~i) Entry point was no more than 1 degree different to the core organised track; and~~

~~ii) Exit point was no more than 2 degrees different to the core organised track; and~~

~~e) the number of core organised tracks in any one OTS would be no more than two.~~

[1] *e.g. C 47/01 means NAT SPG Conclusion 47/01, the NAT SPG Conclusion endorsing the policy*

[2] ~~NAT SPG/47 Report, *paragraph 3.1.4 refers*~~

~~[02] Acceptability of various sub-networks' performance for FANS 1/A data link services (C 48/10, C 49/13)~~

~~That FANS 1/A or equivalent over Inmarsat I3 Classic Aero, Iridium Short Burst Data and Very High Frequency (VHF) sub-networks demonstrate performance acceptable for the use of data link services.~~

~~That FANS 1/A over Inmarsat I4 Classic Aero sub-network demonstrate performance acceptable for the use of data link services on a continuous basis.~~

5:B — SAFETY RELATED POLICIES

~~**[03] ICAO provisions with specific applicability dates (C 42/01)**~~

~~a) States are invited to take appropriate action to achieve timely implementation of the ICAO provisions having a specific applicability date;~~

~~b) States experiencing difficulties to achieve timely implementation of those provisions are invited to seek assistance and advice from the Regional Office with a view to overcome the difficulties; and~~

~~c) the ICAO Regional Director identify means to provide assistance and advice as appropriate as provided for in the unified strategy.~~

~~**[04] Exchange of safety management related information (C 45/05)**~~

~~That, recognising the importance of all NAT SPG contributory groups being aware of safety management issues in the NAT Region and thereby maximising contributions to the resolution of these issues and to facilitate the exchange of safety management information, each meeting of every NAT SPG contributory group shall:~~

~~a) review the safety management sections of the most recent reports of all other NAT SPG contributory groups; and~~

~~b) document any relevant comments in the safety management section of their own report.~~

~~**[05] Convening NAT users meeting (C 45/14)**~~

~~That ICAO, on the basis of a recommendation from the NAT Implementation Management Group (NAT IMG) or of the NAT Safety Oversight Group (NAT SOG) and with the assistance of NAT service providers convene Conferences from time to time to explain to those directly involved with operations in the NAT Region current and future developments, especially those that affect safety.~~

~~[06]~~[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

~~**[07] Implementation of Air Traffic Services (ATS) Inter-Facility Data Communication (AIDC) throughout the NAT Region (C 45/25)**~~

~~a) all States fully implement AIDC, including the re-negotiation function;~~

~~c) the NAT IMG directs its contributory groups to assist in the development of a harmonised multi-regional AIDC Interface Control Document (ICD);~~

~~d) the NAT Safety Oversight Group keeps under review the impact that the gradual implementation of AIDC may have on reducing risk; and~~

~~e) the NAT SPG is provided with regular progress reports.~~

~~[08]~~[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)**

That the list of Key Performance Indicators (KPI) in the area of safety for the ICAO NAT Region is as follows, with applicable targets:

Table 1 - Safety Key Performance Indicators and related targets

Key Performance Indicator		Target
i	Number of accidents	0
ii	Number of fatal accidents	0
iii	Number of fatalities related to aviation fatal accidents	0
iv	Rate of LHD events (No. of LHD events divided by No. of flight hours flown in the NAT region[1]), involving operations with Data Link in use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
v	Rate of LHD events (No. of LHD events divided by No. of flight hours flown in the NAT region), involving operations with Data Link not in use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
vi	Percent of Long Duration[2] LHD events	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
vii	Rate of minutes that aircraft, with Data Link in use, spent at the wrong flight level (Amount of minutes spent at the wrong flight level divided by total duration of flights in minutes)	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
viii	Rate of minutes that aircraft, with Data Link not in use, spent at the wrong flight level (Amount of minutes spent at the wrong flight level divided by total duration of flights in minutes)	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
ix	Rate of GNE events[3] (No. of GNE events divided by No. of flight hours flown in the NAT region) , involving operations with Data Link in use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
x	Rate of GNE events (No. of GNE events divided by No. of flight hours flown in the NAT region), involving operations with Data Link not is use	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
xi	Rate of losses of separation (vertical) (No. of losses of separation events divided by No. of flight hours flown in the NAT region)	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline
xii	Rates of losses of separation (lateral) (No. of losses of separation events divided by No. of flight hours flown in the NAT region)	Reduction over previous rolling three-year period of performance compared to 2015-2016-2017 baseline

Table 2 - Target Level Of Safety (TLS) for lateral and vertical domains to be performed and reported by NAT CMA to NAT SOG and NAT SPG

NAT safety performance		Target
xiii	Performance in the vertical dimension	5×10^{-9} fapfh[4]
xiv	Performance in the lateral dimension	20×10^{-9} fapfh

[1] *Before getting the actual figures flight hour estimates can be used for calculation*
[2] *Long Duration LHD event means an event exceeding 20 minutes, based on a threshold established after review of historical data reported to the NAT CMA*
[3] *GNE is a deviation of 10 NM or greater*
[4] *Fatal accidents per flight hour*

~~[09]~~[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.

~~[10]~~[04] Definition and Components of Safety Cases in support of changes to the NAT air navigation systems requiring NAT SPG approval (C 53/16)

That the definition and components of a safety case in support of changes to the NAT air navigation system requiring NAT SPG approval are as follows:

a) A 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, and includes the assessment of safety risk associated with the proposed change, 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 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.

b) Proposed safety case(s) prepared to support changes within the NAT Region requiring NAT SPG approval should be presented to the NAT SOG for review by or through the NAT IMG, and include the following components:

i) Change advocate {the NAT IMG sub-group or ANSP(s) who propose the change(s)};

ii) Description of and rationale for the proposed change(s);

iii) Summary of hazard identification, risk analysis methodology and conclusions, including risk assessment;

iv) Proposed risk controls and/or mitigations;

v) 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;

vi) Post-implementation monitoring and reversion plans;

vii) Index or bibliography referencing supporting evidence; and

viii) Statements that the necessary State approvals and/or other State requirements necessary to accommodate the change will be in place prior to implementation.

5:C — IMPLEMENTATION PLANNING POLICIES

~~[11]~~[05] Definition of Target Level~~s~~ 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 x 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 X 10^{-9}, as this is the value which has been used to derive the Minimum Aircraft System Performance Specification.

A TLS of 5.0 x 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 5x10^{-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.

~~[12] Changes to the NAT IMG work programme to take account of global planning (C 43/05)~~

~~The NAT Implementation Management Group (NAT IMG) shall:~~

~~a) adjust its work programme to include specific reductions in lateral and longitudinal separation minima based on definable improvements to Communications Navigation Surveillance (CNS) performance; and~~

~~b) provide the NAT SPG with regular updates.~~

~~[13] NAT RLatSM Concept of Operations (C 48/02)~~

~~The following concept of operations shall be used to develop an implementation plan for reducing lateral separation to 25 NM in the ICAO NAT Region:~~

~~a) Each implementation phase shall be harmonized to an appropriate step or benchmark (as determined by the NAT IMG) contained in the *NAT MNPS to PBN Transition Plan for the ICAO NAT Region*.~~

~~b) Phase 1 shall introduce 25 NM lateral separation by implementing ½ degree spacing between the two core tracks within the vertical limits applicable to the airspace associated with the NAT Region Data Link Mandate (NAT SPG Conclusion 46/2 refers); only aircraft with the appropriate Required Navigation Performance (RNP) approval, Automatic Dependent Surveillance-Contract (ADS-C) and Controller Pilot Data Link Communications (CPDLC) would be permitted to operate on the ½ degree spaced tracks.~~

~~*Note 1 – Each Phase will be applicable in whatever vertical band is currently associated with NAT Region data link mandatory airspace.*~~

~~*Note 2 – The dates will also be harmonized with the dates applicable to the* NAT Performance Based Communication and Surveillance Implementation Plan.~~

~~c) Phase 2 shall expand the introduction of 25 NM lateral separation by implementing ½ degree spacing through the entire NAT Organised Track System (OTS), within the vertical limits~~

~~applicable to the airspace associated with the NAT Region Data Link Mandate; only aircraft with the appropriate RNP approval, ADS-C and CPDLC would be permitted to operate on the ½ degree spaced tracks.~~

~~d) Phase 3 shall introduce 25 NM lateral separation throughout the entire ICAO NAT Region, including for converging and intersecting track situations, within the vertical limits applicable to the airspace associated with the NAT Region Data Link Mandate. The application of the reduced separation standard between targets of opportunity should be permissible in any part of the ICAO NAT Region outside the OTS (mixed mode operations).~~

~~[14]~~[06] 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.

~~[15] NAT SPG Conclusion 47/05 — Approval of the *NAT Performance Based Communication and Surveillance Implementation Plan*[1] (C 47/06, C 49/03)~~

~~a) the *NAT Performance Based Communication and Surveillance Implementation Plan* (former NAT RCP and ADS-C surveillance performance based operations implementation plan is endorsed; and~~

~~b) the NAT IMG includes the management and execution of the NAT RCP and ADS-C surveillance performance based operations implementation plan on its work programme.~~

~~[16] Applicability of communication and surveillance performance specifications (C 48/07)~~

~~a) The current separation standards/minima are strategic in nature and not predicated on Required Communication Performance (RCP) and Required Surveillance Performance (RSP);~~

~~b) Communication and surveillance performance specifications will be prescribed when required for reduced separation minima (e.g., Reduced Longitudinal Separation of 5 minutes between Automatic Dependent Surveillance – Contract (ADS-C) equipped aircraft (RLongSM) and Reduced Lateral Separation of 25 Nautical Miles (NM) (RLatSM)) that are predicated on communications and surveillance performance;~~

~~c) Although current separation minima are not predicated on RCP or RSP, NAT data link operations will use RCP and RSP for gauging communications and surveillance performance as follows:~~

~~i) Controller Pilot Data Link Communications (CPDLC) performance will be measured against RCP 240, as defined in the *Global Operational Data Link Document* (GOLD);~~

~~ii) ADS-C performance will be measured against RSP 180, as defined in the GOLD.~~

~~d) the performance specifications envisaged for the operational RLongSM and RLatSM implementations, RCP 240 and RSP 180 are the candidate specifications to be prescribed, subject to validation by the RLongSM and RLatSM trials; and~~

~~e) Further applications of RCP/RSP to communication and surveillance capability may be considered by NAT SPG in situations where it has been found to be beneficial. At such time, the *NAT Performance Based Communication and Surveillance Implementation Plan* would be amended.~~

~~[1] *Former NAT RCP and ADS-C Surveillance Performance based operations implementation plan (NAT IMG/40-2012)*~~

~~**[17] RCP and RSP for RLatSM and RLongSM (C 49/05)**~~

~~The Required Communication Performance (RCP) 240 and Required Surveillance Performance (RSP) 180 are applicable to 25 NM lateral separation minimum (RLatSM) and 5 min longitudinal separation minimum (RlongSM) implementations in the NAT with the following additional provisos:~~

~~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 Global Operational Data Link Document (GOLD);*~~

~~*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)~~a) ~~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	Amendments approved by	Remarks
NAT Doc 001	NAT SPG Handbook	Version 2.~~2~~3.0 – June 201~~7~~8	ICAO Secretariat	NAT SPG*	Except for the following: * *1 — 13 – 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	*Discontinued*				*Superseded by the Pan-Regional (APAC and NAT) Interface Control Document for ATS Inter-facility Data Communication (PAN ICD AIDC)*
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 1.4 – Nov. 2011	NAT TIG	NAT IMG	

Number	Title	Current edition/version	Kept under review by	Amendments approved by	Remarks
NAT Doc 005	Future ATM Concept of Operations for the North Atlantic Region	2nd Edition,– Nov. 2012	NAT IMG	NAT SPG	
NAT Doc 006 - Part I	Air Traffic Management Operational Contingency Plan – North Atlantic Region	Version 1.11~~9~~ – July 2018~~Dec. 2015~~	NAT IMG	NAT SPG	
- Part II EUR/NAT VACP	Volcanic Ash Contingency Plan – Europe and North Atlantic Regions	Version 2.0.0 – July 2016	NAT IMG and EANPG COG in accordance with the process described in the body of the document –	Coordinated approval of main document body by both NAT SPG and EANPG	
NAT Doc 007	North Atlantic Operations and Airspace Manual	Version V-201~~7~~8-~~1~~2 – July 2018	NAT POG and NAT DMO, Except for the following: *Attachment 6 – Flight Level Allocation Scheme (FLAS)*: kept under review by the NAT POG	NAT SPG, Except for the following: *Attachment 6 – Flight Level Allocation Scheme (FLAS)*: 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 1.7 – April 2017	NAT POG	NAT IMG after coordination with NAT SOG	

Number	Title	Current edition/version	Kept under review by	Amendments approved by	Remarks
NAT Doc 009	*Discontinued*				*Integrated in NAT eANP Volume III, Companion Document, NAT GANP/ASBU Report (NAT eANP Volume III approval: NAT SPG Conclusion 53/21 refers).*
NAT Doc 010	Consolidated Reporting Responsibilities Handbook – North Atlantic Region	Provisional Edition – 2015	NAT SOG and NAT IMG	NAT SPG	
NAT eANP Vol III (ICAO Doc 9634, Vol III)	Volume III of the electronic Air Navigation Plan – North Atlantic Region	2017~~6~~ – June 2018~~7~~	NAT IMG and its contributory groups	NAT SPG	
NAT eANP Vol III - ~~Companion Document~~Part 2 and 3	~~NAT~~ GANP ASBU Implementation Status Report – NAT Region	2017~~6~~ – June 2018~~7~~	ICAO Secretariat in coordination with NAT IMG ~~and its contributory groups~~	NAT SPG	
	Minimum Monitoring Requirements: North Atlantic RVSM	29 June 2010	NAT CMA -	NAT SOG	

Number	Title	Current edition/version	Kept under review by	Amendments approved by	Remarks
NAT OPS Bulletins [a] *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.		*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.*
	NAT OESB - NAT Oceanic Errors Safety Bulletin	NAT OPS Bulletin 2017_002_rev1	NAT SG	NAT SOG	*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).*
	NAT OESB Supplements - NAT Sample Oceanic Checklists	NAT OPS Bulletin ~~2014_001~~2017_005	NAT SG	NAT SOG	*The NAT Sample Oceanic Checklist (NAT SOC) is a companion document of the NAT OESB.*

[a] *All currently valid NAT OPS Bulletins and Checklist are at: www.icao.int/EURNAT/EUR & NAT Documents, then NAT Documents, then NAT Ops Bulletins.*

~~6:B DETAILED OCEANIC EVENT REPORTS CONTENT~~

~~In accordance with NAT SPG Conclusion 48/19, occurrence reports submitted to the NAT CMA should contain at least the following information:~~

~~a) event type;~~

~~b) date the event occurred;~~

~~c) start and end times and locations (expressed as latitude/longitude) of the occurrence;~~

~~d) location where the event occurred;~~

~~e) type of airspace involved (i.e. MNPS / NAT HLA, below MNPS / NAT HLA, etc.);~~

~~f) whether the event occurred within, north or south of the NAT OTS;~~

~~g) type of aircraft operation (i.e. commercial, general aviation or military);~~

~~h) operator name;~~

~~i) aircraft identification, type, departure and destination;~~

~~j) assigned flight level and, if different, the observed flight level;~~

~~k whether or not the aircraft entered the reporting OCA (Oceanic Control Area) at an uncoordinated flight level;~~

~~l) assigned speed and, if different, the observed or reported speed;~~

~~m) assigned route and if different, the observed or reported route, including for a subsequent route portion not yet flown:~~

~~n) flight plan;~~

~~o) if applicable, the duration at uncleared flight level;~~

~~p) if applicable, the duration at uncleared speed;~~

~~q) type(s) of communication being used at the time of the occurrence;~~

~~r) identification of the unit, flight information region or sector from which the flight entered the OCA of the unit providing the report;~~

~~s) communications or surveillance mode used to detect the event (i.e. Mode C, ADS-B, ADS-C, pilot report, etc.);~~

~~t) whether the flight crew was advised of the event;~~

~~u) any comments provided by the flight crew;~~

~~v) whether the event was reported to the NAT DLMA;~~

~~w) if applicable, whether or not the appropriate contingency procedure(s) was(were) followed;~~

~~x) if the applicable contingency procedure was not followed, details concerning the action taken by the flight;~~

~~y) an initial event summary (to be included with the initial report to the NAT CMA);~~

~~z) findings and conclusions (including causes and contributory factors) arising from the unit's investigation of the event;~~

~~aa) when applicable, the name of the unit(s) whose breakdown in procedure led to the event;~~

~~bb) corrective actions taken in response to the event; and~~

~~cc) mitigations, if any, put in place to address the event.~~

~~6:C OCCURRENCE CLASSIFICATION CODES~~

-	**~~General~~**	-
~~CF~~	~~Communications failure~~	-
~~CI~~	~~Crew Injury~~	-
~~CR~~	~~Crew Request~~	-
~~CW~~	~~Cracked window~~	-
~~DW~~	~~Destination Weather~~	-
~~ED~~	~~Engine Defect~~	-
~~ES~~	~~Engine Shutdown~~	-
~~F~~	~~Fire~~	-
~~FL~~	~~Fuel Leak~~	-
~~FPD~~	~~Fuel Pump Defect~~	-
~~FS~~	~~Fuel shortage~~	-
~~HP~~	~~Hydraulic Problem~~	-
~~IRSF~~	~~IRS Failure~~	-
~~LFT~~	~~Low Fuel Temperature~~	-
~~ME~~	~~Medical Emergency~~	-
~~PD~~	~~Passenger Disturbance~~	-
~~PEI~~	~~Precautionary-Engine Indication~~	-
~~PR~~	~~Pressurisation problem~~	-
~~S~~	~~Smoke~~	-
~~SIC~~	~~Smoke in Cockpit~~	-
~~TP~~	~~Technical Problem~~	-
~~W~~	~~Weather~~	-

-	**~~Contingency Action~~**	~~CA~~
~~CF~~	~~Communications failure~~	-
~~CI~~	~~Crew Injury~~	-
~~CR~~	~~Crew Request~~	-
~~CW~~	~~Cracked window~~	-
~~DW~~	~~Destination Weather~~	-
~~ED~~	~~Engine Defect~~	-
~~ES~~	~~Engine Shutdown~~	-
~~F~~	~~Fire~~	-
~~FL~~	~~Fuel Leak~~	-
~~FPD~~	~~Fuel Pump Defect~~	-
~~FS~~	~~Fuel shortage~~	-
~~HP~~	~~Hydraulic Problem~~	-
~~IRSF~~	~~IRS Failure~~	-
~~LFT~~	~~Low Fuel Temperature~~	-
~~ME~~	~~Medical Emergency~~	-

-	~~**Contingency Action**~~	~~CA~~
~~**PD**~~	~~Passenger Disturbance~~	-
~~**PEI**~~	~~Precautionary-Engine Indication~~	-
~~**PR**~~	~~Pressurisation problem~~	-
~~**S**~~	~~Smoke~~	-
~~**SIC**~~	~~Smoke in Cockpit~~	-
~~**TP**~~	~~Technical Problem~~	-
~~**W**~~	~~Weather~~	-
-	~~**Diversion**~~	~~DIV~~
~~**D**~~	~~Failed to comply with restriction in clearance~~	-
~~**L**~~	~~ATC error~~	-
-	~~**Horizontal Separation Erosion**~~	~~HSE~~
~~**C**~~	~~Crew error~~	-
~~**ISO**~~	~~Followed flight plan iso clearance~~	-
~~**L**~~	~~ATC error~~	-
~~**L4**~~	~~ATC Co-ordination error~~	-
-	~~**Intervention**~~	~~INT~~
~~**A**~~	~~Committed by aircraft not certified for operation in MNPS airspace (NAT HLA)~~	-
~~**B1**~~	~~ATC Loop Error - Controller error~~	-
~~**B2**~~	~~ATC Loop Error - Poor information exchange between CONTROLLER and the third party communicator~~	-
~~**B3**~~	~~ATC Loop Error - Poor information exchange between PILOT and the third party communicator~~	-
~~**B4**~~	~~ATC Loop Error - Poor centre to centre co-ordination~~	-
~~**C**~~	~~Crew error~~	-
~~**C1**~~	~~Equipment control error encompassing incorrect operation of fully functional FMS or navigation system.~~	-
~~**C2**~~	~~Incorrect transcription of ATC clearance or re-clearance into the FMS.~~	-
~~**C3**~~	~~Wrong information faithfully transcribed into the FMS e.g. flight plan followed rather than ATC clearance or original clearance followed instead of re-clearance~~	-
~~**D**~~	~~Other with failure to notify ATC in time for action~~	-
~~**E**~~	~~Other with failure to notify ATC too late for action~~	-
~~**F**~~	~~Other with failure not notified/received by ATC~~	-
~~**G**~~	~~Inter-facility co-ordination problem~~	-
~~**ISO**~~	~~Followed flight plan iso clearance~~	-
~~**L**~~	~~ATC error~~	-
~~**W**~~	~~Weather~~	-
-	~~Lateral Deviation <25nm~~	~~L~~
-	~~Lateral Deviation <15nm~~	~~L15~~
~~**A**~~	~~Committed by aircraft not certified for operation in MNPS airspace (NAT HLA)~~	-
~~**B1**~~	~~ATC Loop Error - Controller error~~	-
~~**B2**~~	~~ATC Loop Error - Poor information exchange between CONTROLLER and the third party communicator~~	-

~~-~~	~~**Intervention**~~	~~INT~~
~~**B3**~~	~~ATC Loop Error - Poor information exchange between PILOT and the third party communicator~~	~~-~~
~~**B4**~~	~~ATC Loop Error - Poor centre to centre co-ordination~~	~~-~~
~~**C1**~~	~~Equipment control error encompassing incorrect operation of fully functional FMS or navigation system.~~	~~-~~
~~**C2**~~	~~Incorrect transcription of ATC clearance or re-clearance into the FMS.~~	~~-~~
~~**C3**~~	~~Wrong information faithfully transcribed into the FMS e.g. flight plan followed rather than ATC clearance or original clearance followed instead of re-clearance~~	~~-~~
~~**D**~~	~~Other with failure to notify ATC in time for action~~	~~-~~
~~**E**~~	~~Other with failure to notify ATC too late for action~~	~~-~~
~~**F**~~	~~Other with failure not notified/received by ATC~~	~~-~~
~~**G**~~	~~Inter-facility co-ordination problem~~	~~-~~
~~**W**~~	~~Weather~~	~~-~~
	~~**GROSS NAVIGATION ERRORS**~~	
~~-~~	~~The GNE occurred in MNPS airspace (NAT HLA) and the aircraft was observed exiting the ocean through the windows and the deviation >= 30Nm.~~	~~Alpha (eta)~~
~~-~~	~~**The GNE occurred in MNPS airspace (NAT HLA) and the aircraft was observed exiting the ocean through the windows and the deviation >= 50Nm or >= 1 deg, as appropriate.**~~	~~**Alpha (zeta, risk-bearing)**~~
~~-~~	~~The GNE occurred in MNPS airspace (NAT HLA), was NOT observed exiting the ocean through the windows and the deviation >=25Nm or WAS observed exiting the ocean through the windows and the deviation >=30Nm.~~	~~B~~
~~-~~	~~The GNE occurred above or below MNPS airspace (NAT HLA) (not necessarily at the windows) and the deviation >=25Nm~~	~~C~~
~~**C**~~	~~Crew error~~	~~-~~
~~**D**~~	~~Failed to comply with restriction in clearance~~	~~-~~
~~**E**~~	~~Climb/descent without ATC clearance.~~	~~-~~
~~**L**~~	~~ATC error~~	~~-~~
~~**W**~~	~~Weather~~	~~-~~
~~-~~	~~**Longitudinal Separation Erosion**~~	~~LSE~~
~~**C**~~	~~Crew error~~	~~-~~
~~**L**~~	~~ATC error~~	~~-~~
~~**MA**~~	~~Mach no.~~	~~-~~
~~**WP**~~	~~Waypoint~~	~~-~~
~~-~~	~~**Time-Related Incident**~~	~~TRI~~
~~**CF**~~	~~Communications failure~~	~~-~~
~~**CI**~~	~~Crew Injury~~	~~-~~
~~**CR**~~	~~Crew Request~~	~~-~~
~~**CW**~~	~~Cracked window~~	~~-~~
~~**DW**~~	~~Destination Weather~~	~~-~~
~~**ED**~~	~~Engine Defect~~	~~-~~
~~**ES**~~	~~Engine Shutdown~~	~~-~~
~~**F**~~	~~Fire~~	~~-~~

~~-~~	~~**Time-Related Incident**~~	~~TRI~~
~~**FL**~~	~~Fuel Leak~~	~~-~~
~~**FPD**~~	~~Fuel Pump Defect~~	~~-~~
~~**FS**~~	~~Fuel shortage~~	~~-~~
~~**HP**~~	~~Hydraulic Problem~~	~~-~~
~~**IRSF**~~	~~IRS Failure~~	~~-~~
~~**LFT**~~	~~Low Fuel Temperature~~	~~-~~
~~**ME**~~	~~Medical Emergency~~	~~-~~
~~**PD**~~	~~Passenger Disturbance~~	~~-~~
~~**PEI**~~	~~Precautionary-Engine Indication~~	~~-~~
~~**PR**~~	~~Pressurisation problem~~	~~-~~
~~**S**~~	~~Smoke~~	~~-~~
~~**SIC**~~	~~Smoke in Cockpit~~	~~-~~
~~**TP**~~	~~Technical Problem~~	~~-~~
~~**W**~~	~~Weather~~	~~-~~
~~-~~	~~**Turnback**~~	~~TB~~
~~**A**~~	~~Contingency action due to engine fault.~~	~~-~~
~~**B**~~	~~Contingency action due to pressurization failure.~~	~~-~~
~~**C**~~	~~Contingency action due to other cause.~~	~~-~~
~~**D**~~	~~Failure to climb/descend as cleared.~~	~~-~~
~~**E**~~	~~Climb/descent without ATC clearance.~~	~~-~~
~~**F**~~	~~Entry to RVSM airspace at an incorrect level.~~	~~-~~
~~**G**~~	~~ATC FL re-clearance resulting in a loss of lateral or longitudinal separation.~~	~~-~~
~~**H**~~	~~Deviation due to TCAS.~~	~~-~~
~~**I**~~	~~Aircraft unable to maintain level.~~	~~-~~
~~**J**~~	~~ATC failure to correctly record, coordinate, or follow through on FL changes and/or other clearances.~~	~~-~~
~~**K**~~	~~Aircrew not maintaining level as cleared.~~	~~-~~
~~**L1**~~	~~ATC failure to capture incorrect read back of control instructions.~~	~~-~~
~~**L2**~~	~~ATC failure to maintain situational awareness.~~	~~-~~
~~**L3**~~	~~ATC failure to resolve transposed call signs.~~	~~-~~
~~**L4**~~	~~ATC Co-ordination error~~	~~-~~
~~**M**~~	~~Actions taken due to mechanical or equipment failure.~~	~~-~~
~~**O**~~	~~Other~~	~~-~~
~~**W**~~	~~Weather~~	~~-~~
~~-~~	~~Final level within RVSM airspace~~	~~1~~
~~-~~	~~Final level above RVSM airspace~~	~~2~~
~~-~~	~~Final level below RVSM airspace~~	~~3~~

~~APPENDIX A — ICAO HIGH SEAS COORDINATION PROCEDURE~~

~~REGIONAL AIR NAVIGATION AGREEMENT COORDINATION PROCEDURE FOR AIRSPACE CHANGES OVER THE HIGH SEAS~~

~~*(C 53/23 - NAT SPG/53 June 2017)*~~

~~This procedure is aimed to obtain regional air navigation agreement before implementing all airspace changes and ATS routes (regional and non-regional) over the High Seas (international airspace).~~

~~1. States send an official letter to the ICAO Secretariat or indicate the requirement in a NAT SPG Conclusion recorded in the NAT SPG Report, as a direct outcome of the NAT SPG meeting.~~

~~2. The ICAO Secretariat circulates the proposed changes over the High Seas on behalf of the "initiating" States.~~

~~3. The States consulted generally have a four-week deadline for comments.~~

~~4. The "silent procedure" applies (i.e. no comments received means agreement).~~

~~5. After the deadline, if no objections are received, the ICAO Secretariat officially informs all States consulted that the "initiating" State(s) may proceed with the implementation.~~

~~~~~~~~~~~~~~~

~~The following is model text for the official letter from States to initiate the regional air navigation agreement coordination procedure:~~

~~*Note: This should be used only as a guide for the content of the letter to ICAO. For all airspace changes, such as change of airspace classification, change of TMA boundaries, etc., States are invited to use their discretion to adjust the text and provide all necessary information concerning this change, as appropriate.*~~

~~**TO BE ISSUED AND SIGNED ON THE STATE'S LETTERHEAD PAPER**~~

~~To: Mr [*Regional Director Name*][*], ICAO Regional Director, Europe and North Atlantic~~

~~*[DATE]*~~

~~**Subject: [*Free Route Airspace Concept Implementation / ATS Route Network Changes over the High Seas*]**~~

~~Dear Mr [*Regional Director Name*],~~

~~1. In accordance with the provisions in Annex 11, paragraph 2.1.2 and the established procedure for amendment of the North Atlantic Air Navigation Plan, [*STATE OR STATES*] wish to inform the ICAO EUR/NAT Office of their intention to implement [*airspace changes/ATS route changes/the Free Route Airspace Concept]* which will include airspace over the High Seas (international airspace) within [*FIR NAME*] FIR.~~

~~*[2. The proposed area, principles and procedures of the Free Route Airspace Concept implementation are as follows:*~~

~~*a) definition of the implementation area in the vertical and horizontal planes;*~~
~~*b) brief description of the procedures to be applied in this area; and*~~

~~[*] *All text in italics between square brackets [text] to be adjusted accordingly.*~~
~~~~~~~~~~~~~~~

~~*c) indication of the reference material within the national Aeronautical Information Publication.]*~~

~~*[AND/OR]*~~

~~*[3. The proposed changes to the ATS route network are as follows:*~~

~~*Route Designator:*~~	
~~*Route description:*~~	
~~*Route characteristics/ remarks:*~~	~~*]*~~

~~4. Coordination between all parties concerned has been carried out and a chart indicating the changes concerned is attached to this letter for ease of reference.~~

~~5. The planned date of implementation of these changes is *[DD/MM/YY]*.~~

~~*[SIGNED]*~~

~~*Attachment: [Chart showing changes]*~~

LIST OF ACRONYMS

Secretariat Note: To be updated before final publication.

AAD	Assigned Altitude Deviation
ADS	
ADS–B	Automatic Dependent Surveillance – Broadcast
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	*Global Aviation Safety Plan* (GASP)
Doc 10037	*ICAO Global Operational Data Link* (GOLD) *Manual*
Doc 7030	*ICAO Regional Supplementary Procedures* (SUPPs)
Doc 9574	*Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive*
Doc 9750	*Global Air Navigation Plan* (GANP)
Doc 9869	*Performance-Based Communication and Surveillance (PBCS) Manual*
EUR/NAT	European and North Atlantic
fapfh	Fatal accidents per flight hour
FIR	Flight Information Region
GANP	*Global Air Navigation Plan* (Doc 9750)
GASP	*Global Aviation Safety Plan* (Doc 10004)
GOLD	*ICAO Global Operational Data Link Manual* (Doc 10037)
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	*North Atlantic Services Development Roadmap* (NAT Doc 009)
NAT SG	North Atlantic Scrutiny Group
NAT SOG	North AtlanticSafety 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
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	*ICAO Regional Supplementary Procedures* (Doc 7030)
ToR	Terms of Reference
TVE	Total Vertical Error

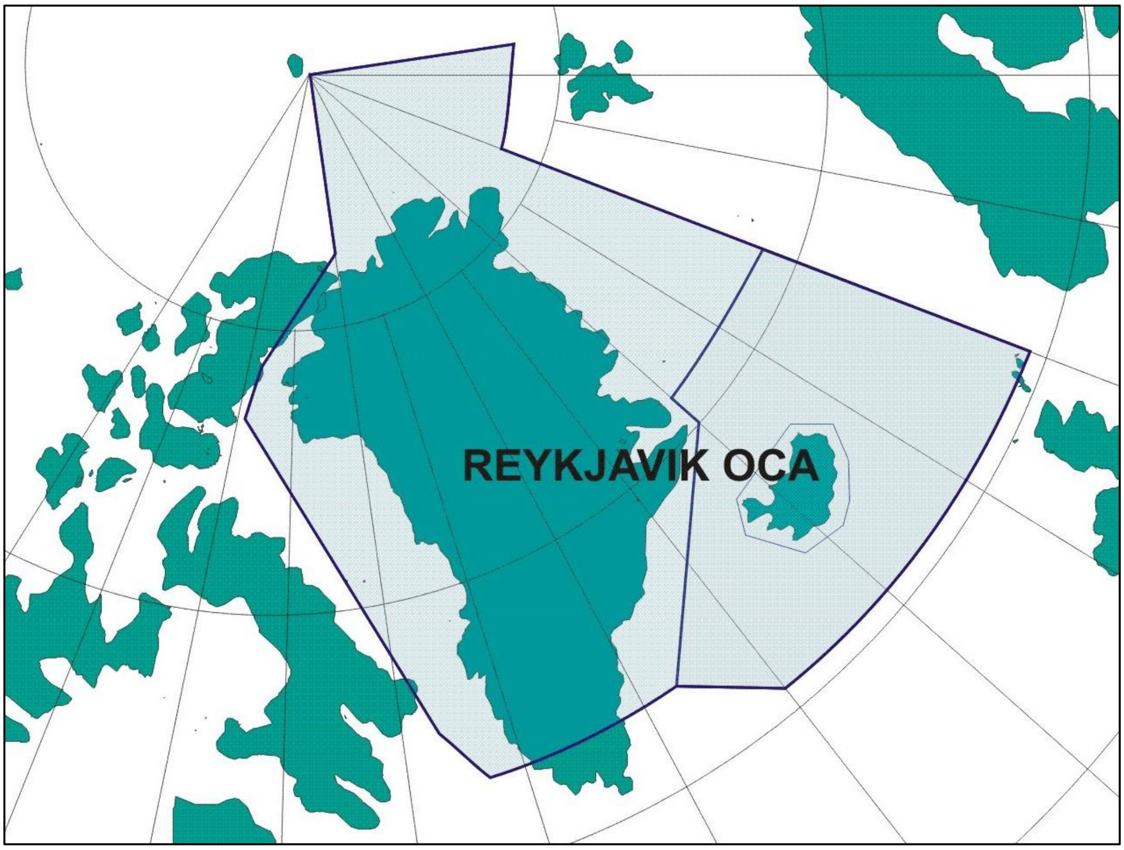
— END —

APPENDIX R — AMENDMENTS TO AIR TRAFFIC MANAGEMENT OPERATIONAL CONTINGENCY PLAN - NORTH ATLANTIC REGION (NAT DOC 006, PART I, V1.11), CHAPTER 3

(*paragraph 5.7.2 refers*)

Starts on next page

CHAPTER 3: DETAILED PROCEDURES – REYKJAVIK OACC



3.1 FIR FOR WHICH THE CONTINGENCY PLAN APPLIES

Reykjavik Oceanic FIR/CTA

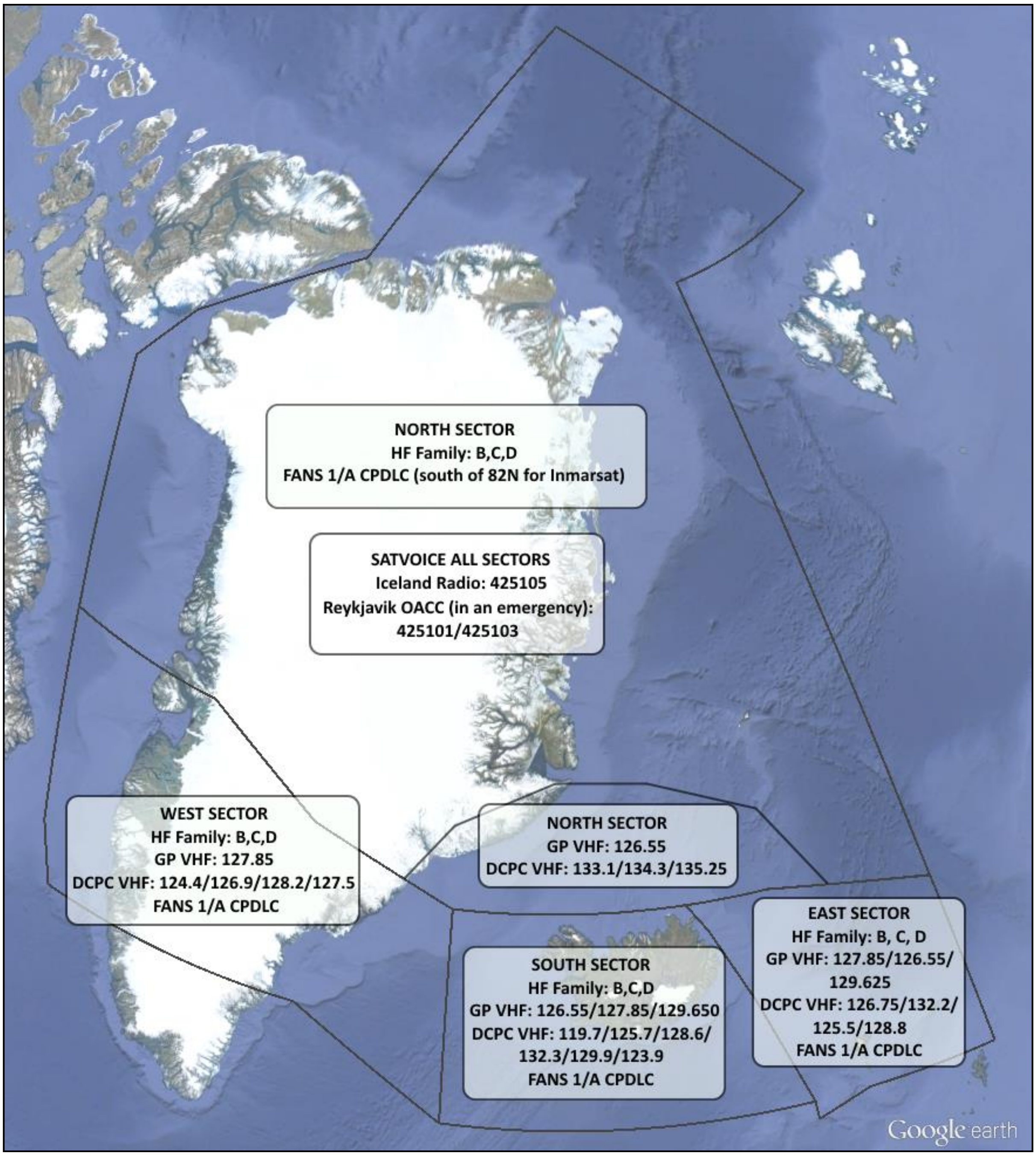


Figure: Reykjavik CTA sectorization and communication possibilities
(VHF frequencies are listed in order of priority)

3.2 FIRs WITH SUPPORTING PROCEDURES

None

3.3 NOTIFICATION PROCEDURES

In a **limited service** situation, notification of any service limitations and traffic management measures will be promulgated to operators and adjacent ANSPs by NOTAM normally not later than 12 hours prior to activation or as soon as practicable in case of an unexpected service interruption.

In a **no service** situation, the OACC is likely to have been evacuated. As soon as possible after evacuation a contingency message will be sent by NOTAM and Iceland radio will advice aircraft within Reykjavik FIR/CTA. Adjacent centres will be advised by phone.

3.4 LIMITED SERVICE - PROCEDURES

3.4.1 Disruption of ground/air communication capability

Iceland Radio and Shanwick Radio jointly provide ~~joint~~ voice communications in~~for~~ the ~~communications area comprising~~ Reykjavik~~/Søndrestrøm~~ and Shanwick Oceanic Control Areas~~resulting in a virtual radio station for the North Atlantic from 45N to the North Pole~~.

Radio Operators work flights in either area on an as-needed basis, ~~updating~~serving both Reykjavik and Shanwick Control Centres.

Joint Operations between Iceland Radio and Shanwick Radio enhance redundancy in the provision of the general purpose voice communications service.~~increases the ability to provide a 'normal' service with assistance from adjacent aeronautical stations.~~

Iceland radio provides communication services using HF and general purpose VHF. Reykjavik OACC provides DCPC VHF communications in the South~~ ,~~ sector~~ and most of the~~, East sector, West sector and the southern~~-~~most part of North sector. Reykjavik OACC and Iceland radio are located in separate buildings ~~located~~ several kilometers apart. Disruption at one facility is therefore unlikely to affect the other ~~facility~~ and each will therefore serve as a backup for the other in cases of limited disruption of ground/air communication capability.

In case of failure of Iceland radio HF services, the HF service will be delegated to ~~the radio stations in neighboring areas; Shanwick Radio,~~ Gander Radio and Bodø Radio.

3.4.2 Disruption of ability to provide control services

Reykjavik will determine, co-ordinate and promulgate any necessary restrictions to meet the service limitation. Traffic in possession of a valid oceanic clearance will have priority over any other traffic. Enroute re-clearance of such traffic will not be permitted except in emergency.

Traffic without a valid oceanic clearance may be subject to tactical traffic management measurements to meet the requirements of the service limitation.

Flight planning

Flight plans shall be filed and addressed to Reykjavik Oceanic Area Control Centre as well as to the appropriate adjacent ATS Units and IFPS, where applicable, in accordance with normal procedures (see AIP Iceland ENR 1.11).

Separation standards

Reykjavik will be responsible for ensuring the co-ordination and implementation of any additional separation requirements. In case of contingency track activation, there shall be at least 20 minutes separation between aircraft upon entry on the same contingency track and level (see chapter 3.7 for contingency route structure).

Contingency tracks

Dependant on the nature of the service limitation, Reykjavik may promulgate and activate contingency tracks for use in addition to the NAT OTS. The contingency route structure detailed in this section will in most cases be implemented.

Air Traffic Flow Management

Reykjavik will co-ordinate any necessary traffic management measures where necessary with the NMOC. Such measures may include, but are not limited to, temporary capacity restrictions and tactical re-routeing measures.

Reykjavik will co-ordinate these restrictions where necessary with adjacent ANSPs where they may affect the flow of traffic through these units airspace.

Communications

Aircraft shall not communicate directly with Reykjavik Oceanic Control on DCPC VHF except when instructed to do so or if in emergency. Position reporting within Reykjavik ~~FIR/~~CTA will be with Iceland Radio or via ADS-C~~/CPDLC/FMS~~ in accordance with normal procedures. Aircraft unable to contact Iceland Radio on HF Frequency shall call either ~~one of the following stations: Shanwick Radio~~ Bodø Radio or Gander Radio.

Aircraft shall maintain continuous listening watch on the assigned frequencies.

~~Radar~~ ATS surveillance service

~~Radar~~ An ATS surveillance service will be provided at ATS discretion. Aircraft are required to maintain their assigned discrete SSR Code while within Reykjavik FIR/CTA. West of 030W the ATS surveillance service is provided with ADS-B only.

Responsibilities of adjacent ANSPs

The action required of adjacent ANSPs will vary dependant on the nature of the service limitation. Where such action is not contained within the inter-centre Letters of Agreement (LOAs) the requirement will be promulgated within the initial failure and restrictions message.

3.5 NO SERVICE - PROCEDURES

3.5.1 Loss of ground/air communication capability

Iceland Radio and Shanwick Radio jointly provide ~~joint~~ voice communications in~~for the communications area comprising~~ Reykjavik~~/Søndrestrøm~~ and Shanwick Oceanic Control Areas~~ resulting in a virtual radio station for the North Atlantic from 45N to the North Pole~~.

Radio Operators work flights in either area, updating both Reykjavik and Shanwick Control Centres.

Joint Operations between Iceland Radio and Shanwick Radio increases the ability to provide a 'normal' service with assistance from adjacent aeronautical stations.

Iceland ~~r~~Radio provides communication services using HF and general purpose VHF. Reykjavik OACC provides DCPC VHF communications in the South sector, East sector, West sector and the southern most part of North sector~~in the South sector and most of the East sector~~. Reykjavik OACC and Iceland ~~r~~Radio are ~~located~~ in separate buildings located several kilometers apart. Disruption at one facility is therefore unlikely to affect the other facility and each will therefore serve as a backup for the other in cases of limited disruption of ground/air communication capability.

In case of failure of Iceland radio HF services, the HF service will be delegated to ~~the radio stations in neighboring areas; Shanwick Radio,~~Gander Radio and Bodø Radio.

3.5.2 Loss of ability to provide control services

Should Reykjavik OACC be evacuated the potential exists for a major disruption to Air Traffic Control service within the Reykjavik OCA.

The HF and general purpose VHF radio communications facilities for the Reykjavik Oceanic Centre are remotely located at the Iceland radio facilities in another part of Reykjavik city, and will therefore unlikely be affected.

In the event that Reykjavik ATCC is evacuated, the operations will be moved to Iceland radio and the provision of Air Traffic Services (ATS) within the Reykjavik FIR/OCA will be continued at that location as far as practicable.

As soon as possible after evacuation a contingency message will be sent by NOTAM and Iceland ~~r~~Radio will advise aircraft within Reykjavik FIR/CTA. Adjacent centers will be advised by phone.

Contact information that may be used in the event of an emergency evacuation is provided in Appendix B.

Flight planning

Flight plans shall be filed and addressed to Reykjavik Oceanic Area Control as well as to the appropriate adjacent ATS Units and IFPS, where applicable, in accordance with normal procedures.

Separation standards

Reykjavik will be responsible for ensuring the co-ordination and implementation of any additional separation requirements. In case of contingency track activation, there shall be at least 20 minutes separation between aircraft upon entry on the same contingency track and level.

Contingency tracks

The contingency route structure detailed in this section will be implemented.

Air Traffic Flow Management

Reykjavik will co-ordinate any necessary traffic management measures where necessary with the NMOC. Such measures may include, but are not limited to, complete closure of the airspace, temporary capacity restrictions and tactical re-routeing measures.

Reykjavik will co-ordinate these restrictions where necessary with adjacent ANSPs where they may affect the flow of traffic through these units airspace.

Communications

HF congestion is likely. Communications should be kept to a necessary minimum. Unnecessary routeing-, flight level- and speed changes will not be issued.

Communications and Position reporting within Reykjavik FIR/CTA will be with Iceland Radio or via ADS-C~~/CPDLC/FMC~~. Aircraft unable to contact Iceland Radio on general purpose VHF or HF Frequency shall call either Gander Radio or Bodø Radio.~~one of the following stations:~~

~~Shanwick Radio~~

~~Bodø Radio~~

~~Gander Radio~~

Aircraft shall maintain continuous listening watch on the assigned frequencies.

~~Radar~~ATS surveillance service

~~Radar~~ An ATS surveillance service will not be provided. Aircraft are nevertheless required to maintain their assigned discrete SSR Code while within Reykjavik FIR/CTA.

Responsibilities of adjacent ANSPs

Other ATSUs will provide guidance as far as possible in the circumstances.

3.6 FLIGHT CREW AND OPERATOR PROCEDURES

3.6.1 For flights within the Reykjavik OCA

The procedures outlined below are to be used as guidance for pilots in the immediate aftermath of a sudden withdrawal of the ATC service as described above.

On receipt of the contingency message pilots are requested to broadcast to other flights on 121.5 and 123.45. A listening watch on these frequencies must be maintained.

Reykjavik OACC will endeavor to provide a limited ATC service through Iceland radio as soon as possible after evacuation commences.

Flights operating with a received and acknowledged oceanic clearance will be expected to continue in accordance with the last clearance issued unless otherwise advised by ATC. Aircrew shall use extreme caution and use all available means to detect any conflicting traffic.

Flights should remain in/establish communications with Iceland ~~r~~Radio. Flights unable to contact Iceland ~~r~~Radio should establish communication with the next agency 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~~/CPDLC/FMC~~) as these reports may not have been received by the next agency.

When flights making automatic position reports are notified of a Reykjavik evacuation they must revert to voice position reporting until clear of Reykjavik OCA, or notified otherwise. Pilots of FANS1/A equipped flights should note that they may be asked to log-on to the next agency while within the Reykjavik OCA, they should not initiate this action until instructed to do so.

If unable to establish radio contact, flights may use SATCOM voice or satellite telephone to provide position reports.

Oceanic Centre	Telephone Number	SATCOM Inmarsat Short Code
Gander	+1 709 651 5207	431613
Santa Maria	+351 296 820 438 +351 296 886 042 (satellite link)	426305
New York	+1 631 468 1413	436623
Ballygirreen (Shanwick Aeradio)	+353 61 471 199	425002
Reykjavik, via Iceland Radio	+354 568 4600	425105

Flights may request their flight dispatch offices to forward position reports, if sending position reports to multiple ATS Units or if otherwise unable to forward position reports.

3.6.2 For flights approaching the Reykjavik OCA when the contingency is activated

Not in Receipt of an Oceanic Clearance

In the event that Reykjavik OACC must be evacuated, only aircraft with received and acknowledged oceanic clearances are permitted to ~~transit~~ enter Reykjavik OCA.

If unable to obtain or acknowledge an oceanic clearance, flights shall re-route around the Reykjavik OCA or land at an appropriate airfield. The adjacent areas will issue advice on procedures to be followed.

In receipt of an acknowledged Oceanic Clearance

Aircraft operating with a received and acknowledged oceanic clearance can, at pilot's discretion, continue, but must expect a limited ATC service within the Reykjavik OCA. Aircrew shall use extreme caution and use all available means to detect any conflicting traffic. ~~Due to the remote location of the~~ HF ~~service provider~~ communications will be available through Iceland radio.

However, due to the uncertainty surrounding the contingency situation pilots are strongly advised to comply with the procedures detailed above for flights not in receipt of an oceanic clearance even if they are in receipt of an acknowledged Oceanic clearance.

3.7 REYKJAVIK OACC – CONTINGENCY ROUTE STRUCTURE

3.7.1 For activation within Reykjavik OCA

In a **limited service** contingency situation Reykjavik OACC may promulgate contingency tracks in addition to the published OTS. A set of routes, titled ICECON Tracks, have been established for this purpose. Promulgation of the tracks will be via AFTN.

It is mandatory to flight plan on the ICECON tracks during the periods detailed below. The contingency tracks must be flight planned as if they were random route tracks (detailing each waypoint in the flight plan).

IT IS ESSENTIAL FOR AVIATION SAFETY THAT ALL PILOTS UNDERSTAND AND COMPLY WITH THE PROVISIONS OF THIS CONTINGENCY PLAN.

Flight level changes for en-route aircraft should not be expected within Reykjavik ~~FIR/~~CTA.

Random flights at directional levels will be accepted at FL 290 and below as well as FL 410 and above, however, flow restrictions may be imposed.

~~Radar~~ An ATS Surveillance service will be provided at ATS discretion.

Ambulance and SAR flights will be dealt with on individual bases.

Day Tracks

The following DAY TRACKS will be effective on entry into Reykjavik FIR/CTA from 0930 to 1800 except A, B and C, which will be activated as part of the NAT OTS.

A	BARKU - RATSU - 63N020W - 64N030W - 64N040W - 63N050W - LIBOR~~61N060W – MIBNO - RODBO~~ Westbound FL340/350/360 Eastbound FL380
B	ATSIX - 62N020W - 63N030W - 63N040W - 62N050W - PIDSO~~60N060W – PEPKI - LOPVI~~ Westbound FL340/350/360/370/380/390 Eastbound NIL
C	BALIX - 61N020W - 62N030W - 62N040W -61N050W – SAVRY~~MOATT - LOMTA~~ Westbound FL340/350/360/370/380/390 Eastbound NIL
ICECON 8	BESGA - MATIK - 62N010W - 64N020W - 66N030W - 67N040W - 67N050W - DARUB Westbound FL340/350/360 Eastbound FL390
ICECON 10	~~GONUT~~OSBON - 63N010W - 65N020W - 67N030W - 69N040W - 70N050W - 70N060W - ADSAM Westbound FL340/350/360 Eastbound FL370/380/390
ICECON 14	~~LIRKI~~SOSAR - 66N005W - 71N010W - 7630N020W - 81N040W - ALERT Westbound FL340/350/360 Eastbound NIL
ICECON 16	73N00W - 79N010W – 82N020W - PELRI Westbound FL340/350/360 Eastbound FL310
ICECON 18	80N00W - 85N020W - OVBES Westbound FL340/350/360 Eastbound FL310
ICECON 20	~~EXITA~~76N000W - 78N020W - 7830N040W - THT - LENIM Westbound FL320/330 Eastbound FL370/380
ICECON 22	IPTON - 63N010W - 63N020W - 64N030W - 64N040W - 63N050W - LIBOR~~61N060W – MIBNO – RODBO~~ Westbound FL330 Eastbound NIL
ICECON 24	GUNPA - 62N010W - 62N020W - 63N030W - 63N040W - 62N050W - PIDSO~~60N060W – PEPKI – LOPVI~~ Westbound FL330 Eastbound NIL
ICECON 24A	GUNPA - 62N010W - 62N020W - 62N030W - 62N040W - 61N050W – SAVRY~~MOATT – LOMTA~~ Westbound FL330 Eastbound NIL

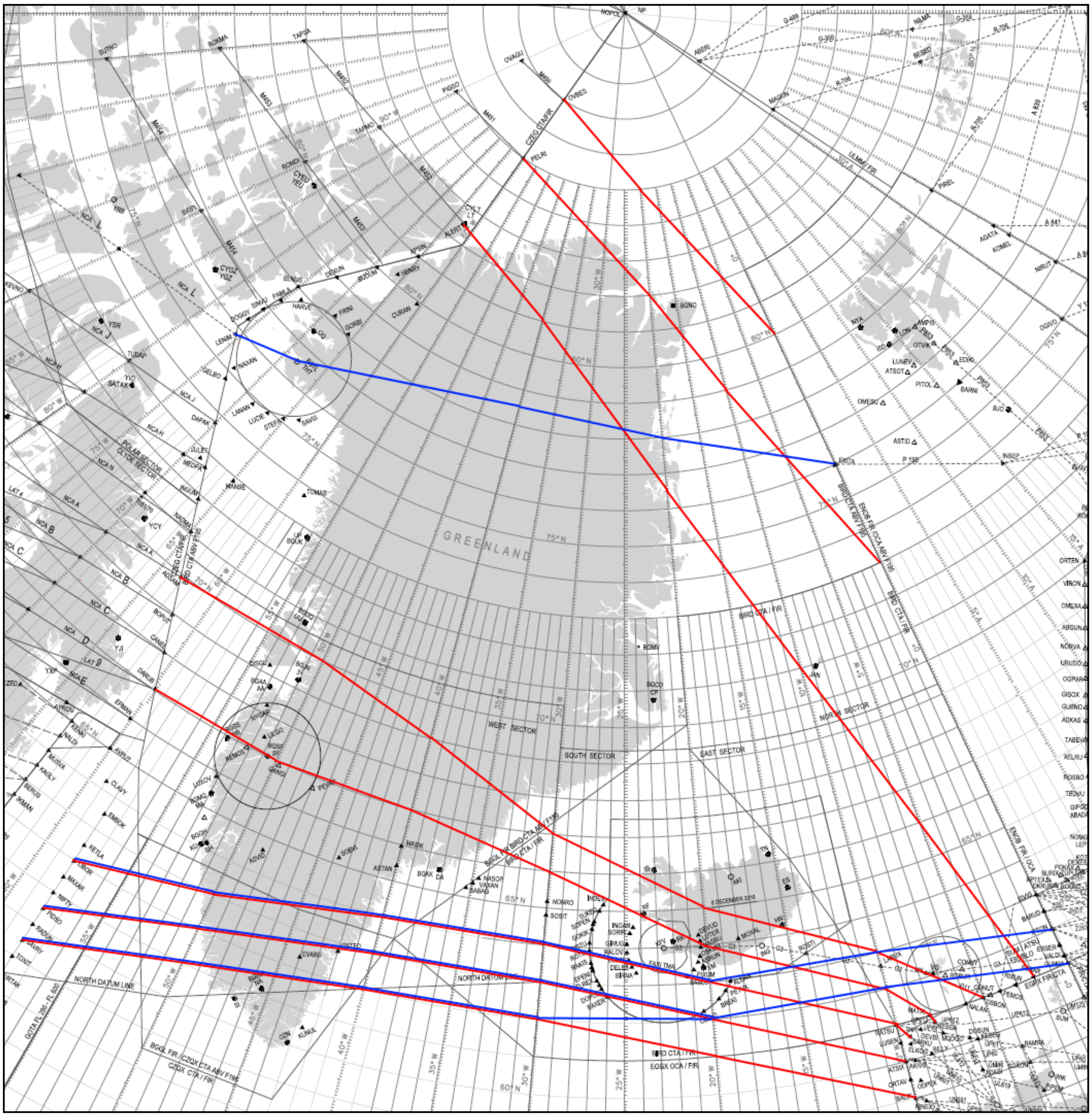


Figure: Contingency day tracks effective on entry into Reykjavik FIR/CTA from 0930 to 1800 except A, B and C, which will be activated as part of the NAT OTS.
Refer to the text above for flight level allocation on the tracks.

Night Tracks

NIGHT TRACKS will be effective on entry into Reykjavik FIR/CTA from 2300 to 0600 except ICECON 11 and 13 which will become effective from 0100 until 0600 at 30W.

ICECON 7 ADSAM -
70N060W - 70N050W - 69N040W - 67N030W - 65N020W - 63N010W - OSBON~~GONUT~~
Eastbound FL340/350
Westbound FL330

ICECON 9 DARUB - 67N050W - 66N040W - 65N030W - 64N020W - 62N010W – MATIK - BESGA
Eastbound FL340/350
Westbound FL330

ICECON 11 62N040W - 63N030W - KFV - 64N020W - 63N010W -IPTON
Eastbound FL360/370/380
Westbound NIL

ICECON 13 61N040W - 62N030W - 62N020W - 62N010W - GUNPA
Eastbound FL360/370/380
Westbound NIL

ICECON 13A 61N040W - 62N030W - 62N020W - RATSU - BARKU
Eastbound FL360/370/380
Westbound NIL

ICECON 15 ALERT- 81N040W - 7630N020W - 71N010W - 66N005W - SOSAR~~LIRKI~~
Eastbound FL350/390
Westbound FL340

ICECON 17 PELRI - 82N020W - 79N010W – 73N000W
Eastbound FL350/360/370
Westbound FL310/340

ICECON 19 OVBES - 85N020W – 80N000W
Eastbound FL350/360/370
Westbound FL310/340

ICECON 21 LENIM - THT - 7830N040W - 78N020W – 76N000W~~EXITA~~
Eastbound FL330/380
Westbound FL320

Eastbound traffic will not be permitted to route from Shanwick or Scottish airspace into Reykjavik airspace unless at FL 270 and below or FL 390 and above.

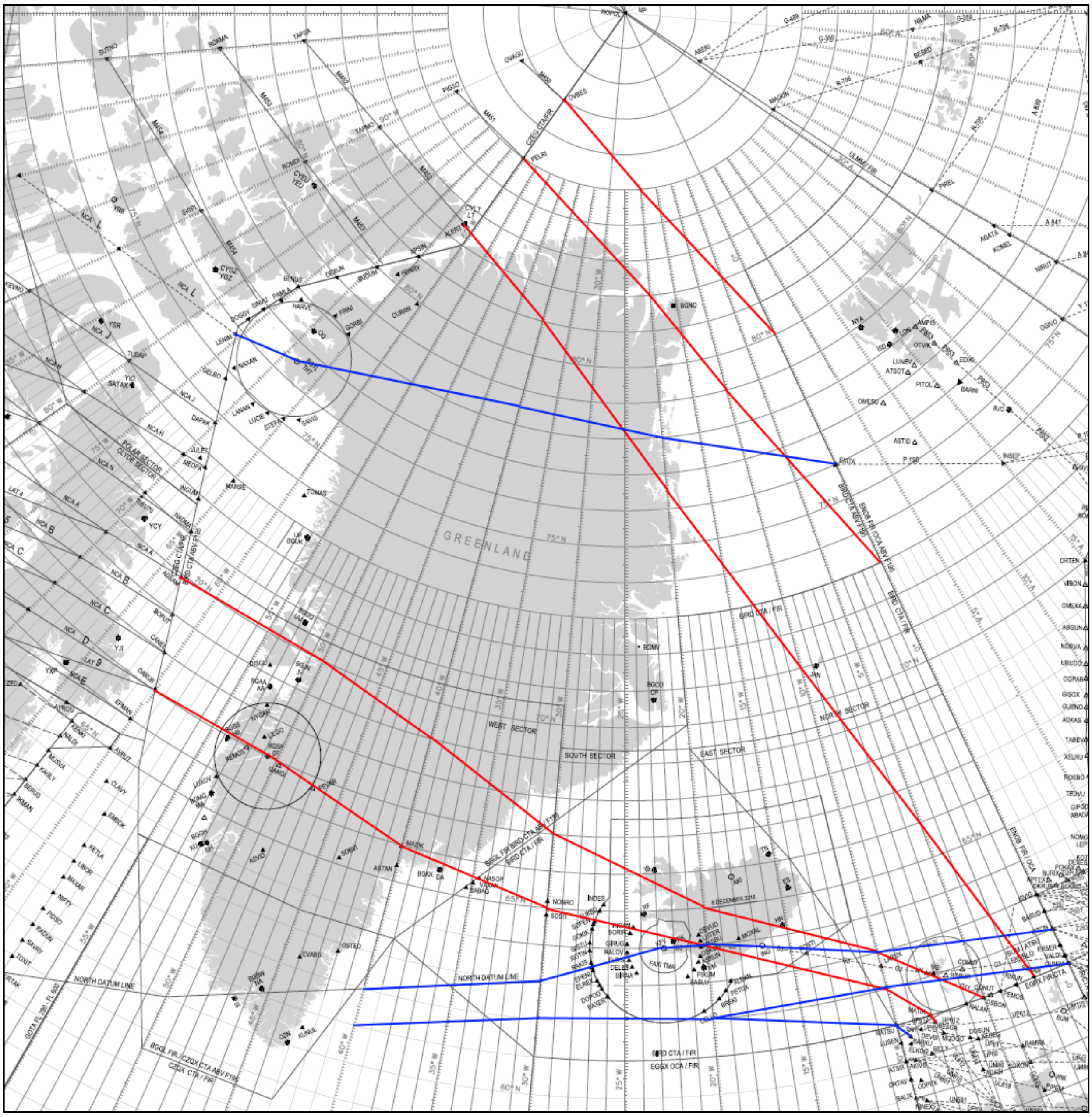


Figure: Contingency night tracks effective on entry into Reykjavik FIR/CTA from 2300 to 0600 except ICECON 11 and 13 which will become effective from 0100 until 0600 at 30W. Refer to the text above for flight level allocation on the tracks.

Tracks available 24 hours

Iceland - inbound and outbound

INBOUND

RATSU - ALDAN - ASRUN - KFV
Westbound FL320

GUNPA - 63N010W - ING - NASBU - KFV
Westbound FL 310

61N040W - 62N030W – ELREX – ELDIS - KFV~~RFV~~
Eastbound FL 290/310

BIAR – IPTON 64N010W ES AKI
BIEG – IPTON 64N~~n~~010W ES
Westbound FL300

OUTBOUND

~~KFV - BREKI~~BIKF - PIXUM PETUX - RATSU - BARKU
Eastbound FL 310 ~~- To be level by BREKI~~

~~Radial 098 until FL 320 - 63N010W – GUNPA~~

BIKF - OSKUM - 63N010W - GUNPA

Eastbound FL 320

~~KFV -~~ BIKF - RALOV - RAKIS - 63N030W - 62N040W
Westbound FL 320

BIAR – AKI ES 64N010W IPTON
BIEG – ES 64N010W IPTON
Eastbound FL290

Faeroes Islands - inbound and outbound

INBOUND

VALDI - ROBUR~~BUREM~~
Westbound FL 280

OUTBOUND

G11 - PEMOS~~GONUT~~
Eastbound FL 290

Søndrestrøm - inbound and outbound

INBOUND

ICECON 12 IPTON - 64N010W - 66N020W - 67N030W - 67N040W - 67N050W - SF
Westbound FL 310

EPMAN - SF
Eastbound FL 300

~~6000N05630W~~ MAXAR - KU - SF
Northbound FL 320

SAVIS - TOMAS - UP - DISGU - SF
Southbound FL 320

OUTBOUND

ICECON 12 67N050W - 67N040W - 67N030W - 66N020W - 64N010W - IPTON
Eastbound FL 320

EPMAN
Westbound FL 320

KU - ~~6000N05630W - PRAWN~~MAXAR
Southbound FL 310

DISGU - UP - TOMAS - SAVIS - THT
Northbound FL 310

~~Radar~~ An ATS Surveillance service will be provided by ATC Søndrestrøm.

Thule - inbound and outbound

INBOUND

DISGU - UP - TOMAS - SAVIS - THT
Northbound FL 310

JULET - ~~LIPSI~~ LANAN - THT
ALL LEVELS to ~~LIPSI~~LANAN, after ~~LIPSI~~LANAN FL290 at or below

OUTBOUND

SAVIS - TOMAS - UP - DISGU - SF
Southbound FL 320, not ABV FL 310 until after SAVIS

~~LIPSI~~ LANAN - JULET
ALL LEVELS, not ABV FL 310 until after ~~LIPSI~~LANAN

Radar service will be provided by Thule-TRACAB~~RAPCON~~.

Traffic via Murmansk~~Aberi~~

CANEL 73N060W 79N055W 84N040W ABERI
Eastbound FL300
Westbound NIL

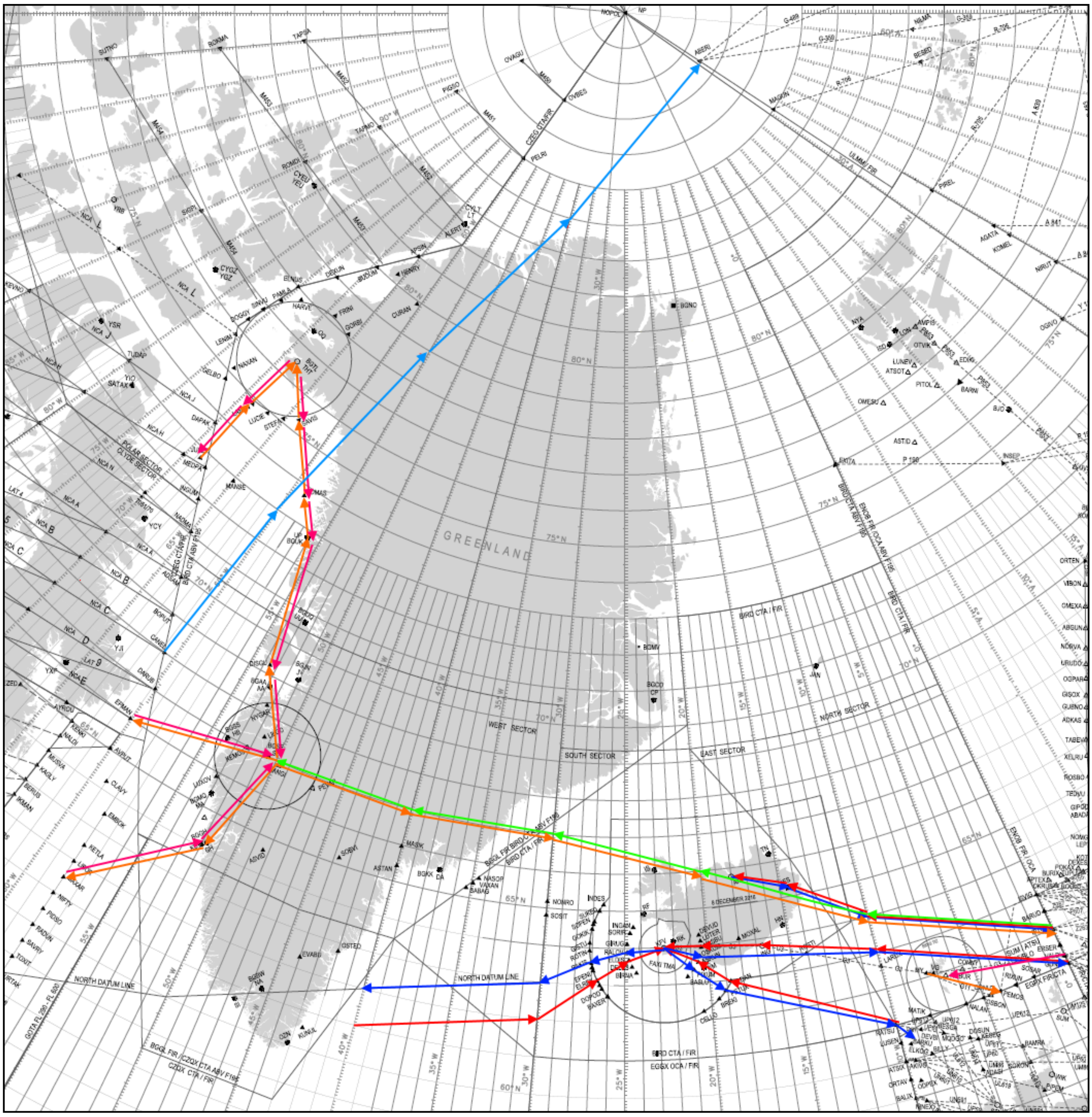


Figure: Contingency tracks available 24 hours.
Refer to the text above for flight level allocation on the tracks.

3.8 LONG TERM CONTINGENCY ARRANGEMENTS

In development.

Appendix A –

Procedures by Adjacent Areas in Event of Reykjavik Evacuation

NONE

Appendix B –

Contact Details - Reykjavik OACC

Reykjavik OACC		
Reykjavik Shift Manager (07:00-23:00)	+354 424 4343	acc@isavia.is
~~Reykjavik Shift Manager Inmarsat Satellite Phone (07:00-23:00)~~	~~+870 776 626 628~~	
Reykjavik Shift Manager Iridium Satellite Phone (07:00-23:00)	+881 631 450 347	
~~Supervisor~~ Shift Manager (23:00-07:00)	+354 424 4141	
Reykjavik OACC Telefax	+354 424 4200	
North Sector primary commercial/ 1st backup	+354 424 4264	
West Sector primary commercial/ 1st backup	+354 424 4264	
East Sector primary commercial/ 1st backup	+354 424 4263	
South Sector primary commercial/ 1st backup	+354 424 4262	
South Sector domestic operations commercial/ 1st backup	+354 424 4261	
All Sectors 2nd backup	+354 568 3033	
All Sectors 3rd backup	+354 568 3035	
JRCC Iceland	+354 545 2100	
System Operators and Flight Data Specialists	+354 424 4265	
System Operators and Flight Data Specialists, Iridium Satellite Phone	+881 621 434 042	
ATM Systems Department	+354 424 4328	
ATM Systems Department, Mobile	+354 897 8483	
Manager Reykjavik OACC Ms. Þórdís Sigurðardóttir	+354 424 5140 +354 699 8504 (mobile)	thordis.sigurdardottir@isavia.is
Deputy Manager Reykjavik OACC Mr. Árni Baldursson	+354 424 5141 +354 615 2565 (mobile)	arni.baldursson@isavia.is
Senior ATM expert Mr. Sigurleifur Kristjánsson	+354 424 5106 +354 897 0336 (mobile)	sigurleifur.kristjansson@isavia.is
Supervisor Iceland Radio	+354 ~~563 6502~~ 424 4100	supervisor.iceland.radio@isavia.is
Radio operator Iceland Radio	+354 568 4600	

Appendix C –

Evacuation Messages - Reykjavik OACC

AFTN

DD BGGLZQZX BGSFYFYX CYQXYFYX CZEGZQZI CZQXZQZX
EGGXZQZX EGPXZQZX EIAAYFYX ENOBZQZX
XXXXXX BICCYFYX
SVC
Reykjavík Centre has been evacuated, ~~personell~~personnel is on its way to BICC.
Telephone numbers: +354 568 4600, +354 568 4601.

ICELAND RADIO ON VOICE

Emergency evacuation of Reykjavik Centre is in progress. No air traffic control service will be provided by Reykjavik. Use extreme caution and monitor this frequency, emergency frequencies and air to air frequencies.

APPENDIX S — AMENDMENTS TO NAT OPERATIONS AND AIRSPACE MANUAL (NAT DOC 007, V2018_1, JANUARY 2018)

(*paragraph 5.8.1 refers*)

NAT DOC 007 PFA ON FREE ROUTE OPERATIONS

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. ~~However, where appropriate ALL oceanic ten-degree meridians should be included as waypoints in the flight plan submitted to ATC, even where “named” significant points are close to these "prime" meridians of longitude. It is not appropriate to then omit the ten-degree crossings from the ATC Flight Plan.~~”

APPENDIX T — NAT OPERATIONS AND AIRSPACE MANUAL

(paragraph 5.8.4 refers)

ICAO ◦ OACI ◦ ИКАО

European and North Atlantic Office

NAT Doc 007

NORTH ATLANTIC OPERATIONS AND AIRSPACE MANUAL

~~V.2018-1~~ V.2018-2

Prepared by the ICAO European and North Atlantic Office

on behalf of the North Atlantic Systems Planning Group (NAT SPG)

EUROPEAN AND NORTH ATLANTIC OFFICE OF ICAO

International Civil Aviation Organization (ICAO)

European and North Atlantic (EUR/NAT) Office

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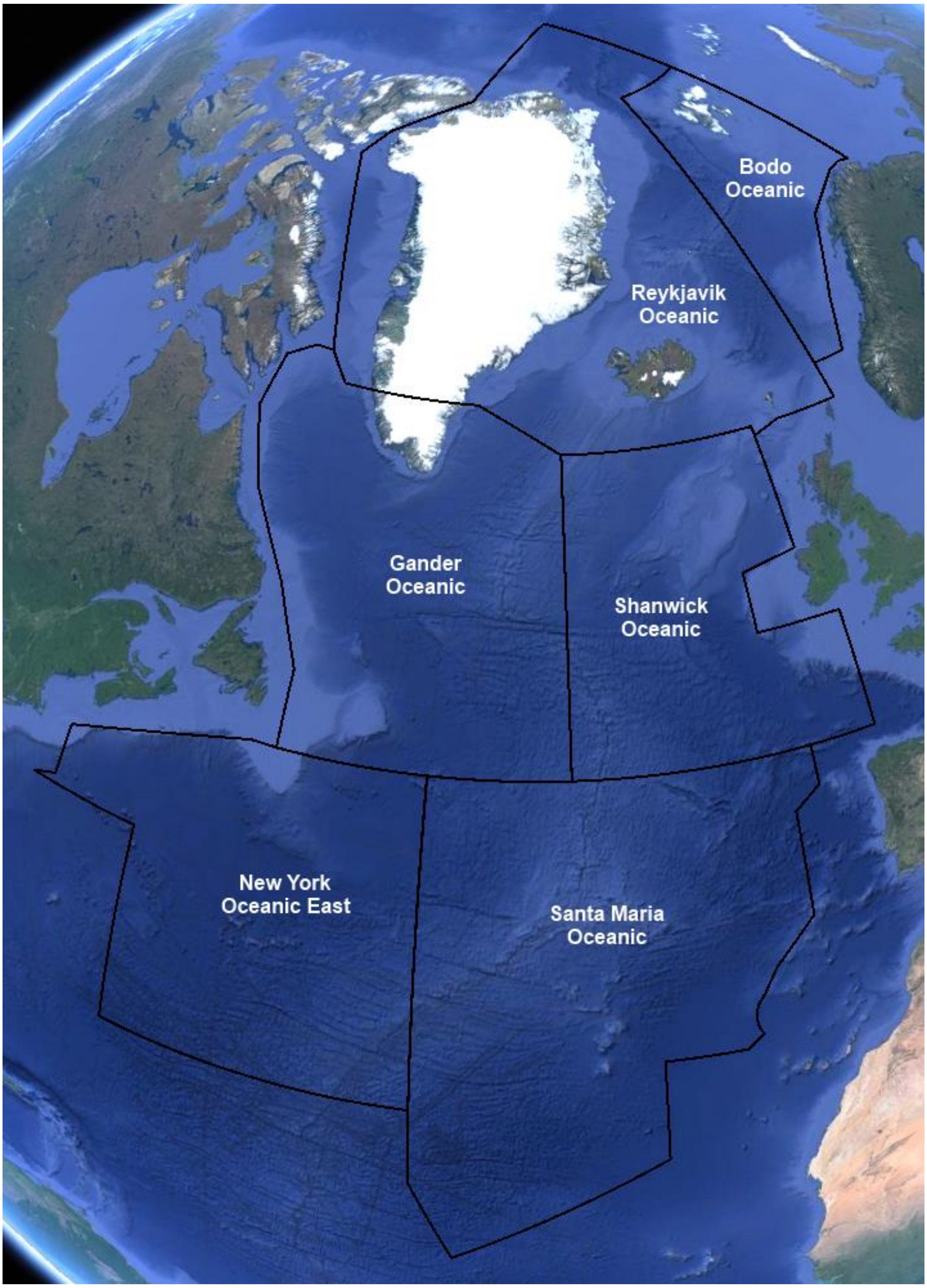
Figure 0-1 – The North Atlantic High Level Airspace (NAT HLA)



(Prior to February 2016 designated as "NAT MNPS Airspace")

EXCLUSION OF LIABILITY

FOREWORD

This Document has been produced with the approval and on behalf of the North Atlantic (NAT) Systems Planning Group (~~NAT~~ 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 ~~R~~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 2012 approximately 460,000 flights crossed the North Atlantic. For the most part in the North Atlantic, Direct Controller Pilot Communications (DCPC) and ATS Surveillance are unavailable. Aircraft separation assurance and hence safety are nevertheless 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 altitudes FL290 – FL410. To ensure adequate airspace capacity and provide for safe vertical separations, Reduced Vertical Separation Minima (RVSM) is applied throughout the ICAO NAT ~~R~~region.

A large portion of the airspace of the ~~North Atlantic Region~~, NAT, ~~through~~ which, incidentally, contains the majority of these ~~North Atlantic~~ NAT crossings routes ~~between FLs 285 and 420 inclusive,~~ is designated as the NAT High Level Airspace (NAT HLA) between FL 285 and 420 inclusive. Within this airspace a formal ~~A~~approval ~~P~~process by the State of Registry of the aircraft or the State of the ~~O~~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 Control Areas (CTAs):

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

*Some idea of these dimensions can be obtained from the maps at **Figure 0-1** and those in Chapters 2 and 3. However, for specific dimensions, reference should be made to ICAO Regional Air Navigation Plan and ~~North Atlantic Regional Supplementary Procedures (~~Doc.7030~~)~~ - NAT/RAC (available at www.icao.int/EURNAT/).*

Note that "NAT HLA" is a re-designation of the airspace formerly known as the "North Atlantic Minimum Navigational Performance Specifications Airspace (NAT MNPSA)," but excludes those portions of SHANWICK OCA which form the SOTA and BOTA areas and includes the BODO OCEANIC FIR. This re-designation is the third of the milestones of the "MNPS to PBN Transition Plan" for the North Atlantic ~~R~~region and is effective from 04 February 2016. Approvals ~~Approvals~~ initially issued to operate in the NAT MNPSA are referred to as "NAT MNPS" approvals and approvals issued to operate in the NAT HLA are referred to as "NAT HLA" approvals.

~~Pilots MUST NOT fly across the North Atlantic within the NAT HLA, nor at flight levels 290 to 410 inclusive anywhere within the NAT Region, unless they are in possession of the appropriate Approval(s) issued by the State of Registry or the State of the Operator. It should be noted that State Approvals for NAT MNPSA operations granted prior to 04 February 2016 will be valid for NAT HLA operations. Except that those Approvals issued prior to 01 January 2015 and based upon the earlier "6.3 NMs" MNPS standard, will not be valid beyond January 2020.~~

Although aircraft and flight crews ~~pilots~~ may fly above the NAT HLA without the requisite of a NAT HLA approval ~~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 ~~Pilots~~ 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 ~~pilots~~ or dispatchers. It combines the guidance material contained prior to 2010 separately in the "North Atlantic MNPS Airspace Operations Manual", and the ICAO "Guidance Material for Air Navigation in the North Atlantic Region.

Aircraft without NAT HLA or RVSM approvals ~~Approvals~~ may, of course, also fly across the North Atlantic below FL285. However, due consideration ~~must~~ 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 was previously contained in the North Atlantic International General Aviation (NAT IGA) Operations Manual published by the FAA on behalf of the ICAO North Atlantic Systems Planning Group (NAT SPG). However, with effect from Edition 2013, such guidance has been subsumed into this document.

The resulting consolidated 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) ~~R~~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.

In October 2012 UK NATS completed a publication titled 'Track Wise-Targeting Risk within the Shanwick OCA'. It was produced in collaboration with the Safety Partnership Agreement. It is available as a DVD or can be viewed on-line via You-Tube. Like this Manual, it is aimed at flight crews~~pilots~~, dispatchers and others concerned in flight operations in the North Atlantic. It follows the progress of a westbound NAT flight through the Shanwick OCA as well as exampling contingency and emergencies situations. While the operational procedures elements are specific to Shanwick, the majority of the DVD considers issues common to the whole ICAO NAT ~~R~~region. It is available at no charge to bona fide operators on application to: customerhelp@nats.co.uk.

The complete DVD can be accessed from the European and North Atlantic (EUR/NAT) Office public pages on the ICAO website (www.icao.int/EURNAT/), following "EUR & NAT Documents", then "NAT Documents", then selecting "Trackwise for on-line U-Tube viewing". It is also available on YouTube™, looking for "**Trackwise - Targeting Risk Within The Shanwick OCA**", or directly at https://www.youtube.com/watch?v=EJTjwW5ZYas

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 ~~pilots~~. For a listing of current initiatives and trials (if any) and participation details etc., reference should be made to the ~~AIS~~ AIP ~~documentation~~ of NAT ATS ~~P~~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/).

~~DEVELOPMENT OF CONTENT~~ EXPLANATION OF CHANGES

~~This is the seventh publication of this NAT Document 007~~

~~History~~

~~This document was initially developed to incorporate updated elements from Edition 2009 of the "North Atlantic MNPS Airspace Operations Manual" and relevant elements from the 7th Edition (2002) of the NAT Doc 001 – "Guidance and Information Material Concerning Air Navigation in the North Atlantic Region". NAT Doc 007 format is based upon that of Edition 2009 of the MNPS Airspace Operations Manual. However, it includes the content modifications and additions, as listed below, most of the latter arising from the 7th Edition of NAT Doc 001. Additionally, subsequent to the publication of Edition 2009 of the NAT MNPS Airspace Operations Manual, various other guidance material documents in the NAT Library were designated as "NAT OPS Bulletins". Mostly they provide detail in respect of specific elements of NAT operations. Some are copies or paraphrases of NAT ATS Provider State AIS. Since individual States must retain the prerogative to revise their AIS, as and when dictated by infrastructure developments, experience or changes to regulations, it was determined that detailed information provided in these NAT OPS Bulletins should be omitted from NAT Doc 007. The Document does, however, include references to these Bulletins where appropriate.~~

~~Edition 2010 Title and Content Modifications and Additions~~

~~Document Title~~

~~Prior to 2010 guidance aimed at North Atlantic operators was split between the "NAT MNPS Airspace Operations Manual" and the "NAT International General Aviation Operations Manual". The latter of these documents dealt primarily with flights in the North Atlantic Region below turbojet levels, while the former concentrated on the unique requirements and procedures relating to flight through the NAT MNPS Airspace (FL290-410 inclusive). During the years preceding 2010 there was a significant growth in the numbers of flights in the NAT Region at flight levels above FL410. In part this was as a result of larger numbers of high flying business jets but also it followed from aerodynamic design improvements of the latest generation of commercial jet transports. Although aircraft and pilots may fly above the NAT MNPSA without the requisite of an MNPS Approval, it is important that crews of such aircraft have both an understanding of the operational procedures and systems employed in the MNPSA and also specific knowledge of the location of any active OTS structure. This is important to help mitigate risk associated with any planned or unplanned penetration of the NAT MNPS Airspace (viz. emergency descents). On this basis particular guidance material was included in NAT Doc 007 and it was entitled "GUIDANCE CONCERNING AIR NAVIGATION IN AND ABOVE THE NORTH ATLANTIC MNPS AIRSPACE".~~

~~Content Modifications and Additions~~

~~Note: Subsequent references in this section to "NAT Doc 001" refer to the 2002 7th Edition of the document entitled "Guidance and Information Material Concerning Air Navigation in the North Atlantic Region", which was previously included in the ICAO North Atlantic Regional Library. That document was withdrawn from that library with the publication of the first Edition of the subject NAT Doc 007 in 2010 and is no longer available on-line. The annotation "NAT Doc 001" has subsequently been re-allocated to the "NAT SPG Handbook", which contains information on the functions and working methods of the NAT SPG, together with the NAT Regional Safety Policy Statement. This document is itself now available in the European and North Atlantic (EUR/NAT) Office public pages on the ICAO website (www.icao.int/EURNAT/).~~

~~The recommendations for Crew Training for NAT MNPS Airspace operations, as were previously contained in section 3.13 of the Guidance and information Material Concerning Air Navigation in the North Atlantic Region NAT – Doc 001, were incorporated into NAT Doc 007 Chapter 1 – "Operational Approval and Aircraft System Requirements for Flight in the NAT MNPS Airspace".~~

~~Recommendations for the Presentation of Navigation Information previously contained in section 3.14 of the Guidance Information Material - NAT Doc 001 were incorporated into NAT Doc 007 Chapter 8 – "MNPS Flight Operation and Navigation Procedures".~~

~~Elements of Part 4 of the Guidance Information Material – NAT Doc 001 dealing with recommended procedures for the adoption by State Regulators in the granting of MNPS Approvals were incorporated into NAT Doc 007 Chapter 1 – "Operational Approval and Aircraft System Requirements for Flight in the NAT MNPS Airspace".~~

~~The contents of Parts 6 and 7 of the Guidance Information Material - NAT Doc 001, dealing with Temporary Airspace Reservations, Formation Flying and Missile Activity in the NAT Region are of direct interest only to State or Military Aircraft Operating Agencies and to NAT ATS Providers. Consequently they are referenced only in passing in Chapter 1 of NAT Doc 007. The future repository of the detail would be determined by the appropriate competent authorities.~~

~~Part 8 of the Guidance Information Material - NAT Doc 001 dealt with "Manned Balloon Flights in the NAT Region". Such flights are specifically excluded from operating in NAT MNPS Airspace and each such flight must be meticulously co-ordinated far in advance with the relevant ATS Providers. Consequently only passing reference is made in Chapter 1 of NAT Doc 007.~~

~~Appendix A5 from the Guidance Information Material - NAT Doc 001 - "VHF Air/Ground Communications Coverage Existing in the NAT Region at FL 300" was incorporated as Attachment 5 to NAT Doc 007.~~

~~A Chapter (# 11), "Monitoring of Aircraft Systems and Crew Performance" was included in NAT Doc 007. This Chapter incorporates the contents of Sections 8.7 & 9.3 and Attachment 1 of Edition 2009 of the MNPS Airspace Operations Manual, together with further information on the Monitoring Methods employed and the Collision Risk Models used (including information from Appendix B and Appendix C19 of the Guidance Information Material - NAT Doc 001).~~

~~In 2010 a number of NAT ATS Provider States were conducting or planning ADS-B Trials in the NAT Region and in immediately adjacent domestic airspace. Reference to these operations was included into NAT Doc 007 at Chapter 6 - "Communications and Position Reporting Procedures".~~

~~In 2010 the sample "Oceanic Check List Proposals" and the "Expanded Oceanic Check List" which were previously included in Chapter 12 of the 2009 Edition of the MNPSA Operations Manual were published in full as NAT OPS Bulletins. Their details were consequently omitted from NAT Doc 007.~~

~~Edition 2011 Content Modifications and Additions~~

~~A temporary corrigendum to Edition 2010 rescinding the guidance on the NAT Region-wide availability of SATCOM Voice for regular ATS voice communications was superseded following the adoption on 13 May 2011 of a relevant Amendment to the North Atlantic Supplementary Procedures 3.4. The corrigendum was consequently removed from the 2011 Edition.~~

~~In December 2010 new text was added to Paragraph 3.7 of Attachment 4 to highlight some of the Common Errors made by operators when providing NAV Equipment information in Field10 and Field 18 of a NAT flight FPL.~~

~~Also in December 2010 additions were made to NAT Doc 007 in Chapters 6 and 12 to apprise Operators of the existence and availability of the "*North Atlantic Air Traffic Management Operational Contingency Plan*" (NAT Doc 006) and to encourage all regular NAT Operators to ensure their familiarity with the content.~~

~~Reference was made in Edition 2011 to the plan to incorporate major changes to the content of the ICAO flight plan on 15 November 2012. Operators were encouraged to study these changes and develop plans for implementation.~~

~~An additional chapter was included in Edition 2011 (Chapter 10) describing the ATS surveillance services provided within the NAT Region.~~

~~Further references were made within Edition 2011 to implemented and planned ADS-B services within and adjacent to the NAT Region.~~

~~References to Traffic levels and error rates were updated to reflect more recent experience.~~

~~A new section 1.9 was added to Chapter 1 of NAT Doc 007 to draw the attention of NAT Operators and their Regulators to the planned developments of systems and procedures which will significantly affect flight operations within the NAT Region in the coming years.~~

~~Text modifications were made to NAT Doc 007 "Chapter 11 – Monitoring of Aircraft Systems and Crew Performance", to reflect adjustments to the NAT SPG working structure, which were effected in 2009 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).~~

~~For further clarification of the Weather Deviations procedures, text revisions were made in NAT Doc 007 at "Chapter 13 – Special Procedures for In-flight Contingencies".~~

~~Text revisions and additions were included in NAT Doc 007 at "Chapter 13 - Special Procedures for In-flight Contingencies" to reference the potential for the appearance of ACAS/TCAS targets in circumstances relating to the trial implementations of 5 minutes longitudinal separations within parts of the NAT Region.~~

~~Edition 2012 Title Change and Content Modifications/Additions Incorporated~~

~~Document Title Change~~

~~The MNPS concept, together with the air traffic management systems and procedures employed, have served air safety well for four decades, in this the busiest of the world's oceanic airspaces. During more recent times, the underlying principles upon which MNPS was based have been developing toward a global Performance Based Navigation (PBN) concept, resulting in the formulation of RNAV and RNP specifications of air navigation performance. The provisions of RNP specifications are embodied into the "Performance Based Navigation (PBN) Manual" (ICAO Doc.9613). It is the intention of ICAO and the NAT SPG to transition from MNPS to PBN in the North Atlantic Region. The plan for this transition has been developed and is available available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents".~~

~~Eventually, MNPS will be eliminated as a requirement and basis for separation in this airspace, to be replaced by appropriate separation standards based upon RNP Navigation Specifications. However, to accommodate the high traffic levels here, the unique diurnal flexible track structure of the NAT OTS is expected to continue to be employed and specified crew procedures, training and system knowledge will remain an essential requirement. In consequence, State authorisations of operators and crews will continue to be required to operate in the airspace currently designated as NAT MNPS airspace and appropriate guidance documentation for both operators and States of Registry will be needed. Such guidance material will evolve directly from that provided by this NAT Doc 007 and to ensure a continuity of future reference the NAT SPG determined that the title of NAT Doc 007 should now be changed to the "North Atlantic Operations and Airspace Manual".~~

~~Content Modifications and Additions incorporated into Edition 2012~~

~~An addition to the Foreword drew the attention of the reader to the existence of the "NAT Region Updates Bulletin", available from the ICAO EUR/NAT website, which advised operators of recent changes which may affect their conduct and planning of operations in the ICAO North Atlantic (NAT) Region.~~

~~The Chapter 1 "Future Developments" section in Edition 2011 of NAT Doc 007 was extended to include more detail of the regional development plans and to include information on current trials.~~

~~The trials referred to in Chapter 1 included the "ENGAGE" trials of variable Mach and variable Altitude. Additional reference to these trials was included in Chapter 7 in an elaboration of the continuing requirement for adherence to the Mach Technique.~~

~~The first phase of the NAT Data Link Mandate was to come into effect on 07 February 2013 and Operators not meeting the mandate would be excluded from flight planning or operating on two specified OTS Tracks~~

~~between FL360 and 390 inclusive, during the peak hours. Relevant Text additions were included in Chapters 1, 2, 4 and 17~~

~~Amendment No.1 to the Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM, Doc 4444) 15th Edition allowing the filed flight plan to accurately reflect the equipment on board the aircraft and the capabilities of both it and the crew and also changing the way certain other information elements are presented in the flight plan, became globally applicable on 15 November 2012. Text revisions were made to Chapters 4 and 17 to reflect this. Attachment 4 – ICAO FPL Completion for a NAT flight was extensively modified.~~

~~An Amendment to the ICAO NAT Regional Supplementary Procedures – Doc 7030 modifying and clarifying the method of definition of random routes was approved in November 2012. To reflect these changes text modifications and additions were included in Chapters 4 and 17 and in Attachment 4 – ICAO FPL Completion for a NAT Flight.~~

~~A chart showing the ATS Surveillance Services in BREST UIR & BOTA was added to Chapter 10 at Section 10.10.~~

~~An additional "Tango Route" No.13 (TAMEL – BERUX) had been recently implemented. Reference was included in Chapter 3 and the route is shown on the Chart of ATS Surveillance Services in BREST UIR & BOTA at Section 10.10. As is the case with T16, full State Unrestricted NAT MNPS Approval is required to plan and fly this route. The addition of this new route onto the Chart in Chapter 3 was still pending.~~

~~Since October 2012 the Westbound OTS Track Message, with minor exceptions, no longer designated specific NAR routes associated with each W/B OTS Track. Information to this effect, together with a more full explanation of the NAR System and the provisions governing NAR Route use was included in Chapter 4. The example W/B Track Message included in Chapter 2 was modified to reflect this change.~~

~~In September 2012, New York Centre changed the way in which Oceanic Clearances are delivered to aircraft that enter the NAT via the New York Oceanic CTA. Detailed information was included in Chapter 5.~~

~~The essential need for Flights using CPDLC or SATCOM Voice for ATS communications in the NAT Region to either maintain a SELCAL or listening watch on the assigned HF frequency and to complete a SELCAL check was re-emphasised in Chapter 6.~~

~~In 2012 Satellite Voice Guidance Material (SVGM) was approved jointly by the ICAO Planning and Implementation Groups for the Asia/Pacific and North Atlantic Regions (APANPIRG & NAT SPG). This document provides a comprehensive update of various regional and State guidance material for ANSPs and aircraft operators to use SATVOICE for ATS communications. The document is available on the ICAO EUR/NAT website. Relevant information, together with the appropriate access link, was included in Chapter 6.~~

~~In 2012 following the scrutiny of particular reported navigation errors in the North Atlantic Region a safety issue was identified with the use of waypoints in the western portion of the North Atlantic Region when they are defined as a range and bearing from a significant point or a navigation aid. Elaboration of the problem, rationale and consequences was included in Attachment 4.~~

~~Further emphasis on the recommendation and rationale for use of a Plotting Chart was included in Chapter 8.~~

~~Minor text modifications were effected to clarify the crew guidance on the method of application of the Strategic Lateral Offset Procedure (SLOP) in Chapter 8.~~

~~Typographical errors in Chapter 11 of the Edition 2011 of NAT Doc 007 in the statement of the global RVSM Airworthiness Requirements were corrected.~~

~~The scope of the monitoring activities performed by the NAT CMA was extended to include the reviewing of all reported lateral deviations from cleared route, not just those of 25NMs or more. This activity will provide the information and statistics necessary for consideration of the safety aspects of the current initiative for increase airspace capacity through possible reductions in lateral separations in the Region. These additional monitoring activities were included in Chapter 11.~~

~~Traffic and Error rate statistics in Chapter 16 were updated to reflect the more recent situation.~~

~~Advice on the availability of a new North Atlantic Operations training DVD, “Track Wise”, was included in the Foreword and Chapter 15. This material has superseded the now outdated “On the Right Track” DVD and references to the latter were consequently removed from the document.~~

~~A new Attachment 7 was included in Edition 2012. This attachment describes the format, content and method of delivery of Oceanic Clearances in the ICAO North Atlantic Region. It includes examples of typical clearances that could be received by flights operating in NAT Region oceanic airspace. The examples were 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. Additional text in Chapter 5 draws attention to this new attachment and promotes its study.~~

~~Edition 2013 Content Modifications/Additions Incorporated~~

~~The scope of the NAT Doc 007 has been expanded in this Edition to incorporate guidance for Operators and Regulators of flights within the North Atlantic Region at levels below FL285. The vast majority of this additional content was previously published in the North Atlantic International General Aviation Operations Manual.~~

~~Advice has been included in Chapter 1 Section 1.2 “Approval”, that in accordance with Milestone 1 of the MNPS to PBN Transition Plan, existing RNAV 10 and RNP 4 Approvals now constitute MNPS Approval without further examination of the navigation component.~~

~~Advance notification has been included in Chapter 1, of the planned implementation of Milestone 2 of the MNPS to PBN NAT transition plan that with effect from January 2015 the longevity of 6.3NM based MNPS Approvals is limited.~~

~~Similarly advance notification of Milestone 3 of the MNPS to PBN NAT Transition Plan in which the current NAT MNPS airspace will be re-designated for PBN based operations has been included in the text of Chapter 1.~~

~~Additional text describing procedures relating to Phase 1 of the North Atlantic Data Link Mandate, including planning and operating restrictions on non-compliant aircraft has been included in Chapters 1, 2, 4, 6 and 17.~~

~~Advice is provided in Chapter 1, of the NAT SPG intentions regarding the proposed staged implementation of Phase 2 of the DLM and of its consequences for operators.~~

~~Reference is included in Chapter 1, to the concepts of Required Communications Performance (RCP) and Required Surveillance Performance (RSP). The NAT Performance Based Surveillance & Communications (PBSC) Implementation Plan, which includes proposals for Reduced Lateral Separation Minima (RLatSM) and Reduced Longitudinal Separation Minima (RLongSM) predicated upon RCP and RSP, is introduced.~~

~~Reference is included in Chapters 3, 4, 9, 17 and in Attachment 4 to the December 2013 implementation of reduced lateral and longitudinal separation minima between suitably equipped aircraft in the, “WATRS Plus”, New York Oceanic FIR airspace adjacent to the NAT MNPSA.~~

~~Annual NAT traffic statistics and error rates are updated to include recent data.~~

~~Route T13, described in Chapter 3 was re-designated as T213. A depiction of Route T213 has been added to Figure 4 – Other Routes and Structures within NAT MNPS airspace.~~

~~The separate NAT OACCs and NOTA, SOTA and BOTA surveillance charts that were included in Chapter 10 of Edition 2012 have been replaced by two NAT-wide charts showing the radar and ADS-B coverage within the NAT Region and adjacent airspaces..~~

~~A new Chapter 18 and Attachment 8 are included with effect from this (2013) Edition providing guidance for pilots/planners and operators of NAT flights below the MNPS Airspace (i.e. below FL285). This material was previously contained in the “*North Atlantic International General Aviation Operations Manual*”.~~

~~***Edition 2014/2015 Content Modifications/Additions Incorporated***~~

~~New York Oceanic FIR has been split into two OCAs, NYC OCA East and NYC OCA West. NYC OCA West is no longer included in the ICAO North Atlantic Region. Details of the geographical boundaries of the two OCAs are published in the ICAO Air Navigation Plans for the NAT and the CAR/SAM Regions (ICAO Docs 9634 & 8733). Throughout this Edition of the Manual necessary changes to NYC OCA references are effected. Particular note should be taken of the amended text relating to Oceanic Clearance delivery in Section 5.6 – "*Oceanic Flights Originating from the NAM, CAR or SAM Regions and Entering the NAT MNPS Airspace via the NEW YORK OCA EAST*".~~

~~One significant change which follows from the split of the NYC FIR is that only the airspace of NYC OCA East (North of 27N) is now included in the North Atlantic MNPS Airspace. The previously included small portion of airspace between 3830N and 3900N parallels, west of 60W, is now excluded from the NAT MNPSA. This change to the boundary of the NAT MNPS Airspace is reflected in this Edition in the Frontispiece Chart and in the description of the MNPSA lateral dimensions in the Foreword.~~

~~A 50 NM lateral separation minimum has been implemented in the Santa Maria OCA between aircraft with RNP4 or RNAV10 Approvals. As with NYC OCA East and the WATRS Plus area, aircraft wishing to benefit from this reduced separation, should ensure that their valid RNP/RNAV Approvals are included in Item 10a & 18 of their filed flight plans. This is reflected in this Edition in text modifications/additions in Chapters 4, 9 & 17 and in Attachment 4.~~

~~For flights operating north of 80°N, the rule on specifying tracks as previously expressed in ICAO NAT Supplementary Procedures Doc.7030, stated "that 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 expressed in whole degrees. The distance between significant points shall, as far as possible, not exceed 60 minutes flight time." This rule did not contain any limitation on how short a flight leg could be. Given the closeness of meridians this near to the north pole, the rule sometimes resulted in filed tracks with very short route segments between significant points. Multiple difficulties arose from this, including increased pilot and radio operator workloads (n.b. ADS-C and CPDLC use Inmarsat geostationary satellites which have limited coverage north of 80°N). Consequently, the Iceland AIP now includes an extra requirement that "the flight time between significant points should not be less than 30 minutes". This additional requirement is reflected in the text of Chapters 4 & 17 and in Attachment 4.~~

~~A great majority of the aircraft flying in the NAT Region now have the capability to automatic offsets. Consequently, previous SLOP guidance for these aircraft to "preferably not fly the centerline but rather elect to fly an offset of one or two nautical miles to the right of the centerline", in order to aim to achieve an equal distribution of traffic across the three available positions, is no longer appropriate. Section 8.5.3 in this Edition is modified to reflect this development and the consequently changed guidance.~~

~~The North Atlantic European Routing Scheme (NERS) has been discontinued and the UK AIP and AIP Ireland now no longer specify the domestic routes to be used for westbound NAT traffic, based upon entry points into oceanic airspace. Consequently the "NERS" and the "Irish/UK Domestic Route Structures" sections in Chapter 3 have been deleted in this Edition and all subsequent references to such flight planning requirements (previously in Chapters 4 & 17) have been eliminated from this Edition.~~

~~The technique of Multilateration is being used in the Region by some NAT ANSPs for ATS Surveillance. The term has been added to the Glossary and appropriate references have been included variously throughout this Edition. Reflecting this and that ADS-B service is widely available in the Region, some of the references to "Radar" or "SSR" services or areas throughout the document, have also been updated to refer generically to "ATS Surveillance".~~

~~Information on the planned Milestones of the NAT MNPS to PBN Transition Plan has been added in Section 1.10 – "Trials and Future Development Plans". Milestones 2, 3 and 4 are planned for Jan 2015, Feb 2016 and Jan 2020, respectively. These are significant changes which affect the State Approvals of Operators for flight in the NAT MNPS Airspace (which will be re-designated as "NAT High Level Airspace" with effect from 04 Feb 2016). Subsequent references are also included appropriately in this Edition.~~

~~Revised procedures in respect of the occasional publication of a split westbound OTS structure have been adopted following trials in 2014. These procedures are described here in Section 2.2.6~~

~~The aircraft equipage requirements and operational standards to benefit from ADS-B ATS service in the NAT Region are now included in ICAO NAT Supplementary Procedures (Doc.7030). They are also fully described in Section 1.7 below, together with information on the maintenance of an exclusion list of non-compliant aircraft and procedures to be employed by operators to request exemption from the full provisions.~~

~~Reykjavk ACC has commissioned additional DCPC VHF Stations in Greenland. Thereby extending its provision of tactical control and ATS Surveillance services to its West Sector. Section 6.1.14 provides detail along with a revised coverage chart.~~

~~Phase 2A of the NAT Data Link Mandate, is planned for implementation 05 February 2015, the definition of the airspace included by the Mandate in this Phase is clarified as “all OTS tracks” as opposed to “within the entire OTS”. *Inter alia*, this is to ensure that it is clear that the airspace entirely between the branches of a split OTS is available for planning and operation by aircraft not equipped with FANS1/A. The vertical limits of the Mandate will be extended in this Phase to include FL350 (i.e. FL350 – 390, inclusive). See Section 4.2.7.~~

~~In Section 1.10 – “Trials and Future Developments”, an update is provided on the results of the “ENGAGE” trials. The fuel savings obtained have provided further impetus to allow, when traffic permits, more flexibility in varying assigned flight level and/or mach number. In this regard a new Section 5.7 is included in this Edition describing the availability of and the differences between “cruise climb” and a “block of flight levels”.~~

~~In Section 1.10 – “*Trials and Future Developments*”, information is provided on the planned first phase of North Atlantic trials of reducing the lateral separation minimum to 25 NM. This is scheduled to commence in November 2015. In this “RLatSM” Phase 1, 25 NM lateral separation will be implemented by establishing ½ degree spacing between two specified core OTS tracks, for use by RNP4 Approved aircraft logged on for ADS-C & CPDLC within the vertical limits applicable to the airspace associated with the NAT Region Data Link Mandate.~~

~~In Section 1.10 – “*Trials and Future Developments*”, information is included concerning plans for trialing LEO satellite based ADS-B ATS surveillance in the NAT Region. Relevant satellite launches are expected during 2015 and operational use of this service may begin as early as mid-2017.~~

~~Reference is added in the SOTA and BOTA descriptions in Chapter 3, that despite their inclusion in NAT MNPS Airspace, ICAO NAT Supplementary Procedures Doc.7030 specifies that aircraft on routes through SOTA or BOTA, such that they do not require Oceanic Clearances, may plan and operate there without a need for a State MNPS Approval.~~

~~A description of the newly created Gander Oceanic Transition Area (GOTA) is included in Chapter 3 and an appropriate reference is included in Chapter 17 – Guidance for Dispatchers at Section 17.6.9. Some new Oceanic Entry/Exit Points have been created on the GOTA boundary, resulting in minor revisions to three of the “Blue Spruce Routes” listed in paragraph 12.2.2 c).~~

~~In Section 6.1.21 additional text encourages FANS equipped aircraft to “log on” with the appropriate ATS unit, even when the aircraft is being provided with ATS surveillance service (e.g. SSR, ADS-B or multilateration). This permits the use of CPDLC for air-ground communications.~~

~~Reference to regulations about RVSM equipment and performance requirements for aircraft flying in the ICAO NAT Region have been updated (paragraphs 9.1.5 and 17.2.4 refer).~~

~~A misleading reference in Chapter 17 – Guidance for Dispatchers, to the provision of MEL relief for inoperative ACAS has been removed from this Edition.~~

~~In Chapters 6, 10 and 17 a caveat to the requirement to select Transponder Code A/C 2000 30 mins after entering NAT airspace is noted with regard to flights routing on Tango 9.~~

~~In “Chapter 18 – Flight Operations Below the NAT MNPS Airspace”, newly introduced to this Manual in Edition 2013, some minor updates/clarifications and additions have been included. These relate to~~

~~Environmental Conditions; Clearance for Weather Deviations; Oceanic Clearances issued by USA; Description of CPDLC service. An inappropriate reference to the "Carriage of Arms" has also been deleted.~~

~~Figure 3 is updated to reflect the establishment of GOTA and changes to some of the "Blue Spruce" routes.~~

~~Annual NAT traffic statistics and error rates are updated to include recent data.~~

~~Two Charts showing the Radar and ADS-B coverage in the NAT Region are intended for inclusion at Attachment 9. These will provide a general guidance to the airspace south of 80 N through which aircraft plan and fly without being equipped with ADS-C and CPDLC. (i.e. airspace excluded from the NAT Data Link Mandate).~~

~~All the web links in the whole document have been updated, some due to the former Paris office website having been integrated into the ICAO global website, some to correct links that were no longer valid.~~

~~2016 Content Modifications/Additions Incorporated~~

~~V.2016-1 changes~~

~~In accordance with the MNPS to PBN Transition Plan for the ICAO North Atlantic Region, with effect from 04 February 2016 that airspace formerly known as the "North Atlantic Minimum Navigational Specifications Airspace" (MNPSA), but excluding the BOTA and SOTA areas and with the addition of the BODO Oceanic FIR (FL285-420 inclusive), is re-designated as the "North Atlantic High Level Airspace" (NAT HLA).~~

~~However, recognizing that ICAO Annex 6 allows for a "minimum navigation performance specification" to be regionally specified in Regional Supplementary Procedures Doc 7030, it has been determined to maintain reference to a "MNPS" in the NAT Region within NAT Doc 7030 and in this guidance material (Doc 007), within particular contexts. Thus, approvals initially issued to operate in the NAT MNPSA are referred to as "NAT MNPS" approvals and approvals issued to operate in the NAT HLA are referred to as "NAT HLA" approvals. Otherwise, except in respect of historical references, from Edition 2016 of this document (NAT Doc.007) and subsequently, previous references to "Minimum Navigation Performance Specifications" and "MNPS" are replaced by "North Atlantic High Level Airspace Specifications" and "NAT HLA".~~

~~MNPS Approvals granted prior to this (04 Feb 2016) change will continue to be valid for NAT HLA operations. However, those issued prior to 01 January 2015 and based on the "6.3 NM" MNPS standard will no longer be accepted beyond January 2020. From then NAT HLA Approvals, if required, will need to have been based on appropriate PBN specifications. DLM Phase 1 references have been removed from the text since Phase 2A has been in effect since 05 February 2015.~~

~~The RLatSM Trials were commenced in December 2015. Text edits to reflect this have been included in Chapters 1, 2, 4 & 8.~~

~~In 2015 the NAT ANSPs agreed to some minor changes to the North Atlantic Flight Level Allocation Scheme (FLAS). The revised scheme is included here at Attachment 6.~~

~~2017 Content Modifications/Additions Incorporated~~

~~Where necessary minor editorials to verb tenses have been effected throughout the document to reflect the recent passing of some NAT implementation project milestones.~~

~~In respect of RVSM MASPS and Operations, references throughout the document to the superseded JAA TGL No.6 documentation have been replaced.~~

~~Text changes/modifications have been effected to section 4.1 to reflect the equivalence of NAT procedures with the Free Route Airspace concept.~~

~~The essential need for the inclusion in the filed flight plan of the appropriate Item 10 Equipment codes to confirm the aircraft's RNP status and that it will be operating FANS1/A, in order to benefit from reduced lateral separation standards employed on RLatSM OTS tracks and in the NYC and SMA OCAs, have been~~

~~included in Chapters 4 & 8 and in Attachment 4.~~

~~Similarly, a new sub-section “RNP Approval Status” has been included in Chapter 8 to emphasize that in order to benefit from particular reduced lateral separation minima, operators must ensure the inclusion of the RNP Approval status in the filed flight plan, and also that flight crews must verify that the correct RNP value is entered in the Flight Management Computer, either by default or through manual input, in order to enable aircraft navigation system to monitor and alert against the most stringent oceanic RNP capability filed in the ATC flight plan.~~

~~Minor text additions have been included in Chapter 4 (4.1.19) to remind Operators/Pilots wishing to benefit from the reduced lateral separation standards offered by some NAT ANSPs, of the essential need to include the appropriate Equipment codes (J5 and D1) in the Filed Flight Plan to indicate that the aircraft is intending to operate INMARSAT based CPDLC and ADS-C, respectively.~~

~~References throughout the document to the FAA Advisory Circulars specifying RVSM and ADS-B airworthiness requirements have been updated to reflect current version annotations.~~

~~The schedule for trials and implementation of space based ADS-B services referenced in Chapter 1 (1.10.12) has been updated.~~

~~With effect from 01 January 2017, neither TCAS versions 6.04A nor 7.0 meet the ACAS II requirements as specified by Annex 10 Volume IV. From that date TCAS version 7.1 is required. Text changes in Chapter 6 and 13 (6.9.1 & 13.6.1) reflect this change.~~

~~Editorials have been effected to Chapter 8 with respect to the conduct of an FDE outage prediction programmes:-~~
~~- to emphasize that any such requirement will be specified by the State of Registry;~~
~~- to highlight the commonly used exemption caveat for such programmes relating to “multi-sensor navigation systems”;~~
~~- to include the 34 minutes outage criterion for RNAV 10 (RNP 10) operations..~~

~~In section 6.1 references to the “HF Management Guidance Material for the NAT Region” have been updated.~~

~~In section 6.6 minor text edits have been effected to reflect the growing use of datalink communications in the NAT Region (CPDLC) and the consequent reduced emphasis on HF.~~

~~In the NAT Region coast-out to coast-in conflict-free strategic clearances are today used in limited circumstances. The improved surveillance and air-ground ATS communications afforded by ADS-C and CPDLC permit the adoption of a more tactical approach to air traffic control in the Region. Editorials have been effected in Chapters 6 and 8 to reflect this fact.~~

~~One consequence of the preceding revised provision is that operators planning to fly random routes outside of the OTS time periods are no longer required to plan flight levels in accordance with the ICAO Annex 2 Table of Cruising Levels. Editorials to reflect this have been effected in Chapters 4 and 17.~~

~~Previously existing fixed routes between the Azores and the Portuguese mainland and between the Azores and the Madeira Archipelago are no longer published. Nevertheless flights on these traffic axes may still be flown with HLA Approvals based on a single LRNS. Consequently, references to these pre-existing “routes” in Chapters 1, 3 and 12 are replaced with the term, “routings”.~~

~~The reference in Chapter 17 that Oceanic Clearances for some controlled flights leaving airports in the Azores are issued by the relevant ATS unit prior to departure, has been removed since this is no longer the practiced here.~~

~~Reference to the now regular use in the NAT Region of ADS-C conformance monitoring and the issuance of any resulting CPDLC alerting messages, is included in Chapter 8.~~

~~Text additions in respect of the RLatSM programme have been included in Chapters 1 & 4 and in Attachment 4.~~

~~Following the commencement of RLatSM trials Gross Navigation Errors in the NAT Region have effectively been re-defined as "≥ 10 NMs" in place of "≥25 NMs". This change is noted in para 8.1.6.~~

~~Modifications to the Contingency Procedures, to take account of possible turn-backs when operating in RLatSM airspace, are included in Chapter 13.~~

~~With respect to Phase 2B of the NAT Data Link Mandate programme (planned for Dec 2017) further airspace exemptions to those originally announced have been agreed. This is reflected in para 1.10.5.~~

~~Effected changes to waypoint names in respect of some "Blue Spruce Routes" and Route G11 have been included in Chapter 12.~~

~~A new Example 4d of CPDLC delivered Oceanic Re-clearances has been added to Attachment 7.~~

~~***2018 Content Modifications/Additions Incorporated***~~

~~Text modifications have been made to section 4.1 to clarify the equivalence of NAT procedures with the Free Route Airspace concept.~~ This modification includes updates regarding Performance Based Communication and Surveillance (PBCS) implementation and the conclusion of the RLatSM trial (e.g., the change of nomenclature from RLatSM tracks to PBCS tracks). Included in this modification are numerous editorial and organizational changes for clarity and consistency. Modifications have been made to the Glossary of Terms: new information has been added and unnecessary information has been removed; as well, the structure has been changed to divide into "Abbreviations" and "Definitions".

~~GLOSSARY OF TERMS~~ ABBREVIATIONS

ACARS	Aircraft Communications Addressing and Reporting System
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
~~ADC~~	~~Air Data Computer~~
ADF	Automatic Direction Finding
ADS	Automatic Dependant Surveillance
ADS-B	Automatic Dependant Surveillance - Broadcast
ADS-C	Automatic Dependant 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
~~ASR~~	~~Aviation Safety Report~~
ATA	Actual Time of Arrival
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
~~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.~~ ~~*Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than mono-pulse SSR.*~~
~~AWPR~~	~~Automatic Waypoint Position Reporting~~
BOTA	Brest Oceanic Transition Area
BRNAV	Basic Area Navigation
CAR	Caribbean
CDL	Configuration Deviation List
CDM	Collaborative Decision Making
CDR	ConDitional Route
CDU	Control Display Unit
CMA	Central Monitoring Agency
~~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.~~
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
~~DVD ROM~~	~~Digital Video Disk Read-Only Memory~~
EDTO	Extended Diversion Time Operations
ELT	Emergency Locator Transmitter
ETA	Estimated Time of Arrival
ETOPS	Extended Range Twin-engine Aircraft Operations
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
~~FRA~~	~~Free Route~~FRA ~~Airspace~~[1]
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
HMU	Height Monitoring Unit
HSI	Horizontal Situation Indicator
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules

[1] Secretariat comment: Relevance needs to be determined, (NAT SPG/54 Report, para. 5.3.8 refers).

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
~~MTT~~	~~Minimum Time Track~~
~~Multilateration~~	~~A system of surveillance using the differences in times of arrival of replies to SSR interrogations at several ground stations to determine aircraft position.~~
NAM	North America
NAR	North American Route
NAT	North Atlantic
NAT HLA	North Atlantic High Level Airspace ~~(formerly NAT MNPSA)~~
NAT SPG	North Atlantic Systems Planning Group
NDB	Non Directional Beacon
NM	Nautical Mile
NOAA	National Oceanic and Atmospheric Administration
NOTA	Northern Oceanic Transition Area
NOTAM	Notice to Airmen
OACC	Oceanic Area Control Centre
OCA	Oceanic Control Area
~~Oceanic Entry Point~~	~~Point on the FIR boundary where the aircraft enters the first oceanic control area~~
~~Oceanic Exit Point~~	~~Point on the FIR boundary where the aircraft leaves the last oceanic control area~~
OESB	Oceanic Errors Safety Bulletin
OTS	Organized Track System
PBCS	Performance-Based Communication and Surveillance
PDC	Pre Departure Clearance
PRM	Preferred Route Message
~~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)~~
RA	Resolution Advisory (per ACAS/TCAS)
RAIM	Receiver Autonomous Integrity Monitoring
RMI	Radio Magnetic Indicator
RNP	Required Navigation 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
~~Strategic Control~~	~~As used in this manual, control techniques employed in an environment where the level of surveillance and intervention capability requires that each oceanic clearance be planned and issued prior to the flight's entry into oceanic airspace, in order to provide safe separation between known traffic from oceanic entry to oceanic exit.~~
~~TA~~	~~Traffic Advisory (per ACAS/TCAS)~~
~~Tactical Control~~	~~As used in this manual, control techniques employed in an environment where the surveillance and intervention capabilities allow conflicts between flights to be resolved nearer the time they would occur, rather than prior to the oceanic clearance being issued.~~
TAS	True Airspeed
TCAS	Traffic (Alert and) Collision Avoidance System
TLS	Target Level of Safety
TMI	Track Message Identification
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.
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	Point on the FIR boundary where the aircraft enters the first oceanic control area
Oceanic Exit Point	Point on the FIR boundary where the aircraft leaves the last oceanic control area
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)

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CHAPTER 1

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

Flight crews ~~*Pilots*~~ *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 ~~Approvals~~ *issued by the State of Registry of the aircraft or by the State of the* ~~*O*~~*operator. The Minimum Equipment List (MEL) for operations must be strictly observed.*

1.1 GENERAL

1.1.1 With effect from 04 February 2016 the airspace previously designated as NAT MNPSA~~, but excluding the SOTA and BOTA areas,~~ was re-designated as NAT HLA. 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, Reykjavik, Santa Maria and Shanwick, excluding the Shannon and Brest Ocean Transition Areas. State approvals ~~Approvals~~ for NAT MNPSA operations granted prior to that date will be valid for NAT HLA operations. Except that those approvals ~~Approvals~~ issued prior to 01 January 2015 and based upon the earlier "6.3 NMs" MNPS standard will not be valid beyond January 2020. Any NAT MNPS approvals ~~Approvals~~ granted using PBN specifications for navigation equipment performance will continue to be valid beyond that date.

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). Target maxima set for these estimates are expressed in terms of potential collisions per flight hour and are known as "Target Levels of Safety (TLSs)".

1.1.3 Aircraft operating within the NAT HLA are required to meet specified navigation performance in the horizontal plane through the carriage and proper use of navigation equipment that meets identified standards and has been approved as such by the State of Registry or State of the ~~O~~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 ~~Since January 2002 when the final phase implementation of RVSM at all levels in NAT MNPS Airspace took place, a~~All aircraft intending to operate within the NAT ~~MNPSA/~~HLA ~~have had to~~ must be equipped with altimetry and height-keeping systems which meet RVSM Minimum Aircraft System Performance Specifications (MASPS). RVSM MASPS are contained in *ICAO Doc 9574* and detailed in designated FAA document, *AC91-85A*(latest edition) ~~and in equivalent Joint Aviation Authority (JAA) documentation~~. These documents can be downloaded from:

www.faa.gov/air_traffic/separation_standards/rvsm/documents/AC_91-85A_7-21- 2016.pdf and www.skybrary.aero/bookshelf/books/157.pdf, respectively.

1.1.5 ~~This NAT Doc 007, together with the above referenced global RVSM MASPS documents, are provided to assist States of Registry, operators, owners and planning staff who are responsible for issuing or obtaining NAT HLA/RVSM approvals for aircraft. However, the~~ 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 ~~pilots~~ 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 ~~pilots~~ 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 ~~pilots~~ 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*~~*.4*~~ requires carriage of Emergency Locator Transmitters (ELTs) by all commercial and IGA aircraft, respectively. ~~It should be further noted that new specifications for these beacons to operate exclusively on frequency 406 MHz (but with a 121.5 MHz search and rescue homing capability) have been in effect since January 2005. New aircraft have been required to be so equipped since 2005.~~

Exceptions - Special Operations

1.1.7 NAT ATS ~~P~~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 UAV 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 ~~R~~region, relevant AIS is published, including, if appropriate, annotations on the NAT track message ~~Track Message.~~

1.1.8 Manned Balloon flights can be operated in or through the NAT ~~R~~region. They are, however, required to avoid the NAT HLA and must be meticulously co-ordinated with affected ATS Authorities ~~many months~~ 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 ~~O~~operator. Aircraft operating in RVSM airspace ~~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 ~~O~~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 now designated as RVSM airspace at all levels, ~~(i.e. FL290-410 inclusive)~~ ~~**specific State RVSM Approval is also required to operate within the NAT HLA**~~. ~~RVSM Approvals prescribe both airworthiness requirements to ensure aircraft height-keeping performance in accordance with the RVSM MASPS, and also crew operating procedures. In general, RVSM Approvals granted by most States are not regionally specific but are valid for world-wide operations. However, some crew operating procedures, particularly those to be followed in contingency situations, are specific to the airspace environment. Such procedures for use in the NAT HLA vary from those adopted in a domestic airspace environment in which radar surveillance and DCPC are available (see Chapter 9 & Chapter 12). States provide approval of these procedures specific to NAT HLA or Oceanic airspace operations in different ways. It may be explicitly addressed in the general RVSM Approval. It may be included as an element of the NAT HLA Approval or it may be a stated item of the Operations Specifications. Nevertheless, however provided,~~ 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 ~~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 ~~shall~~ should maintain a database of all NAT HLA and RVSM approvals that they have granted ~~for operations within the~~

~~NAT HLA~~. 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 ~~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 ~~Chapter 7 – "Application of Mach Number Technique"~~). 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 is 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 ~~P~~provider States. A non-exhaustive list is shown in Chapter 8 of this Document.

Lateral Navigation

Equipment

1.3.2 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)*~~, Part I para 7.2.9 and Part II, para 2.5.2.9~~ refers).

1.3.3 ~~In terms of accuracy, an aircraft which is approved for operations within NAT MNPSA/HLA prior to January 2015 shall have a navigation performance capability such that:~~

~~a) the standard deviation of lateral track errors shall be less than 6.3 NM (11.7 km);~~

~~b) the proportion of total flight time spent by the aircraft 30 NM (56 km) or more off the cleared track shall be less than 5.3 x 10~~$^{-4}$~~;~~

c) ~~the proportion of total flight time spent by the aircraft between 50 and 70 NM (93 and 130 km) off the cleared track shall be less than 13 x 10~~$^{-5}$~~.~~

1.3.4 ~~For (MNPS) Approvals issued before January 2013, the State of Registry or the State of the Operator, as appropriate, should have verified that the lateral navigation capability of approved aircraft meets the above specified requirements. For Approvals issued between January 2013 and January 2015 Approvals~~

~~can have been based on these foregoing navigational performance capabilities or based on the PBN specifications, RNP 10 (PBN application of RNAV 10) or RNP 4. For Approvals issued after January 2015 the~~ The navigation system accuracy requirements for NAT MNPSA/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 MNPSA/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 ~~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 is designated and authorized as RNP 10 irrespective of the fact that RNP 10 designation is inconsistent with PBN RNP and RNAV specifications since RNP 10 does not include requirements for on-board performance monitoring and alerting. The justification for this being that renaming current RNP 10 routes, 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 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 Additionally, in order for the 50 ~~Nms~~ NM lateral separation minimum to be utilized in the New York Oceanic East the following navigation performance criteria must also be met by aircraft with RNAV 10 (RNP 10) approvals ~~Approvals~~: -

a) the proportion of the total flight time spent by aircraft 46 km (25 NM) or more off the cleared track shall be less than 9.11 × 10-5; and

b) the proportion of the total flight time spent by aircraft between 74 and 111 km (40 and 60 NM) off the cleared track shall be less than 1.68 × 10-5.

1.3.6 And similarly the additional criteria which must be met by aircraft approved as RNP 4 are as follows : -

c) the proportion of the total flight time spent by aircraft 28 km (15 NM) or more off the cleared track shall be less than 5.44 × 10-5; and

d) the proportion of the total flight time spent by aircraft between 44 and 67 km (24 and 36 NM) off the cleared track shall be less than 1.01 × 10-5.

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

~~*Note: In Summary : – From February 2016 the NAT MNPSA is re-designated as NAT HLA. Previously granted MNPS Approvals are valid for NAT HLA operations. Milestone 2 of the MNPS to PBN NAT transition plan was achieved in January 2015. From that date all **new** North Atlantic MNPS Operational Approvals should have been based upon RNAV 10 (RNP 10) or RNP 4 navigation specifications. Previously issued 6.3NM based MNPS Approvals will continue to be valid for NAT HLA operations but it is important to note that their longevity will be limited. Since subsequently, from January 2020, Milestone 4 of the MNPS to PBN NAT Transition Plan will take effect and the NAT HLA will be re-designated for "PBN Based Operations" and thus from then Aircraft Approvals based on the earlier 6.3NM MNPS standard will no longer be valid.*~~

1.3.6 ~~In most cases, Operators will be able to select equipment for which performance capability has already been established to the satisfaction of a State of Registry. However, where a completely new navigation system is proposed for use, or where major changes have been made in the technology of an existing system, an evaluation will be necessary, to establish its quality of performance, before authorisation~~

~~for use as a primary means system can follow. Currently, it has been demonstrated that the requisite accuracies may be achieved using~~ 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: ~~A GPS installation must be approved as follows:~~
~~If the two required LRNSs are both GPS, they must be approved in accordance with the current version of FAA Advisory Circular AC-20-138D Appendix 1. AC- 20-138 requires that GPS systems used in Oceanic airspace must have a FDE function. States other than the USA may set their own standards for operational approval of GPS to provide Primary Means of Navigation in Oceanic and remote areas but in all cases these approvals will include the requirement to carry out Pre-Departure Satellite Navigation Prediction Programmes (See~~ ~~Chapter 8 -~~ *~~GNSS (GPS) Systems for further details). If, however, GPS serves as only one of the two required LRNSs, then it must be approved in accordance with FAA TSO- C129 or later standard as Class A1, A2, B1, B2, C1 or C2, or with equivalent European Aviation Safety Programme (EASA) documentation ETSO-C129a. In this instance individual States vary in their insistence upon the need for the conduct of pre-departure satellite navigation prediction programmes (viz.FDE /RAIM).~~* 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) applicable to NAT HLA operations.

Note 3: Currently equivalent approval material for GLONASS is not under development but it will need to be available prior to approval of any GLONASS equipped aircraft for NAT HLA operations.

b) each LRNS must 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.

Data Presentation

1.3.7 ~~It is important that navigation data provided to crews in the form of charts, flight plans, master documents, track messages, etc. are presented in a format suitable for error-free use in the cockpit~~

~~environment. A significant proportion of navigation errors result from the use of incorrect or misinterpreted data. To minimize the problem, source data must be clearly legible under the worst cockpit lighting conditions. More detailed recommendations are included in Chapter 8 of this Document.~~

Flight Crew Training

1.3.8 It is essential that flight crews obtain proper training for NAT HLA and RVSM operations~~. Current navigation systems, because of their precision and reliability, can induce a sense of complacency, which in turn tends to obscure the value of standard procedures, and in particular of cross-checks. Under these circumstances errors occur more easily. To prevent them, a special training programme for flight crews should be devised, which includes instructions on the efficient use of equipment, with emphasis on how to avoid mistakes. Crew members should be trained to develop a meticulous method of using Control Display Units (CDUs), with careful cross-checking at all operational stages,~~ in line with procedures described in ~~Chapter 8~~ other chapters of this ~~D~~document.

1.3.9 ~~The Operator should thereafter seek to retain the interest and co-operation of flight crews by ensuring that a high standard of navigation performance be maintained. This may be achieved during ground refresher courses, routine checks, or/and by issuing periodic newsletters that include a focus on fleet navigation performance – hopefully indicating that standards are being maintained or are being improved upon. Newsletters might also include analyses of error reports volunteered by crews (i.e. covering instances of equipment being mishandled). However, periodic reminders should not be so frequent as to be self-defeating.~~

1.3.10 ~~Crew training should stress the need for maintaining accuracy both along and across track (i.e. the careful application of Mach Number Technique, accurate reporting of positions and the use of accurate time in reporting positions).~~

1.3.11 ~~The following items should also be stressed in flight crew training programmes:~~

~~a) knowledge and understanding of standard ATC phraseology used in each area of operations;~~

~~b) importance of crew members cross-checking each other to ensure that ATC clearances are promptly and correctly complied with;~~

~~c) use and limitations, in terms of accuracy, of standby altimeters during contingency situations. Where applicable, the pilot should review the application of Static Source Error Correction/Position Error Correction (SSEC/PEC) through the use of correction cards;~~

~~d) characteristics of aircraft altitude capture systems which may lead to the occurrence of overshoots;~~

~~e) relationships between the altimetry, automatic altitude control and transponder systems in normal and abnormal situations; and~~

~~f) aircraft operating restrictions related to airworthiness approval.~~

~~g) familiarity with the recommendations to reduce oceanic errors as contained in the current version of the "Oceanic Errors Safety Bulletin" (OESB) published by ICAO EUR/NAT Office as a NAT Oceanic Error Safety Bulletin and available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", then "NAT OES Bulletins".~~

1.3.12 ~~Finally, crew training should be extended to include instruction on what action should be considered in the event of systems failures. Chapter 11 of this Document provides assistance in establishing such action.~~

1.4 ROUTES FOR USE BY AIRCRAFT NOT EQUIPPED WITH TWO LRNS~~S~~

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 ~~paragraph 12.2.2~~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/Canaries/Lisbon 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.

~~*Note: if this single LRNS is a GPS it must be approved in accordance with FAA TSO-C129 or later standard as Class A1, A2, B1, B2, C1 or C2, or with equivalent EASA documentation ETSO- C129a. Some States may have additional requirements regarding the carriage and use of GPS (e.g. a requirement for FDE RAIM) and pilots should check with their own State of Registry to ascertain what, if any, they are. These above mentioned documents can be found at:*~~

~~www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgWebcomponents.nsf~~

~~*and*~~

~~www.easa.europa.eu/ws_prod/g/doc/Agency_Mesures/Certification Spec/CS-ETSO.pdf~~

1.4.1.1 If this single LRNS is a GPS it must be approved in accordance with FAA TSO-C129 or later standard as Class A1, A2, B1, B2, C1 or C2, or with equivalent EASA documentation ETSO- C129a. Some States may have additional requirements regarding the carriage and use of GPS (e.g. a requirement for FDE RAIM) and flight crews ~~pilots~~ should check with their own State of Registry to ascertain what, if any, they are. These above mentioned documents can be found at:

www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgWebcomponents.nsf and

www.easa.europa.eu/ws_prod/g/doc/Agency_Mesures/Certification Spec/CS-ETSO.pdf.

Routes for Aircraft with Short-Range Navigation Equipment Only

1.4.2 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 ~~Approval~~ must be obtained. (See ~~paragraph 12.2.2~~ Chapter 3for details of these routes.)

1.4.3 ~~The filed ATS Flight Plan does not convey information to the controller on any such NAT HLA Approval limitation. Hence, it is the responsibility of those pilots with "less than unrestricted" (i.e. with limited) Approval to reject any ATC clearances that would otherwise divert them from officially permitted routes.~~ 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 ~~THE PENETRATION OF THE~~ OPERATION IN NAT HLA BY NON- NAT HLA ~~APPROVED~~ CERTIFIED AIRCRAFT

1.5.1 ~~Aircraft not approved for operation in the NAT HLA may be cleared by the responsible ATC unit to climb or descend through the NAT HLA provided NAT HLA Approved aircraft operating in that part of the NAT HLA affected by such climbs or descents are not penalized.~~ Aircraft that do not meet NAT HLA requirements my 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: 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.

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 ~~required provisions will~~ special arrangements may be found in AIP ~~the AIS publications~~ of ~~the appropriate~~ each ATS ~~P~~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 FL430 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 ~~pilot~~, in the normal manner. **~~The service will not be provided to aircraft that are not approved for NAT HLA operations.~~**

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 ~~pilot~~ to circumvent the RVSM approval process. Operators or flight crews ~~pilots~~ 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 ~~O~~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 2000ft separation. Additionally, flight crews ~~Pilots~~ 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.

~~Note: 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 2000ft separation. Additionally, Pilots 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 ~~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 ~~the~~ parts of the NAT region ~~Bodø, Reykjavik, Gander, Shanwick, Santa Maria and New York oceanic areas~~.

1.7.3 ADS-B services ~~have for some time been available in some continental airspaces immediately adjacent to the NAT Region and~~ are ~~now~~ provided within portions of the NAT region ~~HLA, specifically in the Gander, Reykjavik and Santa Maria OCAs.~~ (see Chapter 10). Eligibility and procedures for ADS-B service in the NAT ~~is~~ are based upon the provisions in the ~~NAT Regional Supplementary Procedures (ICAO~~ Doc 7030~~)~~ section 5.5.

1.7.4 ~~The procedures contained in 1.7.5 below shall be applicable in those portions of the following FIRs where an ADS-B-based ATS surveillance service is provided:~~

~~Reykjavik FIR, Søndrestrøm FIR, Bodø FIR, Gander Oceanic FIR, New York Oceanic East FIR and Santa Maria Oceanic FIR.~~

1.7.5 ~~Downlinked ADS-B data will not be used by the ATC system for determining aircraft position when, as specified in ICAO Doc 7030, any of the position quality indicators have a value of 0 (zero). Consequently, an aircraft carrying 1090 MHz extended squitter (1090ES) ADS-B equipment shall disable ADS-B transmission unless:~~

~~a) the aircraft emits position information of an accuracy and integrity consistent with the transmitted values of the position quality indicator; or~~

~~b) the aircraft always transmits a value of 0 (zero) for one or more of the position quality indicators (NUCp, NIC, NAC or SIL), when the requirements of a) above cannot be met; or~~

~~c) the operator has received an exemption granted by the appropriate ATS authority.~~

~~Note. — The following documents provide guidance for the installation and airworthiness approval of ADS-B OUT system in aircraft and ensure compliance with a) above:~~

~~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.~~

1.7.6 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.

1.7.7 Aircraft operators wishing to receive an exemption from the procedures specified in ~~1.7.5 above~~ 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 MANDATED AIRSPACE

1.8.1 ~~Phase 2A of the ICAO NAT Region Data link Mandate was implemented on 05 February 2015 (See ICAO NAT Supplementary Procedures (SUPPS) (Doc 7030) Sections 3.3 – CPDLC and 5.4 – ADS-C). In this phase the CPDLC/ADS-C mandated airspace includes all OTS tracks at FLs 350 to 390, inclusive. To flight plan or fly in the altitude band FL350-390 inclusive on any OTS Track, aircraft must be equipped with and operating FANS 1/A or equivalent CPDLC and ADS-C.~~ The NAT Data Link Mandate (DLM) is being implemented in phases. The goals are that: by 2018, 90% of aircraft operating in the NAT region airspace at FL290 and above will be equipped with FANS 1/A or equivalent ADS-C and CPDLC and that by 2020, 95% of aircraft operating in that airspace will be so equipped. The DLM requires aircraft to be equipped with, and operating, CPDLC and ADS-C in specific portions of the NAT region. Currently, the mandate incorporates FL350 to FL390 throughout the NAT region.

1.8.2 For further information see Doc 7030 and states' AIPs.

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 ~~Airspace~~. The overall navigation performance of all aircraft in the NAT HLA is compared to the standards established for the region ~~Region~~, to ensure that the relevant TLSs are being maintained. (See Chapter 11).

1.10 TRIALS AND FUTURE DEVELOPMENTS

1.10.1 The ICAO North Atlantic Systems Planning Group undertakes a continuous programme of monitoring the safety and efficiency of flight operations throughout the NAT region ~~Region~~. Plans are thereby developed to ensure the maintenance and further enhancement of the safety and traffic capacity of the airspace. The NAT SPG has produced a document providing a comprehensive overview of expected development of North Atlantic flight operations. This document, "Future ATM Concept of Operations for the North Atlantic Region" (NAT Doc 005) is available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT Doc 005".

1.10.2 Presently such plans include a gradual transition ~~from MNPS~~ to a PBN system of navigation performance specification. ~~This *MNPS to PBN Transition Plan for the ICAO NAT Region*,~~ The detailed transition plan is available on the ICAO EUR/NAT website where updates~~. The Plan will be continuously updated~~ are reflected ~~but the first Milestone in the planned transition Plan was passed in January 2013~~. ~~From then an MNPS operational authorization could be issued to any aircraft that is approved (certified) for RNAV 10 (RNP 10) and/or RNP 4 without any further examination of the navigation specification component.~~ In preparation, from January 2015 onward, any new approvals to operate in MNPS airspace have been based on RNP10 or RNP4 navigation specifications and in support, MNPS airspace was redesigned and renamed in February 2016 to NAT High Level Airspace (HLA).~~Milestone 2 of the MNPS to PBN NAT transition plan was passed in January 2015. From that date the navigation performance specification component of all new North Atlantic MNPS Operational Approvals must have been based upon RNAV 10 (RNP 10) or RNP 4 navigation specifications. At Milestone 3 effective from 04 February 2016, the name of the "NAT MNPS Airspace" changed to "NAT High Level Airspace". Notwithstanding these nomenclature and navigation performance criteria changes, the indicator X, is still required to be included in item 10 of the ICAO FPL.~~

1.10.3 ~~It is important to note that the longevity of 6.3NM based MNPS Approvals issued prior to January 2015 will be limited. Since from 30 January 2020, Milestone 4 of the MNPS to PBN NAT Transition Plan will take effect and the current NAT HLA will be re-designated for "PBN Based Operations". From then North Atlantic operations Aircraft Approvals which had been issued on the basis of the 6.3NM SD standard will no longer be~~ valid.

1.10.4 The evolution of MNPS airspace to NAT HLA in conjunction with the Data Link Mandate and the PBN based navigational requirements will improve flight safety allowing for the use of reduced lateral and longitudinal separation standards. This will enhance airspace capacity and provide more fuel efficient profiles for operators.

1.10.5 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).

1.10.6 Details of already determined NAT region separation reduction plans are available on the ICAO/ EUR/NAT website including trials that are currently ongoing. One such trial is the application of RLongSM in the NAT region. (See EUR and NAT Documents - OPS Bulletins)

1.10.7 ~~Further to these ongoing trials, a Performance Based Communications and Surveillance (PBCS) Plan is being developed for the NAT region. Effective March 29, 2018 the regulated PBCS systems will be required to support reduced separation standards. (See EUR and NAT Documents - OPS Bulletins)~~

1.10.8 There is some airspace where the DLM may not apply, including ATS Surveillance airspace; airspace north of 80° North; and New York Oceanic FIR. Aircraft not DLM equipped may be permitted to operate on the TANGO Routes and other specified routings during Phase 2B. Any such permissions will be promulgated via ANSP State AIP. Also certain categories of flights may be allowed to plan and operate through the mandated airspace with non-equipped aircraft. Details will be promulgated in future via State AIP. (See also "**NAT OPS Bulletin 2012-031**" available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", then "NAT OPS Bulletins"). Charts providing an indication of the likely extent of the NAT ATS Surveillance airspace are included in Attachment 9.

1.10.9 ~~The first phase of the North Atlantic Data Link Mandate was implemented on 07 February 2013. In this phase the Remarks section of the daily OTS Track Messages each specified two core tracks on which to flight plan or fly in the altitude band FL360-390 inclusive, aircraft must be equipped with and operating CPDLC and ADS-C. The initial element of the second phase of the mandate (2A) was implemented on 05 February 2015. The vertical and lateral extent of the Data Link Mandated NAT airspace was then expanded to encompass all NAT OTS Tracks in the altitude band FL350-390 inclusive.. The goals are that: by 2018, 90% of aircraft operating in the NAT Region airspace at FL290 and above will be equipped with FANS 1/A or equivalent ADS-C and CPDLC and that by 2020, 95% of aircraft operating in that airspace will be so equipped. On this basis current plans are that Phase 2 will progress in three stages:~~

- ~~Phase 2A, commenced 5 February 2015: the mandate incorporates FL350 to FL390 on all NAT OTS tracks;~~

- ~~Phase 2B, commencing 7 December 2017: will incorporate FL350-FL390 throughout the ICAO NAT Region;~~

- ~~Phase 2C, commencing 30 January 2020: will incorporate FL290 and above throughout the ICAO NAT Region.~~

1.10.10 ~~Some airspace will be excluded from the mandates, including ATS surveillance airspace; airspace north of 80° North; and New York Oceanic FIR. Aircraft not DLM equipped may be permitted to operate on the TANGO Routes and other specified routings during Phase 2B. Any such exemptions will be promulgated via ANSP State AIS. Also certain categories of flights may be allowed to plan and operate through the mandated airspace with non-equipped aircraft. Details will be promulgated in future via State AIS. (See also "**NAT OPS Bulletin 2012-031**" available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", then "NAT OPS Bulletins").~~

~~This matter is also discussed in paragraph 10.4.1 and charts providing an indication of the likely extent of the NAT ATS surveillance airspace are included in Attachment 9 (*N.B.* This Attachment is still pending).~~

1.10.11 ~~Together such new requirements will improve the safety of flight in the Region and permit the use of reduced lateral and longitudinal separation minima (RLatSM & RLongSM), thereby enhancing airspace capacity and providing more fuel efficient profiles for operators. All such changes will be gradually phased in and operators will be provided adequate advance notice. The timing of implementation phases and the extent of the airspace involved in each phase of these mandates will be determined by the ICAO NAT Systems Planning Group in full co-ordination with airspace users.~~

1.10.12 ~~The performance of the communications and surveillance systems required to support future separation reductions will be regulated. A Performance Based Communication and Surveillance (PBCS) Plan is being developed for the North Atlantic Region. Details of this plan are available in the European and North Atlantic (EUR/NAT) Office public pages on the ICAO website (www.icao.int/EURNAT/), following "EUR & NAT Documents", then "NAT Documents", in folder "Planning documents supporting separation reductions and other initiatives".~~

1.10.13 ~~Details of the ICAO NAT Region separation reduction plans are provided in several documents on the ICAO EUR/NAT website. These include The Implementation Plan for the Trial Application of RLongSM in the NAT Region and The Draft Implementation Plan for the Trial Application of RLatSM in the NAT Region. These may be accessed on the website at www.icao.int/EURNAT/, following~~

~~"EUR & NAT Documents", then "NAT Documents", in folder "Planning documents supporting separation reductions and other initiatives".~~

1.10.14 ~~Towards these goals various trials will be undertaken and suitably equipped operators will be offered the opportunity to participate in these trials. Information on current trials of reductions in longitudinal separations is available as NAT OPS Bulletins (available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT OPS Bulletins"). One such trial is currently running in the Gander and Shanwick OCAs. In this trial a 5 minutes longitudinal separation minima is being applied between pairs of aircraft equipped with and operating ADS-C and CPDLC.~~ ~~**NAT OPS Bulletin 2012-030**~~ ~~provides fuller details. Also~~ ~~**NAT OPS Bulletin 2010-007**~~ ~~provides details of a separate initiative "Flight Crew Guidance re 5 minutes Separation between GNSS Aircraft".~~

1.10.15 ~~In December 2015 the first phase of North Atlantic trials of reducing the lateral separation minimum to 25 NM was commenced. In this "RLatSM" Phase 1, 25 NM lateral separation is implemented by establishing ½ degree spacing between two specified core OTS tracks and a central track, within the vertical limits applicable to the airspace associated with the NAT Region Data Link Mandate (FL350 – 390). Only aircraft with the appropriate Required Navigation Performance (RNP4) approval and operating Automatic Dependent Surveillance-Contract (ADS-C) and Controller Pilot Data Link Communications (CPDLC), are permitted to operate on these ½ degree spaced tracks. Special procedures in respect of planning and operating on these tracks have been developed and promulgated via the AIS of the participating States i.e. Canada, Iceland and the United Kingdom. Operators intending to participate in these trials will need to ensure that advanced appropriate pilot and dispatcher training is undertaken. The second Phase of this RLatSM implementation is expected to commence in 2017. In this Phase ½ degree spacing will be established between all OTS tracks, within the vertical limits of the NAT Data Link Mandate (FL350 -390). At least two months advanced notification of the commencement of this Phase of RLatSM will be provided through the NAT States' AIS.~~

1.10.16 ~~In 2010/2013 Flight trials were conducted in the Gander and Shanwick OCAs to assess the impact of variable Mach and altitude clearances in the North Atlantic. These trials, entitled ENGAGE (Europe-North America Go ADS-B for a Greener Environment) were initially conducted by NAV CANADA and UK NATS and subsequently expanded to include ISAVIA and NAV Portugal. The ENGAGE trials were successfully completed in July 2013 with average reductions of 500 litres of fuel consumption and 1300 kilogrammes of carbon dioxide equivalents (CO2e) emissions achieved for participating flights and without adverse impact on collision risk.~~

1.10.17 The NAT region ~~Region~~ is envisaged as the first place that ~~satellite~~ space based ADS-B ATS ~~s~~Surveillance will be used. ~~On 17 January 2017 Iridium Communications Inc. successfully launched into Low Earth Orbit its first 10 Iridium NEXT satellites, This launch is the start of a series of Iridium NEXT launches scheduled over the next 18 months, The intention is to establish a constellation of around 70 such satellites, which will support real-time automatic dependent surveillance broadcast (ADS-B) operations in oceanic regions Initial validation activities to confirm the usability of the signal are planned to take place in Canadian Domestic Airspace and in the soon to be established ADS-B Corridor across the northern portion of the NAT.~~ Within the NAT SPG structure work is already underway to develop the necessary Regional Business Case, Concept of Operations, Safety Plan and Implementation Plan.

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 ~~Due to the constraints of large horizontal separation criteria and a limited economical height band (FL310–400) the airspace is congested at peak hours. 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 energetic nature of the NAT weather patterns, including the presence of jet streams, consecutive eastbound and westbound minimum time tracks are seldom identical. The creation of a different organised track system is therefore necessary for each of the major flows. Separate organised track structures are published each day for eastbound and westbound flows. These track structures are referred to as the Organised Track System or OTS.~~ The flight levels normally associated with the OTS are FL310 to FL400 inclusive. These flight levels, and their use have been negotiated and agreed by the NATS ATS providers and are published as the Flight Level Allocation Scheme (FLAS). (See Attachment 6). 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 ~~normally~~ 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 OACCs 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 OACCs when required, but these should normally be transparent to operators*.

2.1.4 ~~It should be appreciated, however, that use~~ Use of the OTS tracks is not mandatory. ~~Currently about half of NAT flights utilise the OTS.~~ Aircraft may ~~fly~~ flight plan on random routes which remain clear of the OTS or may fly on any route that joins, ~~or~~ leaves, or crosses ~~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, o~~Operators must be aware that ~~whilst~~ while ATC will make every effort to clear random traffic across the OTS at ~~published~~ requested levels, re-routes or significant changes in flight level from those planned are very 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.

2.1.5 ~~Over the high seas, the NAT Region is primarily Class A airspace (at and above FL60) (See ICAO Doc. 7030 - NAT Regional Supplementary Procedures), in which Instrument Flight Rules (IFR) apply at all times. Throughout the NAT Region, below FL410, 1000 feet vertical separation is applied. However, airspace utilisation is under continual review, and within the HLA portion of NAT airspace, in addition to the strategic and tactical use of 'opposite direction' flight levels during peak flow periods the Mach Number Technique is applied.~~

2.2 CONSTRUCTION OF THE ORGANISED TRACK SYSTEM (OTS)

General processes

2.2.1 The appropriate OACC 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 OACC and the day-time OTS by Shanwick OACC (Prestwick), each incorporating any requirement for tracks within the New York, Reykjavik, Bodø and Santa Maria Oceanic Control Areas (OCAs). OACC planners co-ordinate with adjacent OACCs 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. The impact on domestic route structures and the serviceability of transition area radars and navaids are checked before the system is finalised.

2.2.2 When the expected volume of traffic justifies it, tracks may be established to accommodate the EUR/CAR traffic axis ~~or traffic between the Iberian Peninsula and North America~~. 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). Similarly, some westbound tracks may commence at 00°W or 30°W, North of 61°N, to accommodate NAT traffic routing via the Reykjavik OCA and Northern Canada.

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 ~~This~~ CDM process ~~commences~~ begins with the Preferred Route Message (PRM) system~~, which has been used in the NAT Region for many years. To enable oceanic planners to take into consideration operators' preferred routes in the construction of the OTS,~~. ~~all~~ All NAT operators (both scheduled and non-scheduled) are urged to provide information by AFTN message to the appropriate OACCs regarding ~~the~~ optimum ~~tracks of~~ routing for any/all of their flights ~~which are~~ ~~intended~~ intending to operate during ~~the~~ 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 ~~requirement and schedule~~ details for submitting ~~PRMs~~ operators' preferred routes in respect of day-time westbound flights are specified in the UK AIP ~~in Section ENR 2.2 at paragraph 3.5.2, and the addresses and formats for these westbound PRMs are specified in paragraph 3.24~~. The filing of night-time eastbound preferred routings is an element of the NavCanada Traffic Density Analyser (TDA) tool (see Chapter 17 ~~paragraph 17.6.22~~). ~~Access to the TDA requires a password which can be requested from NAV CANADA Customer Service via E-mail : service@navcanada.ca or telephone : +1 613 563 5588 or Toll free at : + 1 800 876 4693. The TDA can then be accessed currently from the following link: https://extranetapps.navcanada.ca/NATTDA/TDAListing.aspx?reqDirection=East~~

2.2.5 Subsequently, following the initial construction of the NAT tracks by the publishing agencies ~~(Gander OAC for Eastbound tracks and Shanwick OAC for Westbound tracks)~~, 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 (an example of such a structure is shown in Example 1/Figure 2 below). ~~However, where this provision requires moving the westbound OTS to a less optimum position, it can be agreed that only one exit point and landfall will be left vacant and that some opposite direction flight levels are left off an adjacent westbound track separated by one degree, for use by eastbound flights.~~

2.3 THE NAT TRACK MESSAGE

2.3.1 The agreed OTS is promulgated by means of the NAT track message ~~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 ~~co-ordinates~~ 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 ~~T~~track ~~M~~messages are shown ~~below~~ in this chapter.

2.3.3 The originating OACC identifies each NAT ~~T~~track ~~M~~message, within the Remarks section appended to the end of the NAT ~~T~~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 ~~T~~track amendments affecting the entry/exit points, route of flight (coordinates ~~co-ordinates~~) or flight level allocation are made, the whole NAT ~~T~~track ~~M~~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 ~~T~~track ~~M~~message. ~~The Remarks may vary significantly from day to day. They i~~Included is essential information ~~that Shanwick or Gander need to bring to the attention of~~ for operators that may vary greatly from day to day. These Remarks ~~sometimes~~ may also include details of special flight planning ~~restrictions~~ considerations, reminders of ongoing initiatives (e.g., Data Link Mandate or RLatSM trials), planned amendments to NAT operations, or active NOTAMS referencing airspace restrictions ~~that may be in force~~. ~~For example, with effect from 05 February 2015 Phase 2A of the NAT Data Link Mandate was implemented. *From that date all NAT OTS Tracks in the revised altitude band* ***FL350*** *-390* are *subject to the FANS equipage requirement*. The Remarks section carries such notification. Also since the implementation of RLatSM Tials in December 2015 *The Remarks section* of the Track Message identifies two core OTS tracks and a ½ Degree spaced central track, on which to flight plan or fly in the DLM altitude band FL350-390 inclusive, aircraft must also be RNP 4 certified.~~ The ~~R~~remarks section of the Night-time Eastbound OTS Message will also include~~s~~ important information on appropriate clearance delivery frequency assignments.

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

~~Day-time OTS~~	~~1130 UTC to 1900 UTC at 30°W~~
~~Night-time OTS~~	~~0100 UTC to 0800 UTC at 30°W~~

2.3.6 ~~Changes to these times can be negotiated between Gander and Shanwick OACs 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 OACs when required, but these should normally be transparent to operators.~~

2.3.7 ~~Correct interpretation of the track message by airline dispatchers and aircrews is essential for both economy of operation and in minimising the possibility of misunderstanding leading to the use of incorrect track co-ordinates. Oceanic airspace outside the published OTS is available, subject to application of the appropriate separation criteria and NOTAM restrictions. It is possible to flight plan to join or leave an outer track of the OTS. If an operator wishes to file partly or wholly outside the OTS, knowledge of separation criteria, the forecast upper wind situation and correct interpretation of the NAT Track Message will assist in judging the feasibility of the planned route. When the anticipated volume of traffic does not warrant publication of all available flight levels on a particular track, ATC will publish only those levels required to meet traffic demand. However, the fact that a specific flight level is not published for a particular track does not necessarily mean that it cannot be made available if requested. Nevertheless, it should be recognised that the actual availability of an unpublished flight level for planning on an OTS Track may be subject to constraints of the NAT Flight Level Allocation Scheme (FLAS) agreed between NAT ATS Providers (See Attachment 6).~~

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 6.

2.4.3 It should also be recognised that during these times there is often a need for clearances to be individually co-ordinated between OACCs 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 OACC 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

~~FF CYZZWNAT 102151~~
~~EGGXZOZX~~
~~(NAT-1/3 TRACKS FLS 310/390 INCLUSIVE~~
~~JAN 14/1130Z TO JAN 14/1900Z~~
~~PART ONE OF THREE PARTS-~~
~~A PIKIL 57/20 58/30 59/40 58/50 DORYY~~
~~EAST LVLS NIL~~
~~WEST LVLS 310 320 330 340 350 360 370 380 390~~
~~EUR RTS WEST NIL~~
~~NAR -~~
~~B RESNO 56/20 57/30 58/40 57/50 HOIST~~
~~EAST LVLS NIL~~
~~WEST LVLS 310 320 330 340 350 360 370 380 390~~
~~EUR RTS WEST NIL~~
~~NAR -~~
~~C DOGAL 55/20 56/30 57/40 56/50 JANJO~~
~~EAST LVLS NIL~~
~~WEST LVLS 310 320 330 340 350 360 370 380 390~~
~~EUR RTS WEST NIL~~
~~NAR -~~
~~END OF PART ONE OF THREE PARTS)~~

~~FF CYZZWNAT~~
~~102151 EGGXZOZX~~
~~(NAT-2/3 TRACKS FLS 310/390 INCLUSIVE~~
~~JAN 14/1130Z TO JAN 14/1900Z~~
~~PART TWO OF THREE PARTS-~~
~~D NEBIN 5430/20 5530/30 5630/40 5530/50 KODIK~~
~~EAST LVLS NIL~~
~~WEST LVLS 350 360 370 380 390~~
~~EUR RTS WEST NIL~~
~~NAR -~~
~~E MALOT 54/20 55/30 56/40 55/50 LOMSI~~
~~EAST LVLS NIL~~
~~WEST LVLS 310 320 330 340 350 360 370 380 390~~
~~EUR RTS WEST NIL~~
~~NAR -~~
~~F LIMRI 53/20 54/30 55/40 54/50 NEEKO~~
~~EAST LVLS NIL~~
~~WEST LVLS 310 320 330 340 350 360 370 380 390~~
~~EUR RTS WEST NIL~~
~~NAR -~~
~~G BEDRA 49/20 48/30 45/40 43/50 42/60 DOVEY~~
~~EAST LVLS NIL~~
~~WEST LVLS 310 320 330 350 360 390~~
~~EUR RTS WEST NIL~~
~~NAR -~~
~~H ETIKI 48/15 48/20 47/30 44/40 42/50 41/60 JOBOC~~
~~EAST LVLS NIL~~
~~WEST LVLS 310 320 330 350 360 390~~
~~EUR RTS WEST REGHI~~
~~NAR -~~
~~END OF PART TWO OF THREE PARTS)~~

~~FF CYZZWNAT102152~~
~~EGGXZOZX~~
~~(NAT-3/3 TRACKS FLS 310/390 INCLUSIVE~~
~~JAN 14/1130Z TO JAN 14/1900Z~~
~~PART THREE OF THREE PARTS-~~
~~J 41/50 39/60 MUNEY~~
~~EAST LVLS NIL~~
~~WEST LVLS 320 340 360 380~~
~~EUR RTS WEST~~
~~NAR -~~
~~REMARKS.~~
~~1. TMI IS 014 AND OPERATORS ARE REMINDED TO INCLUDE THE~~
~~TMI NUMBER AS PART OF THE OCEANIC CLEARANCE READ BACK.~~
~~2. ADS-C AND CPDLC MANDATED OTS ARE AS FOLLOWS~~
~~TRACK A 350 360 370 380 390~~
~~TRACK B 350 360 370 380 390~~
~~TRACK C 350 360 370 380 390~~
~~TRACK D 350 360 370 380 390~~
~~TRACK E 350 360 370 380 390~~
~~TRACK F 350 360 370 380 390~~
~~TRACK G 350 360 370 380 390~~
~~TRACK H 350 360 370 380 390~~
~~END OF ADS-C AND CPDLC MANDATED OTS~~
~~3. RLATSM OTS LEVELS 350-390. RLATSM TRACKS AS FOLLOWS~~
~~TRACK C~~
~~TRACK D~~
~~TRACK E~~
~~END OF RLATSM OTS~~
~~4. FOR STRATEGIC LATERAL OFFSET AND CONTINGENCY PROCEDURES RELATED TO OPS~~
~~IN NAT FLOW PLEASE REFER TO THE ICAO NORTH ATLANTIC OPERATIONS AND AIRSPACE~~
~~MANUAL NAT Doc 007.~~
~~WWW.ICAO.INT/EURNAT. SLOP SHOULD BE USED AS A STANDARD PROCEDURE AND NOT JUST~~
~~AS WEATHER TURBULENCE AVOIDANCE.~~
~~-~~

~~5. EIGHTY PERCENT OF GROSS NAVIGATION ERRORS RESULT FROM POOR COCKPIT PROCEDURES. ALWAYS CARRY OUT PROPER WAY POINT CHECKS.~~
~~6.OPERATORS ARE REMINDED THAT THE CLEARANCE MAY DIFFER FROM YOUR FLIGHT PLAN, FLY YOUR CLEARANCE.~~
~~7.UK AIP, ENR 2.2.4.2 PARA 5.2 STATES THAT NAT OPERATORS SHALL FILE PRM'S.~~
~~8.FLIGHTS REQUESTING WESTBOUND OCEANIC CLEARANCE VIA ORCA DATALINK SHALL INCLUDE IN THE RMK/ FIELD THE HIGHEST ACCEPTABLE FLIGHT LEVEL WHICH CAN BE MAINTAINED AT THE OAC ENTRY POINT.-~~
~~END OF PART THREE OF THREE PARTS ...~~

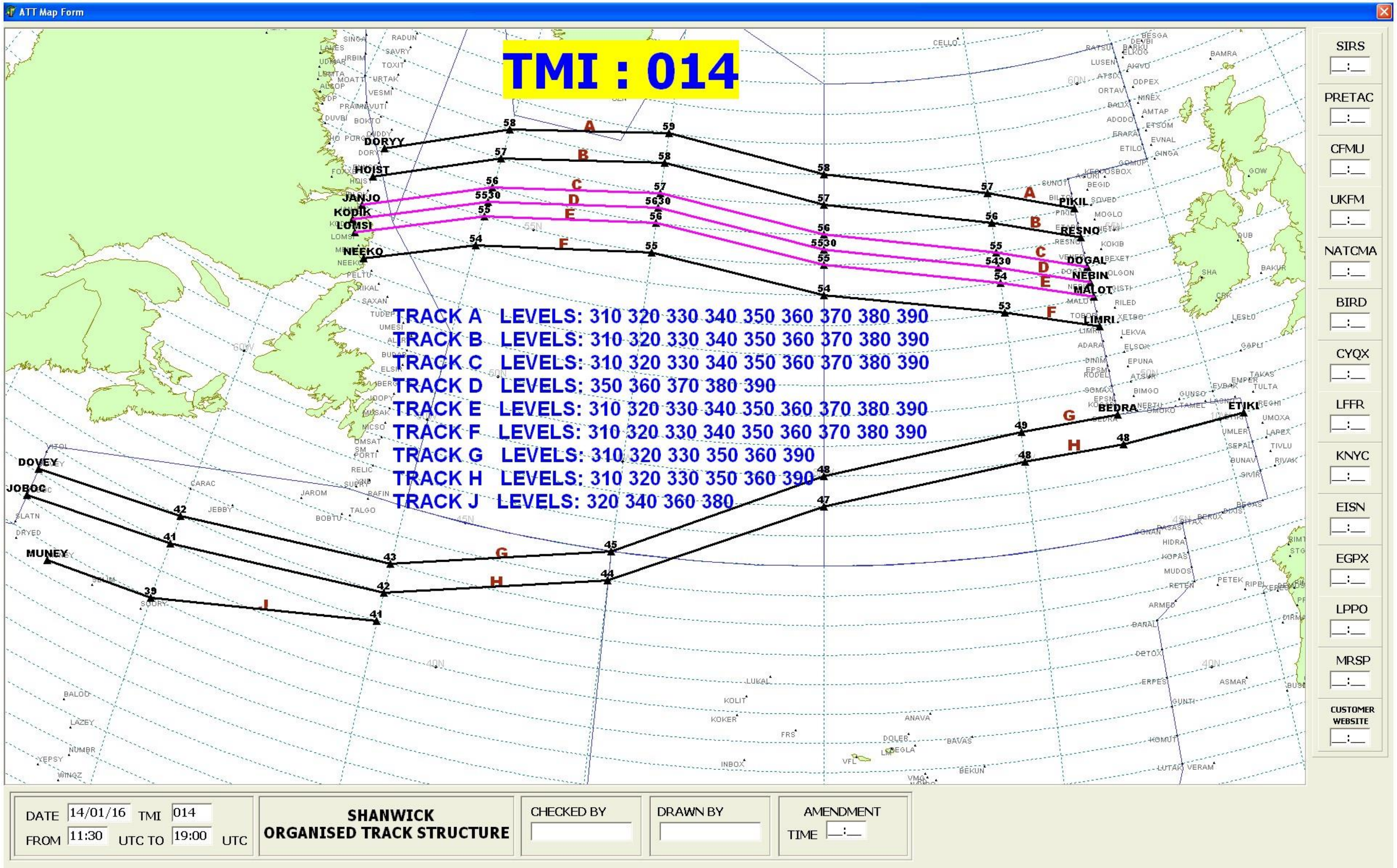
TZA179 082009
FF BIRDZQZZ BIKFYXYX
082009 EGGXZOZX
(NAT-1/3 TRACKS FLS 310/390 INCLUSIVE
APR 09/1130Z TO APR 09/1900Z
PART ONE OF THREE PARTS-
A ERAKA 60/20 62/30 63/40 63/50 MAXAR
EAST LVLS NIL
WEST LVLS 310 320 330 350 360
EUR RTS WEST ETSOM
NAR -
B GOMUP 59/20 61/30 62/40 62/50 PIDSO
EAST LVLS NIL
WEST LVLS 310 320 330 350 360 380
EUR RTS WEST GINGA
NAR -
C SUNOT 58/20 60/30 61/40 61/50 SAVRY
EAST LVLS NIL
WEST LVLS 310 320 330 340 360 380
EUR RTS WEST NIL
NAR -
END OF PART ONE OF THREE PARTS)

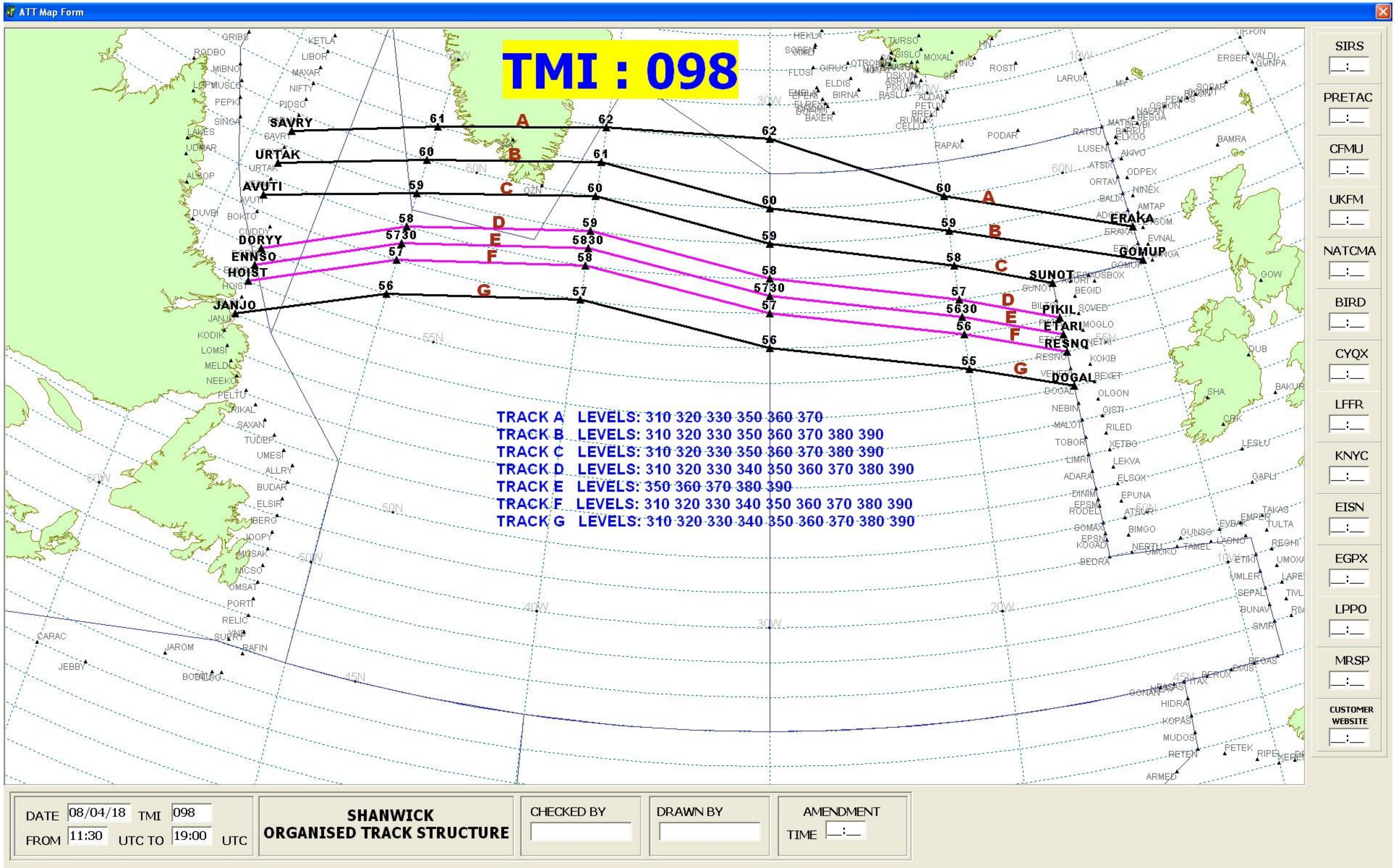
TZA181 082010
FF BIRDZQZZ BIKFYXYX
082009 EGGXZOZX
(NAT-2/3 TRACKS FLS 310/390 INCLUSIVE
APR 09/1130Z TO APR 09/1900Z
PART TWO OF THREE PARTS-
D PIKIL 57/20 57/30 56/40 54/50 NEEKO
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR -
E RESNO 56/20 56/30 55/40 53/50 RIKAL
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR -
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 -
G DOGAL 55/20 55/30 54/40 52/50 TUDEP
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR -
END OF PART TWO OF THREE PARTS)

TZA182 082010
FF BIRDZQZZ BIKFYXYX
082010 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 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR -
REMARKS.
1. TMI IS 099 AND OPERATORS ARE REMINDED TO INCLUDE THE

TMI NUMBER AS PART OF THE OCEANIC
CLEARANCE READ BACK.
2.OPERATORS ARE REMINDED THAT ADS-C AND
CPDLC IS MANDATED FOR
LEVELS 350-390 IN NAT AIRSPACE.
3. PBCS OTS LEVELS 350-390. PBCS TRACKS AS
FOLLOWS
TRACK E
TRACK F
TRACK G
END OF PBCS OTS
4.FOR STRATEGIC LATERAL OFFSET AND
CONTINGENCY PROCEDURES FOR OPS IN
NAT FLOW REFER TO NAT PROGRAMME
COORDINATION WEBSITE
WWW.PARIS.ICAO.INT.
SLOP SHOULD BE STANDARD PROCEDURE, NOT
JUST FOR AVOIDING WX/TURB.
5.80 PERCENT OF GROSS NAVIGATION ERRORS
RESULT FROM POOR COCKPIT
PROCEDURES. CONDUCT EFFECTIVE WAYPOINT
CHECKS.
6.OPERATORS ARE REMINDED THAT CLEARANCES
MAY DIFFER FROM THE
FLIGHT PLAN, FLY THE CLEARANCE.
7.UK AIP. ENR 2.2.4.2 PARA 5.2 STATES THAT NAT
OPERATORS SHALL FILE
PRM'S.
8.FLIGHTS REQUESTING WESTBOUND OCEANIC
CLEARANCE VIA ORCA DATALINK
SHALL INCLUDE IN RMK/ FIELD THE HIGHEST
ACCEPTABLE FLIGHT LEVEL WHICH
CAN
BE MAINTAINED AT OAC ENTRY POINT.
9.ALL ADSC CPDLC EQUIPPED FLIGHTS NOT
LOGGED ON TO A DOMESTIC ATSU
PRIOR TO ENTERING THE SHANWICK OCA MUST
INITIATE A LOGON TO EGGX
BETWEEN 10
AND 25 MINUTES PRIOR TO OCA ENTRY.-
END OF PART THREE OF THREE PARTS)

Figure 2-0-1 — Example of Day-Time Westbound NAT Organised Track System[MV(3]




ATT Map Form
TMI : 098
SAVRY
URTAK
AVUTI
DORYY
ENNSO
HOIST
JANJO
ERAKA
GOMUP
SUNOT
PIKIL
ETARI
RESNO
DOGAL
TRACK A LEVELS: 310 320 330 350 360 370
TRACK B LEVELS: 310 320 330 350 360 370 380 390
TRACK C LEVELS: 310 320 330 350 360 370 380 390
TRACK D LEVELS: 310 320 330 340 350 360 370 380 390
TRACK E LEVELS: 350 360 370 380 390
TRACK F LEVELS: 310 320 330 340 350 360 370 380 390
TRACK G LEVELS: 310 320 330 340 350 360 370 380 390
SIRS
PRETAC
CFMU
UKFM
NATCMA
BIRD
CYQX
LFFR
KNYC
EISN
EGPX
LPPO
MRSP
CUSTOMER WEBSITE
DATE 08/04/18 TMI 098
FROM 11:30 UTC TO 19:00 UTC
SHANWICK
ORGANISED TRACK STRUCTURE
CHECKED BY
DRAWN BY
AMENDMENT
TIME

[MV(4)]

Example 2 — Example of Eastbound NAT Track Message ~~(TO BE UPDATED)~~

~~DD CYZZENAT~~
~~091401 CZQXZQZX~~
~~(NAT-1/3 TRACKS FLS 320/400 INCLUSIVE~~
~~FEB 10/0100Z TO FEB 10/0800Z~~
~~PART ONE OF THREE PARTS-~~
~~S ALLRY 51/50 53/40 55/30 56/20 PIKIL SOVED~~
~~EAST LVLS 320 330 340 350 360 370 380 390 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR N247A N251A N253A-~~
~~T ELSIR 50/50 52/40 54/30 55/20 RESNO NETKI~~
~~EAST LVLS 320 330 340 350 360 370 380 390 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR N209C N215A N217A-~~
~~U JOOPY 4930/50 5130/40 5330/30 5430/20 DOGAL BEXET~~
~~EAST LVLS 320 330 340 350 360 370 380 390 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR N177D N181F-~~
~~V NICSO 48/50 50/40 52/30 53/20 MALOT GISTI~~
~~EAST LVLS 320 330 340 350 360 370 380 390 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR N143A N153D-~~
~~END OF PART ONE OF THREE PARTS)~~

~~DD CYZZENAT~~
~~091402 CZQXZQZX~~
~~(NAT-2/3 TRACKS FLS 320/400 INCLUSIVE~~
~~FEB 10/0100Z TO FEB 10/0800Z~~
~~PART TWO OF THREE PARTS-~~
~~W PORTI 47/50 49/40 51/30 52/20 LIMRI XETBO~~
~~EAST LVLS 320 330 340 350 360 370 380 390 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR N105C N117A-~~
~~X DOVEY 42/60 44/50 47/40 50/30 51/20 DINIM ELSOX~~
~~EAST LVLS 320 360 380 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR NIL-~~
~~Y JOBOC 41/60 43/50 46/40 49/30 50/20 SOMAX ATSUR~~
~~EAST LVLS 320 360 380 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR NIL-~~
~~END OF PART TWO OF THREE PARTS)~~

~~DD CYZZENAT~~
~~091403 CZQXZQZX~~
~~(NAT-3/3 TRACKS FLS 320/400 INCLUSIVE~~
~~FEB 10/0100Z TO FEB 10/0800Z~~
~~PART THREE OF THREE PARTS-~~
~~Z SOORY 42/50 45/40 48/30 49/20 BEDRA NERTU~~
~~EAST LVLS 320 340 380 400~~
~~WEST LVLS NIL~~
~~EUR RTS EAST NIL~~
~~NAR NIL-~~
~~REMARKS:~~
~~1.TMI IS 041 AND OPERATORS ARE REMINDED TO INCLUDE THE TMI NUMBER AS PART OF THE OCEANIC CLEARANCE READ BACK.~~
~~2.ADS-C AND CPDLC MANDATED OTS ARE AS FOLLOWS~~
~~TRACK S 350 360 370 380 390~~
~~TRACK T 350 360 370 380 390~~
~~TRACK U 350 360 370 380 390~~
~~TRACK V 350 360 370 380 390~~
~~TRACK W 350 360 370 380 390~~
~~TRACK X 350 360 370 380 390~~
~~TRACK Y 350 360 370 380 390~~
~~TRACK Z 350 360 370 380 390~~
~~END OF ADS-C AND CPDLC MANDATED OTS~~
~~3. RLATSM OTS LEVELS 350-390. RLATSM TRACKS AS FOLLOWS~~
~~TRACK T~~
~~TRACK U~~
~~TRACK V~~
~~END OF RLATSM OTS~~
~~4.80% OF NAVIGATIONAL ERRORS RESULT FROM POOR COCKPIT PROCEDURES. ALWAYS CARRY OUT PROPER WAYPOINT PROCEDURES.~~
~~5.NAT REGION DATALINK MANDATE PHASE 2A WILL COMMENCE FEB 05 2015 AT 1130Z. FL350-390 INCLUSIVE ON OR AT ANY POINT ALONG THE OTS REGARDLESS OF PUBLISHED ALTITUDES. OPERATORS ATTENTION IS DRAWN TO AIC 2/14.~~
~~6.OPERATORS ATTENTION IS DRAWN TO NOTAM A0017/13 RE: CHANGE IN NEW YORK CENTER OCEANIC CLEARANCE PROCEDURES.~~
~~7.OPERATORS ARE ADVISED THAT VERSION 23 OF THE GANDER DATA LINK OCEANIC CLEARANCE DELIVERY CREW PROCEDURES IS NOW VALID AND AVAILABLE AS NAT OPS BULLETIN 2014-007 ON THE WWW.PARIS.ICAO.INT WEBSITE.-~~
~~END OF PART THREE OF THREE PARTS)~~

TZA466 241302
FF BIRDZQZZ
241302 CZQXZQZX
(NAT-1/3 TRACKS FLS 320/400 INCLUSIVE
APR 25/0100Z TO APR 25/0800Z
PART ONE OF THREE PARTS-
R ALLRY 51/50 52/40 52/30 53/20 MALOT GISTI
EAST LVLS 320 330 340 350 360 370 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR N389B N383B-
S BUDAR 5030/50 5130/40 5130/30 5230/20 TOBOR RILED
EAST LVLS 350 360 370 380 390
WEST LVLS NIL
EUR RTS EAST NIL
NAR N365A N359B N355B-
T ELSIR 50/50 51/40 51/30 52/20 LIMRI XETBO
EAST LVLS 320 330 340 350 360 370 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR N333B N329B N323A-

END OF PART ONE OF THREE PARTS)

TZA468 241302
FF BIRDZQZZ
241302 CZQXZQZX
(NAT-2/3 TRACKS FLS 320/400 INCLUSIVE
APR 25/0100Z TO APR 25/0800Z
PART TWO OF THREE PARTS-
U JOOPY 49/50 50/40 50/30 51/20 DINIM ELSOX
EAST LVLS 320 330 340 350 360 370 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR N269A N261A-
V NICSO 48/50 49/40 49/30 50/20 SOMAX ATSUR
EAST LVLS 320 330 340 350 360 370 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR N211E N197A-
W PORTI 47/50 48/40 48/30 49/20 BEDRA NERTU
EAST LVLS 320 330 350 360 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR N155A N139A-
X SUPRY 46/50 47/40 47/30 48/20 48/15 OMOKO GUNSO
EAST LVLS 320 330 350 360 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR N93A N75A-
Y RAFIN 45/50 46/40 46/30 47/20 47/15 ETIKI REGHI
EAST LVLS 320 330 350 360 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR N59C N45D-

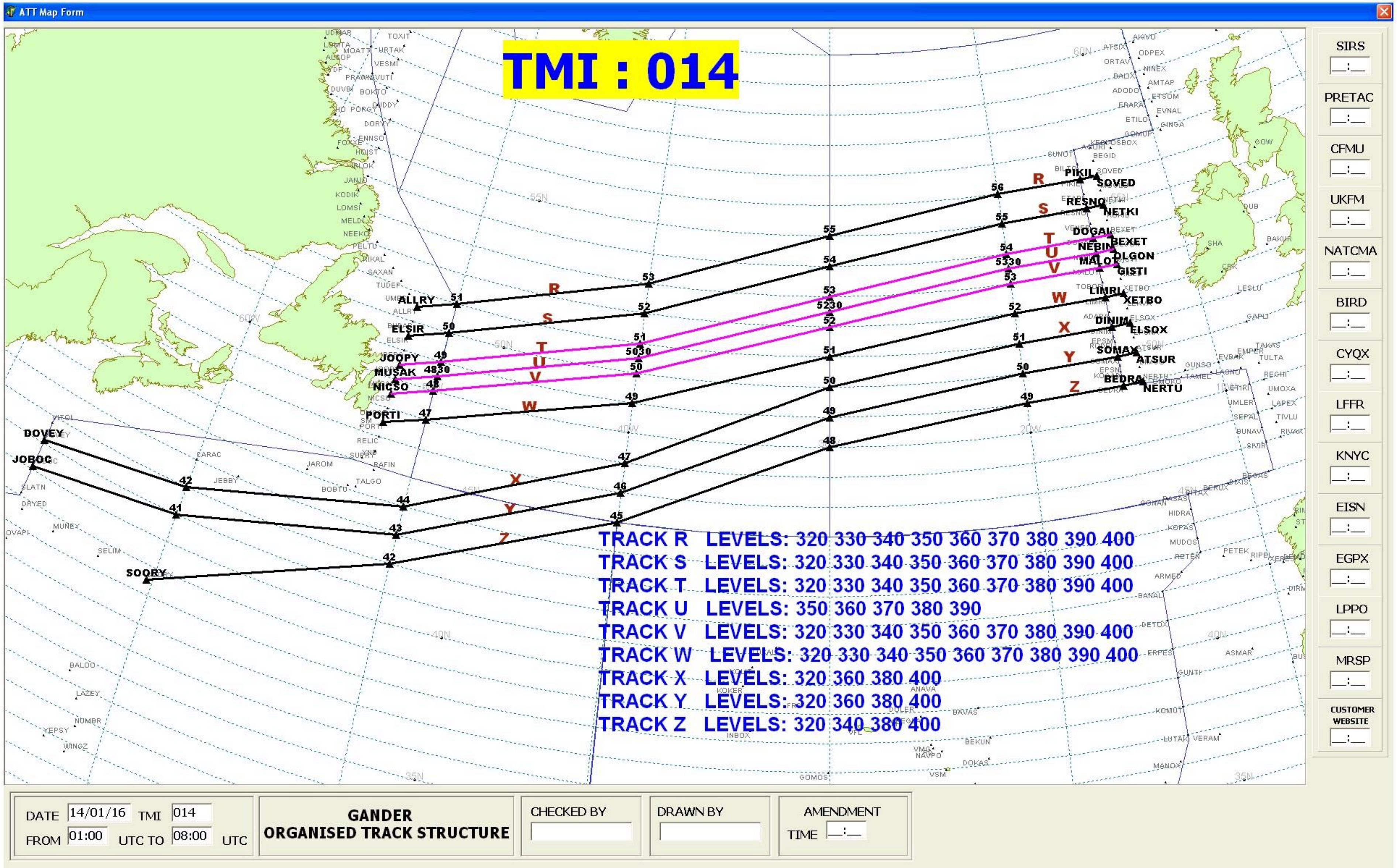
END OF PART TWO OF THREE PARTS)

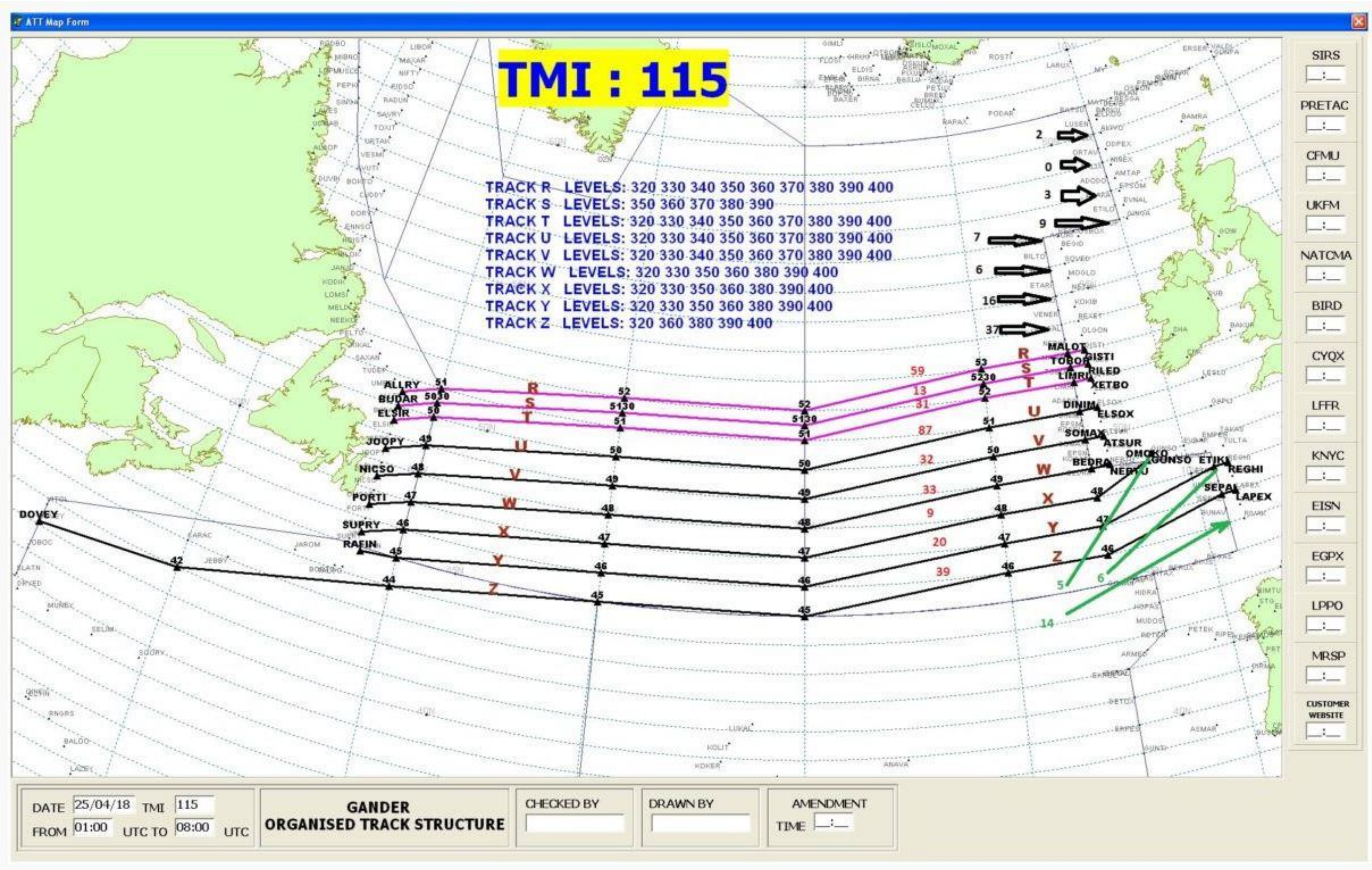
TZA471 241303
FF BIRDZQZZ
241303 CZQXZQZX
(NAT-3/3 TRACKS FLS 320/400 INCLUSIVE
APR 25/0100Z TO APR 25/0800Z
PART THREE OF THREE PARTS-
Z DOVEY 42/60 44/50 45/40 45/30 46/20 46/15 SEPAL LAPEX
EAST LVLS 320 360 380 390 400
WEST LVLS NIL
EUR RTS EAST NIL
NAR NIL-
REMARKS:
1.TMI IS 115 AND OPERATORS ARE REMINDED TO INCLUDE THE TMI
NUMBER
AS PART OF THE OCEANIC CLEARANCE READ BACK.
2.OPERATORS ARE REMINDED THAT ADS-C AND CPDLC ARE MANDATED
FOR LEVELS
350-390 I
NAT AIRSPACE.
3.PBCS OTS LEVELS 350-390. PBCS TRACKS AS FOLLOWS
TRACK R
TRACK S
TRACK T
END OF PBCS TRACKS.

4.CLEARANCE DELIVERY FREQUENCY ASSIGNMENTS
FOR AIRCRAFT OPERATING
FROM AVPUT TO TALGO INCLUSIVE:AVPUT TO LIBOR
132.02,MAXAR TO VESMI
134.2,AVUTI
TO JANJO 128.7,KODIK TO TUDEP 135.45,UMESI TO
JOOPY 135.05, MUSAK TO SUPRY 128.45,RAFIN TO TALGO
119.42.
5.80 PERCENT OF NAVIGATIONAL ERRORS RESULT FROM
POOR COCKPIT PROCEDURES
ALWAYS CARRY OUT PROPER WAYPOINT PROCEDURES.
6.OPERATORS ARE ADVISED THAT VERSION 24 OF THE
GANDER DATA LINK
OCEANIC CLEARANCE DELIVERY CREW PROCEDURES IS
NOW VALID AND
AVAILABLE AS NAT OPS BULLETIN 2015-004 ON THE
WWW.PARIS.ICAO.INT
WEBSITE.
7.OPERATORS ARE REMINDED THAT EASTBOUND
AIRCRAFT INTENDING TO
OPERATE IN THE OTS ARE REQUIRED TO COMPLY WITH
NAR FLIGHT PLANNING
RULES AS DEFINED IN THE CANADA FLIGHT
SUPPLEMENT OR WITH ROUTES AS
CONTAINED IN
THE DAILY BOSTON ADVISORY.
8.FL320 EXPIRES AT 30W AT 0600Z FOR TRACK X, Y, AND
Z.-

END OF PART THREE OF THREE PARTS)

Figure 2-0-2 — Example of Night-Time Eastbound NAT Organised Track System[MV(5]




ATT Map Form
TMI : 115
TRACK R LEVELS: 320 330 340 350 360 370 380 390 400
TRACK S LEVELS: 350 360 370 380 390
TRACK T LEVELS: 320 330 340 350 360 370 380 390 400
TRACK U LEVELS: 320 330 340 350 360 370 380 390 400
TRACK V LEVELS: 320 330 340 350 360 370 380 390 400
TRACK W LEVELS: 320 330 350 360 380 390 400
TRACK X LEVELS: 320 330 350 360 380 390 400
TRACK Y LEVELS: 320 330 350 360 380 390 400
TRACK Z LEVELS: 320 360 380 390 400
DOVEY
ALLRY
BUDAR
ELSIR
JOOPY
NICSO
PORTI
SUPRY
RAFIN
MALOT
TOBOR
LIMRI
GISTI
RILED
XETBO
DINIM
ELSOX
SOMAX
ATSUR
BEDRA
NERTU
OMOKO
GUNSO
ETIKI
REGHI
SEPAL
LAPEX
SIRS
PRETAC
CFMU
UKFM
NATCMA
BIRD
CYQX
LFFR
KNYC
EISN
EGPX
LPPO
MRSP
CUSTOMER WEBSITE
DATE 25/04/18 TMI 115
FROM 01:00 UTC TO 08:00 UTC
GANDER
ORGANISED TRACK STRUCTURE
CHECKED BY
DRAWN BY
AMENDMENT
TIME

[MV(6]

CHAPTER 3

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

3.1 GENERAL

3.1.1 ~~The Organised Track System is the most significant route structure within the NAT HLA. Other~~ Routes, route structures, and transition areas within and adjacent to the NAT HLA are detailed below.

3.2 ~~OTHER~~ ROUTES WITHIN THE NAT HLA

3.2.1 ~~Other r~~Routes within the NAT HLA (illustrated in Figure 4) are as follows:

~~(1)* 'Blue Spruce' Routes, established as special routes for aircraft equipped with only one serviceable LRNS. (Chapter 1 refers.) **State approval for NAT HLA operations is required in order to fly along these routes**. (See Chapter 12 for full route definitions);~~

~~(2) routes between Northern Europe and Spain/Canaries/Lisbon FIR. (T9*, T13 and T16);~~

~~(3)* routings between the Azores and the Portuguese mainland and between the Azores and the Madeira Archipelago;~~

~~(4)* routes between Iceland and Constable Pynt on the east coast of Greenland and between Kook Islands on the west coast of Greenland and Canada~~

~~(5) special routes of short stage lengths where aircraft equipped with normal short-range navigation equipment can meet the NAT HLA track-keeping criteria (G3 and G11). **State approval for NAT HLA operations is required in order to fly along these routes**.~~

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 – ALTOD (FL290 to FL600) - PRAWN – YDP

  (VHF coverage exists. Non HF equipped aircraft can use this route)

  OZN – 59°N 50°W – CUDDY (FL290 to FL600) - PORGY – HO

  (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/Canaries/Lisbon FIR. (T9*, T13 and T16);

c) *routings between the Azores and the Portuguese mainland 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)

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

*Note: *routes/routings identified with an asterisk in sub paragraphs (a), (b), (c) and (d) 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.*

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 ~~Paragraphs □ & 4.2.10~~).

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 Ooperators are encouraged to refer to FAA Air Traffic Control System Command Center Advisory Database (www.fly.faa.gov) for NAT Advisory Message, published daily, for specified transitions from select U.S. 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 FIR/CTA.

Canadian Domestic Track Systems

3.3.4 Within Canada there are three track systems: the Northern Control Area tracks (NCAs), the Southern Control Area tracks (SCAs) and the Northern Organised Track System (NOROTS); these provide links for NAT traffic operating between Europe and North America to central and western North American airports. Track procedures and details are published in Transport Canada's Aeronautical Information Manual (TC AIM). The coordinates ~~co-ordinates~~ of the NOROTS are published daily via NOTAM.

Routes between North America and the Caribbean area

3.3.5 ~~An extensive network of routes linking points in the United States and Canada with Bermuda, the Bahamas and the Caribbean area are defined~~ The West Atlantic Route System (WATRS) resides within the New York OCA West~~.~~, ~~This network has been known as the West Atlantic Route System (WATRS). Since 5 June 2008 the original WATRS airspace together with portions of~~ the Miami oceanic ~~Oceanic~~ airspace, and the San Juan ~~FIR~~ oceanic ~~Oceanic~~ airspace. ~~have been designated as "WATRS Plus Airspace". In this airspace New York Air Route Traffic Control Center (ARTCC) applies 30 NM lateral and 30 NM longitudinal separation minima, and 50 NM longitudinal separation minimum between appropriately authorized and equipped aircraft. (FANS1/A and RNP 4 or RNAV 10 (RNP 10), respectively, see Chapter 4 for further detail). New York ARTCC will continue to accommodate operators that are not eligible for these reduced separations.~~ Details of these routes and associated procedures are contained in the United States AIP. ~~Some information on WATRS can be currently found at:~~
.

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

3.3.6 Parts of the Shanwick OCA are designated as the Shannon Oceanic Transition Area (SOTA) and the Northern Oceanic Transition Area (NOTA). ~~NOTA airspace is included in the NAT HLA and hence NAT HLA requirements are still applicable from FL285 to FL420 in NOTA. However, SOTA is not included in the NAT HLA. Therefore flights within SOTA routing such that they are subject to an Oceanic Clearance, are required to be NAT HLA Approved.~~

3.3.7 SOTA ~~has the same vertical extent as the Shanwick OCA, and is bounded by lines joining successively the following points~~:

~~N5100 W01500 N5100 W00800 N4830 W00800 N4900 W01500 N5100 W01500~~

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

FL060 TO FL600 INCLUSIVE

NOT INCLUDED IN NAT HLA*

**Note: Flights transitioning through SOTA and requiring an oceanic clearance FL285 to FL420 inclusive must meet NAT HLA requirements.*

3.3.8 NOTA: ~~has the same vertical extent as the Shanwick OCA and is bounded by the lines joining successively the following points.~~

~~N5400 W01500 - N5700 W01500 - N5700 W01000W - N5434 W01000 - N5400 W01500.~~

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

FL 060 TO FL600 INCLUSIVE

NAT HLA FL285 TO FL420.

3.3.9 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.

Brest Oceanic Transition Area (BOTA)

3.3.10 Part of the Shanwick OCA is designated as the Brest Oceanic Transition Area (BOTA). ~~BOTA is not included in the NAT HLA. Hence only flights routing such that they are subject to an Oceanic Clearance, are required to be NAT HLA Approved.~~

3.3.11 BOTA ~~has the same vertical extent as the Shanwick OCA, and is bounded by lines joining successively the following points~~:

~~N4834 W00845 – N4830 W00800 – N4500 W00800 – N4500 W00845 – N4834 W00845~~

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

FL060 TO FL600 INCLUSIVE

NOT INCLUDED IN NAT HLA*

**Note: Flights transitioning through BOTA and requiring an oceanic clearance FL285 to FL420 inclusive must meet NAT HLA requirements.*

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

Gander Oceanic Transition Area (GOTA)

3.3.14 ~~The GOTA is comprised of airspace from 6530N 060W east to the Reykjavik ACC boundary; south to 6330N 055W; south to OYSTR; north to PRAWN; then MOATT; then north to 61N 063W; along the Montreal ACC boundary north to the Edmonton ACC boundary.~~ Part of the Gander OCA is designated as the Gander Oceanic Transition Area (GOTA):

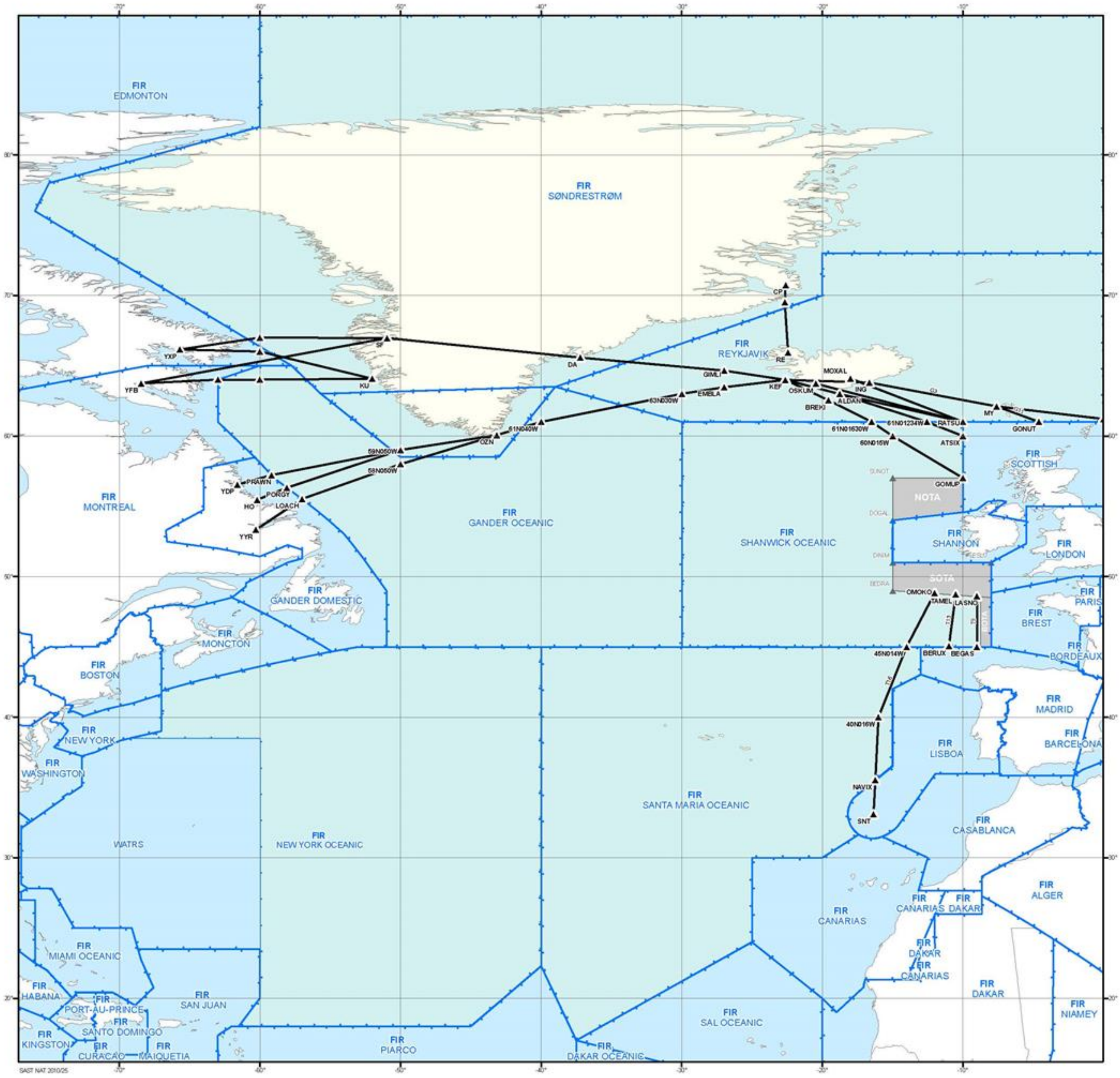
6530N 060W east to the Reykjavik ACC boundary, southeast along the Reykjavik boundary to 6330N 05540W, east to 6330N 055W, southwest to 5352N 05458W, northwest along the Gander boundary to PRAWN, north to MOATT, northwest to 61N 063W, then north along the Montreal ACC boundary to the Edmonton ACC boundary.

FL290 to FL600 inclusive

NAT HLA FL285 to FL420

3.3.15 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).

3.4 FIGURE 3-1 – OTHER ROUTES AND STRUCTURES WITHIN THE NAT HLA



CHAPTER 4

FLIGHT PLANNING

4.1 FLIGHT PLAN REQUIREMENTS

General

4.1.1 ~~The NAT HLA effectively constitutes free route airspace. However, NAT SUPPs (Doc.7030) details some routing constraints which must be adhered to unless otherwise prescribed by the appropriate ATS Authority. These constraints are detailed in NAT Doc.7030 at paragraphs 2.1.9.2 and 2.1.9.3 and may be paraphrased as follows:~~ 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 ~~However, where so prescribed by the appropriate ATS Authority, in areas where surveillance (SSR and/or ADS-B) and VHF voice coverage are available, airspace users may freely plan a route through each relevant FIR between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) waypoints, subject to airspace availability, without reference to the ATS route network, or the foregoing provisions, as fully detailed in the NAT SUPPs (Doc 7030) paragraphs 2.1.9.2 and 2.1.9.3. If intending to benefit from these routing freedoms, operators should carefully consult relevant State AIS.~~ ~~However, if so prescribed by the appropriate ATS Authority, airspace users can plan their user-preferred trajectories where Free Route Airspace (FRA) has been implemented. Operators~~[JV7] ~~should carefully consult relevant State AIPs for details~~[2].

4.1.4 ~~All flights should plan to operate on great circle tracks joining successive significant waypoints.~~ 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 During the hours of validity of the OTS, operators are encouraged to flight plan as follows (keeping in mind equipment requirements for operations on PBCS tracks and within DLM airspace):

- in accordance with the OTS; or
- along a route to join or leave an outer track of the OTS; or
- on a random route to remain clear of the OTS, either laterally or vertically.

4.1.6 ~~Nothing in the paragraph above prevents operators from flight planning through/across the OTS. However they should be aware that whilst ATC will make every effort to clear random traffic across the OTS at published levels, re-routes or significant changes in flight level are likely to be necessary during most of the OTS traffic periods. It must also be noted that aircraft without the equipage necessary for the~~

[2] Secretariat comment: To be reviewed, (NAT SPG/54 Report, para. 5.3.8 refers).

~~Data Link Mandate will not be permitted during the OTS validity period to join or cross those tracks within the mandate, as specified via the daily OTS Track Message Remarks. For such aircraft, however, continuous climb or descent through the specified levels may be available on request, subject to traffic.~~ Nothing in the paragraph above prevents operators from flight planning through/across the OTS. While ATC will make every effort to clear random traffic across the OTS at published levels, re-routes or significant changes in flight level are likely to be necessary during most of the OTS traffic periods.

4.1.7 Outside of the OTS periods, operators flying against the pending OTS may flight plan any random routing, except ~~that during a period of one hour prior to each OTS period~~:

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

should plan to remain clear of the ~~incoming/~~pending OTS structure.

4.1.8 ~~It is essential that care is taken when entering track information into a computer and the information should be cross-checked before it is given to the operating crew.~~

4.1.9 ~~Crews of all NAT flights at or above FL290, even those that will transit the NAT either above the NAT HLA (i.e. above FL420) or through the NAT HLA but are not planned to use the OTS, must be given both the organised track message and relevant amendments to it. Copies must be available on board the aircraft. (N.B. In the event of a contingency or diversion, knowledge of the location of the OTS tracks will be useful to the crew of any NAT high level flight). Should more than one version of the daily Track Message have been issued, then crews should be issued the entire revised version together with an appropriate explanation to relate differences between versions. Each successive version will be identified by the TMI and an alphabetic suffix. e.g. 243A, 243B etc.~~ Flight crews of all NAT flights at or above FL290, 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 points; published track levels; or named points within European routes west. A TMI revision will not be issued for changes to other items such as NARs.

Flight Levels

4.1.10 ~~Within RVSM Airspace improved opportunity exists for step climbs and such opportunities are even more improved from the trial applications of 5 minutes longitudinal separations. (Details of these trials are provided in relevant State AIS and in four ICAO NAT OPS Bulletins, available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT OPS Bulletins".~~ Flight planning in the NAT at FL350 to FL390 inclusive is restricted by the Data Link Mandate. Chapter 1 outlines equipment required to flight plan in the NAT at FL350 to FL390 inclusive as well as any airspace not confined by the DLM.

4.1.11 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: The FLAS is published in the UK and Canadian AIPs and described in Attachment 6.

4.1.12 ~~Operators may include step climbs in the flight plan, although each change of level during flight must be requested from ATC by the pilot. The chance of approval of such requests will, of course, be entirely dependent upon potential traffic conflicts. Outside the OTS there is a good likelihood of achieving the requested profiles. However, within the prime OTS levels at peak times, ATC may not always be able to accommodate requested flight level changes and prudent pre-flight fuel planning should take this into consideration.~~

4.1.13 ~~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 current daily OTS Message. However, with effect from 05 February 2015 Phase 2A of the NAT Data Link Mandate was implemented. From that date all NAT OTS Tracks in the altitude band FL350-390 are subject to the FANS equipage requirement. FANS1/A (or equivalent) equipage and operation will be required to plan and/or fly on **any** OTS Track at **FL350** -FL390, inclusive. The Remarks section of the OTS Message carries such notification.~~ 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 FL350-390 on the PBCS OTS are subject to equipage and authorization requirements as outlined in NAT OPS Bulletin, "Implementation of Performance Based Separation Minima".

4.1.14 ~~Trials of reduced lateral separation of (nominally) 30 NMs (RLatSM) were commenced in December 2015. Two core OTS Tracks are designated and a central ½ Degree spaced Track between them is published. To plan or fly on any of these three Tracks at FL350 – 390 inclusive aircraft must be RNP 4 Approved.~~ Operators may include climbs in the flight plan, although each change of level during flight must be requested from ATC by the flight crew ~~pilot~~. 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.

4.1.15 ~~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. Pilots intending to fly on a random route or 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).~~

4.1.16 ~~Planners should note however that the NAT ATS Provider State AIPs specify some exceptions to use of "Appropriate Direction Levels" both during the OTS time periods and outside them. At specified times, appropriate direction levels are reserved for use by (opposite direction) traffic flows that then predominate. These exceptions may be modified in future to accommodate changes in traffic flows. The current usage allocation of flight levels in the NAT HLA is published in the UK and Canadian AIPs and shown at Attachment 6 as the NAT Flight Level Allocation Scheme (FLAS). Hence, pilots and planners should always consult the current AIPs and any supporting NOTAMs when flight planning random routes through the NAT HLA.~~

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

~~ATC~~ Flight Plans

4.1.18 ~~Correct completion and addressing of the flight plan is extremely important as errors can lead to delays in data processing and to the subsequent issuing of clearances to the flights concerned. Despite the growing use of automated flight planning systems, a significant proportion of ATC 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. The format and contents of the ICAO model flight plan was significantly amended with effect from 15 November 2012. A detailed description of the changes is contained in the document "**Review of Amend 1 to PANS ATM**" available at www.icao.int/EURNAT/, following "Other Meetings Seminars and Workshops", then "Sub-Regional FPL2012 Workshop-Greece".~~

4.1.19 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 ~~an ATS Flight Plan~~ ~~in~~ with respect ~~of~~ to the NAT portion of a flight are contained in Chapter 17 ~~and Attachment 4~~ of this Manual. ~~The Attachment also highlights the more common completion errors that are made.~~

4.1.20 Operators are reminded that they must indicate their aircraft and flight crew capabilities (e.g. RNP, RNAV, RCP240 and RSP180 authorization, RVSM, FANS 1/A data link, ADS- B and NAT HLA approval ~~Approval~~) in the flight plan. Separation criteria ~~It is essential that operators provide this information in flight plans for ATC to apply appropriate separation criteria to the flight and thereby ensure that the full benefits of current capacity~~ and safety improvement initiatives in the NAT region ~~Region~~ are made available to all appropriately equipped flights based on filed flight plan information. This~~. The provision of this information will~~ also supports planning for future initiatives by providing more accurate information regarding the actual capabilities of the fleet operating in the ICAO NAT region ~~Region~~. ~~In order to signify that a flight is approved to operate in the NAT HLA, the letter 'X' shall be inserted 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.~~

> ~~*Note: Since 5 June 2008 the former West Atlantic Route System (WATRS) together with the Atlantic portion of Miami Oceanic Airspace and the San Juan FIR has been designated "WATRS Plus Airspace". Since December 2013 in this airspace, pairs of aircraft with RNP 4 and FANS1/A Approvals may receive clearances by ATC using 30 NMs lateral and 30 NMs longitudinal separation minima; and pairs of aircraft with RNAV 10 (RNP 10) and FANS1/A Approvals may be cleared for 50 NMs longitudinal separation.*~~
>
> ~~*Aircraft approved for RNP 4 operations and operating FANS1/A may plan and fly on the designated RLatSM (25 NM separated) OTS Tracks.*~~
>
> ~~*Also currently 50 Nm lateral separation standard is implemented in the New York Oceanic East and Santa Maria Oceanic FIRs between aircraft meeting RNAV 10 (RNP 10) or RNP 4 specifications.*~~

4.1.21 ~~Hence, in order to benefit from these separation standards any NAT HLA Aircraft intending to fly through these NAT FIRs or through the adjacent WATRS Plus airspace, should ensure that its RNP Approval status is included in the Flight Plan and indicate that it will be operating FANS1/A. Specifically such operators should:~~

~~i) annotate ICAO Flight Plan Item 10 (Equipment) with the letter "R" and~~

~~ii) annotate Item 18 (Other Information) with, as appropriate, "PBN/A1 (for RNAV 10 (RNP 10) Approval) or PBN/L1 (for RNP 4 Approval)".~~

~~iii) annotate Item 10a (Equipment) with the code "J5"~~

~~iv) annotate Item 10b (Equipment) with the code "D1"~~

4.1.22 ~~For turbojet aircraft, the Speeds/Mach Number planned to be used for each portion of the flight in the NAT Region should be specified in Item 15 of the flight plan.~~

~~The proposed speeds should be reflected in the following sequence:~~

~~a) cruising True Airspeed (TAS) prior to oceanic entry;~~

~~b) oceanic entry point and cruising Mach Number;~~

~~c) TAS subsequent to oceanic exit.~~

4.1.23 ~~For non-turbojet aircraft TAS should be specified in Item 15 of the flight plan.~~

4.1.24 ~~For Flights 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.~~

4.2 FLIGHT PLANNING REQUIREMENTS ON SPECIFIC ROUTES

Flight~~s~~ Planning on the Organised Track System

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. ~~, as detailed in the NAT Track Message, should the intended organised track be defined in~~ Item 15 of the flight plan may be defined by using the abbreviation 'NAT' followed by the ~~code~~ 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 ~~N~~number and flight level for the organised track should be specified at either the last domestic reporting point prior to oceanic airspace ~~entry~~ or the organised track commencement point.

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

4.2.5 For flights operating along the whole length of one of the organised tracks, estimates are only required for the commencement point of the track and oceanic ~~Oceanic~~ FIR boundaries.

4.2.6 ~~Phase 2A of the NAT data Link Mandate was implemented 05 February 2015. In this phase all OTS tracks will be designated as DLM airspace at Flight Levels **350** to 390 inclusive. Aircraft/crews which are not DLM compliant are not permitted to plan/fly on, or to join or cross, any OTS track at these levels. For such aircraft, however, continuous climb or descent through the specified levels (FL350-390) may be available, on request, subject to traffic. When a "Split" westbound structure is published, although eastbound flights which are not DLM compliant may flight plan in the airspace between the branches of the Split OTS they should not plan any route which results in a partial back-tracking of a westbound OTS track.~~

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

4.2.7 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.

4.2.8 ~~Except where FRA has been prescribed by the appropriate ATS Authority, and published in the respective State AIP, the following applies~~[JV8][3]:

- 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.

- 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.

- 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.:

  a) at intervals of 10 degrees of longitude (between 5°W and 65°W) for flights operating at or south of 70°N; and

  b) 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.

4.2.9 ~~When the flight time between successive significant points referred to in 4.2.9 is less than 30 minutes, one of these points may be omitted.~~

- For flights operating north of 80°N, the planned tracks shall normally be defined by ~~significant~~ points ~~formed by the~~ 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. ~~(The 30 minute minimum was introduced in the Iceland AIP in 2014).~~

Flights~~s~~ Planning on Random Routes in a Predominantly North - South Direction

~~4.2.10 Except where FRA has been prescribed by the appropriate ATS Authority, and published in the respective State AIP, the following applies~~[JV9]~~:~~[4]

- 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.

- 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. ~~*(N.B.: This 30 minute minimum was introduced in the Iceland AIP in 2014)*.~~

[3] Secretariat Note: To be reviewed, (NAT SPG/54 Report, para. 5.3.8 refers).
[4] Ibidem.

Flights~~s~~ Planning to Enter or Leave the NAT Region via the North American Region

~~4.2.11~~4.2.10 To provide for the safe and efficient management of flights to/from the NAT region ~~Region~~, a transition route system is established in the NAM region ~~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: ~~—~~[MC10]

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.

~~4.2.12~~4.2.11 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. ~~Following a one-to-three-digit number, an~~ An alpha character may follow the one to three digit identifying code indicating an amendment. Together it forms ~~indicates the validation code and forms part of~~ the route identifier. The alpha numeric identifier is ~~Validation codes are~~ associated with ~~to~~ ~~amendments to~~ the common routes only and not ~~to~~ with the non-common route portions.

~~4.2.13~~4.2.12 The use of NARs is~~, however,~~ not compulsory for every oceanic exit point. The East-bound NAT ~~T~~track ~~M~~message includes recommended NARs for ~~access to~~ each track ~~OTS Track~~ which enters oceanic airspace through Canadian domestic airspace. The ~~Since 01 October 2012 the~~ West-bound NAT ~~T~~track ~~M~~message ~~routinely~~ carries the annotation "NAR Nil" for each track ~~OTS 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: West-bound NAR details are ~~still~~ listed in the Canada Flight Supplement and Moncton FIR issues daily NOTAMS showing "recommended NARs". Operators may file them if desired. ~~The only exception is in respect of West-bound OTS Tracks terminating at CARAC, JAROM or RAFIN for which a NAR must be filed. Here operators may file on any one of the destination appropriate NARs published from that relevant coastal fix.~~

~~4.2.14~~4.2.13 Canadian Domestic route schemes and the US East Coast Link Routes are also published. Flights entering the NAM region ~~Region~~ north of 65N must be planned in accordance with the NCA and/or NOROTS as appropriate. 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.

Flights~~s~~ Planning to Operate Without Using HF Communications

~~4.2.15~~4.2.14 ~~The carriage of functioning HF communications is mandatory for flight in the Shanwick OCA, even if the pilot intends using alternative media for regular ATS air-ground contacts.~~ Aircraft with only functioning VHF communications equipment should plan their route according to the information contained in the appropriate State AIPs ~~outside the Shanwick OCA~~ and ensure that they remain within VHF coverage of appropriate ground stations throughout the flight. ~~Theoretical~~ VHF coverage charts are shown in Attachment 5. ~~Such strict routing restriction may not apply in all NAT Oceanic Control Areas.~~ Some may permit the use of ~~SATCOM Voice~~ SATVOICE to substitute for or supplement HF communications. ~~Details of communication requirements by individual NAT ATS Providers are published in State AIPs.~~ However, it must also be recognised that the Safety Regulator of the operator may impose its own operational limitations on ~~SATCOM Voice~~ SATVOICE usage. Any operator intending to fly through the NAT HLA without fully functional HF communications or wishing to use an alternative medium should ensure that it will meet the requirements of its State of Registry and those of all the relevant ATS ~~P~~providers throughout the proposed route.

Flight~~s~~ Planning to Operate with a Single Functioning LRNS

~~4.2.16~~4.2.15 ~~Within the NAT HLA~~ Information on specific routes that ~~only those routes identified with an asterisk in sub-paragraphs (1), (2), (3) and (4) of paragraph~~ ~~**Error! Reference source not found.**~~ may be light 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. ~~Specific State Approval for such NAT HLA operations must, however, be obtained from the State of the Operator or the State of Registry of the aircraft.~~

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

~~4.2.17~~4.2.16 Two routes providing links between Iceland and the ICAO EUR region ~~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 ~~Approval~~ for NAT HLA operations is still required in order to fly along these routes.

CHAPTER 5

OCEANIC ATC CLEARANCES

5.1 GENERAL

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

5.1.2 Oceanic ~~C~~clearances are required for all flights within NAT controlled airspace ~~Airspace~~ (at or above FL60). Flight crews ~~Pilots~~ should request ~~O~~oceanic ~~C~~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~~, although in most cases obtained some time before reaching the Oceanic entry point,~~ are applicable only from that entry point.~~ It is recommended that pilots should request their Oceanic Clearance at least 40 minutes prior to the Oceanic entry point ETA except when entering the Reykjavik area from the Scottish or Stavanger areas, then the clearance should be requested 20 minutes before the Oceanic entry point ETA~~.

5.1.3 ~~To assist the OAC in pre-planning optimum airspace utilisation, when requesting an oceanic clearance the pilot should notify the OAC of the maximum acceptable flight level possible at the boundary, taking into account that a climb to the assigned oceanic flight level must be achieved prior to entering oceanic airspace and normally whilst the aircraft is within radar coverage. The pilot should also notify the OAC of any required change to the oceanic flight planned level, track or Mach Number as early as practicable after departure. If requesting an OTS track, the clearance request should include the next preferred alternative track.~~

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. ~~Various methods of obtaining Oceanic Clearances include:~~

~~a) use of published VHF clearance delivery frequencies;~~

~~b) by HF communications to the OAC through the appropriate aeradio station (in accordance with the timeframes detailed in paragraph 5.1.1 above);~~

~~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 OACs provide such a facility and the relevant operational procedures are published in national AIS and also as NAT OPS Bulletins which are available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", and folder "NAT OPS Bulletins". New York OAC uses the FANS 1/A CPDLC function to uplink oceanic clearances to all aircraft utilising CPDLC.~~

5.1.5 ~~At some airports **situated close to oceanic boundaries or within the NAT Region**, it may be necessary to obtain the Oceanic Clearance before departure. Oceanic Clearances for controlled flights leaving airports **within the region** are issued by the relevant ATS unit prior to departure. These procedures~~

~~are detailed in relevant State AIPs, which should be consulted prior to departure. On the east side of the NAT, this will apply to departures from all Irish airfields, all UK airfields west of 2° 30'W and all French Airfields west of zero degree longitude.~~

(5.1.6) 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~~, which would normally be RVSM, and/or NAT HLA Approved,~~ encounters an in-flight equipment failure relevant to the airspace~~,~~ ~~whilst~~ ~~en-route~~ enroute to the NAT oceanic ~~Oceanic~~ airspace ~~Airspace~~, ~~or is unable to meet the MEL requirements for RVSM or NAT HLA Approval on the flight~~, then the flight crew ~~pilot~~ must advise ATC ~~at initial contact~~ when requesting an ~~O~~oceanic ~~C~~clearance.

5.1.7 ~~After obtaining and reading back the clearance, the pilot~~ 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, ~~the pilot must~~ pass a revised estimate to ATC. As planned longitudinal spacing by these OACCs is based ~~solely~~ 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 ~~Mach Number~~ 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 ~~Pilots~~ should pay particular attention when the issued clearance differs from the flight plan ~~Flight Plan~~. *(N.B. a significant proportion of navigation errors investigated in the NAT involve an aircraft which has followed its flight plan ~~Flight Plan~~ rather than its differing clearance).*

5.1.9 ~~Furthermore it must be recognised that if~~ If the entry point of the oceanic ~~route~~ clearance ~~on which the flight is cleared~~ differs from that originally requested and/or the oceanic flight level differs from the current flight level, the flight crew ~~pilot~~ is responsible for requesting and obtaining the necessary domestic re-clearance to ensure that the flight is in compliance with its ~~O~~oceanic ~~C~~clearance when entering oceanic airspace.

5.1.10 If flight crews ~~pilots~~ have not received their ~~O~~oceanic ~~C~~clearance prior to reaching the ~~Shanwick~~ OCA boundary, they must follow the guidance provided in the appropriate State AIP. ~~contact Domestic ATC and request instructions to enable them to remain clear of Oceanic Airspace whilst awaiting such Clearance. This is not the case for other NAT OCAs into any of which flights may enter whilst pilots are awaiting receipt of a delayed Oceanic Clearance. Pilots should always endeavour to obtain Oceanic Clearance prior to entering these other NAT OCAs; however if any difficulty is encountered the pilot should not hold while awaiting Clearance unless so directed by ATC. In such circumstances, pending receipt of the Oceanic Clearance, the aircraft should continue to maintain the flight level cleared by the current control authority~~.

5.1.11 Unless otherwise stated the ~~O~~oceanic ~~C~~clearance issued to each aircraft is at a specified flight level and cruise Mach ~~N~~number ~~(Exceptions are discussed in Chapter 5 – at section 5.7below~~). Subsequent ~~enroute~~ en route changes to ~~F~~flight level or Mach ~~N~~number should not be made without prior ATC clearance, except in an urgency situation. (e.*g. encountering unanticipated severe turbulence).*

5.1.12 .~~An example of a pilot voice request for Oceanic Clearance is as follows:~~

> ~~*"ACA 865 request Oceanic Clearance. Estimating PIKIL at 1131. Request Mach decimal eight zero, Flight Level three five zero, able Flight Level three six zero, second choice Track Charlie".*~~

~~5.1.13 If the request also includes a change to the original flight plan, affecting the oceanic segment, then it should be according to the following example:~~

~~*"BAW 123 request Oceanic Clearance. Estimating RESNO at 1147. Request Mach decimal eight zero, Flight Level three four zero. Now requesting Track Charlie, able Flight Level three six zero, second choice Track Delta"*~~.

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 ~~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 ~~co-ordinates~~. If any doubt exists as to the TMI or the NAT track coordinates ~~co-ordinates~~, the flight crew should request the complete track coordinates ~~co-ordinates~~. Similarly, if the flight crew cannot correctly state the TMI, confirmation will include NAT track coordinates ~~co-ordinates~~ in full and a full read back of those coordinates ~~co-ordinates~~ will be required.

5.2.2 ~~When an abbreviated clearance is issued it includes:~~

~~a) clearance Limit, which will normally be destination airfield;~~

~~b) cleared track specified as "Track" plus code letter;~~

~~c) cleared flight level(s); and~~

~~d) cleared Mach Number (if required); and~~

~~A typical example of such a clearance is as follows:~~

~~*"ACA865 is cleared to Toronto via Track Bravo, from PIKIL maintain Flight Level three five zero, Mach decimal eight zero".*~~

5.2.3 ~~Procedures exist for an abbreviated read back of an Oceanic Clearance. The flight crew will confirm that they are in possession of the current NAT Track message by using the TMI number (including any appropriate alpha suffix) in the read-back of the Oceanic Clearance, as follows:~~

~~*"ACA865 is cleared to Toronto via Track Bravo **283A**, from PIKIL maintain Flight Level three five zero, Mach decimal eight zero".*~~

5.2.4 ~~If the TMI number is included in the read-back, there is no requirement for the pilot to read back the NAT Track co-ordinates even if the cleared NAT Track is not the one which was originally requested. If any doubt exists as to the TMI (see paragraph 2.3.3 for fuller explanation of this term) or the NAT Track co-ordinates, the pilot should request the complete track co-ordinates from the OAC. Similarly, if the pilot cannot correctly state the TMI, the OAC will read the cleared NAT Track co-ordinates in full and request a full read back of those co-ordinates.~~

5.2.5 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. ~~For aircraft cleared by Shanwick OAC on random routings in the NAT Region the present procedure of reading the full track co-ordinates as part of the Oceanic Clearance or the term "via flight planned route" may be used. and requesting from the pilot a full read back of the co-ordinates is expected to continue. Gander and Reykjavik OACs may, however, issue clearances for random routings which specify "via flight plan route". Nevertheless, in all circumstances regarding random route clearances, In either case, pilots are required to read back **the full track co-ordinates** of the flight plan route, from the oceanic entry point to the exit point.~~

5.2.6 ~~In 2011/2012 the NAT SPG developed documentation to provide examples of standard phraseology used in the ICAO NAT Region This effort was undertaken to promote standardization of air traffic services practices and to address safety risks associated with incorrect understanding of, and reactions~~

~~to, the typical clearances issued to flights operating in the North Atlantic airspace. The resulting material is included at Attachment 7. It provides examples and accompanying explanations for a variety of clearances and instructions which could be provided in the course of normal operations in the ICAO NAT Region. The examples include both voice and data link messages adhering to the ED/106 standard, which is used to provide oceanic clearances via data link from the Gander, Prestwick, Reykjavik and Santa Maria oceanic area control centres. The examples include voice messages as they would be delivered via aeradio, clearance delivery or directly by the air traffic controller. Operators and pilots, particularly those new to NAT operations, are encouraged to study the material closely.~~ Attachment 7 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 ~~Oceanic~~ airspace via RATSU (61°N 010°W) should not call Shanwick for an ~~O~~oceanic ~~C~~clearance. The required ~~O~~oceanic ~~C~~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 ~~O~~oceanic ~~C~~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 CLEARANCES FOR FLIGHTS INTENDING TO OPERATE WITHIN THE NAT REGION AND SUBSEQUENTLY ENTER THE NAM REGIONS~~

5.4.1 ~~As indicated in Chapters 3 and 4 of this Manual, to provide for the safe and efficient management of flights to/from the NAT Region, transition route systems/schemes are established in the NAM Region. These schemes detail particular domestic routings associated with each landfall point. Flights in this category must be planned in accordance with these schemes. Should a pilot of a flight in this category receive a clearance on a route other than originally flight planned, special caution should be exercised to ensure that the co-ordinates of the assigned route and of the associated landfall **and** subsequent domestic routings are fully understood and correctly inserted into the automated navigation systems. Appropriate cross checks should be carried out. In all cases when an enroute re-clearance is requested, the pilot should ensure that the revised ATC clearance includes the new routing from the oceanic exit point to the first landfall point or coastal fix. If at the time of being given a clearance or re-clearance, the pilot has any doubt concerning the subsequent domestic routing, details should be checked with the ATC unit issuing the clearance/re-clearance.~~

~~5.5 OCEANIC CLEARANCES FOR RANDOM FLIGHTS INTENDING TO OPERATE WITHIN THE NAT REGION AND SUBSEQUENTLY ENTER REGIONS OTHER THAN NAM OR EUR~~

5.5.1 ~~Oceanic Clearances issued to flights in this category are similar to domestic ATC clearances in that clearances are to destination on the assumption that co-ordination will be effected ahead of the aircraft's passage. In this case, if necessary, the flight profile may be changed en-route, prior to hand-over from one centre to another, subject to traffic conditions in the adjacent area.~~

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

5.6.1 ~~In February 2013, New York Center changed the way in which Oceanic Clearances are delivered to aircraft that enter the NAT via the New York Oceanic East FIR.~~

5.6.2 ~~There are three elements to an Oceanic Clearance; Complete Route, Flight and Mach number. These elements do not have to be issued in the same clearance. Additionally, these elements may not be issued by the same ATS Provider. For example, the Route portion may be issued by one ATC Unit, the Oceanic Altitude issued by another and finally the Mach Number by a third. The receipt of all three elements, even if not received at the same time, constitutes receipt of an Oceanic Clearance and no further request for one is necessary. The detail of the procedures followed may differ depending on the ICAO region from which the flight originates.~~

5.6.3 For flights ~~aircraft~~ planning to enter the NAT directly from ~~via~~ the New York Oceanic East FIR ~~from the NAM Region or the New York Oceanic West FIR~~, the IFR clearance to destination received at the departure aerodrome ~~from Air Traffic Control~~ constitutes the route ~~Route~~ portion of the oceanic clearance ~~Oceanic Clearance~~. Once airborne, and prior to entry into the NAT, aircraft will be assigned ~~Mach number~~ ~~and~~ an ~~A~~altitude and a speed (if required) by ~~the FAA~~ New York Center. 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.

~~Note: For the purpose of this procedure," complete route" is defined as any route clearance with a clearance limit of the aircraft's destination.~~

5.6.4 ~~Example one: on a flight from Santo Domingo (MDSD) to Madrid (LEMD), Santo Domingo ACC issues a clearance with a complete route; later, San Juan Center issues the aircraft a clearance to its requested altitude and Mach number. At this point, all three required elements (route, Mach number and flight level) have been received and the flight has an 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.

5.6.5 ~~Example two: on a flight from New York (KJFK) to Madrid (LEMD), Kennedy Clearance Delivery up-links a clearance via Pre-Departure Clearance (PDC) with a complete route and altitude; later, New York Center assigns the aircraft a Mach number. At this point, all three required elements (route, Mach number and flight level) have been received and the flight has an Oceanic Clearance. A subsequent change to any element(s) of the Oceanic Clearance does not alter the others~~.

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 Center confirms requested speed and issues clearance. All three elements of an oceanic clearance have been received.

5.6.6

5.6.7 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

5.6.8 ~~The only exception to this procedure is for aircraft entering from the Piarco CTA and thence through the southern (non-NAT HLA) portion of the New York East FIR. For these flights, Piarco ACC will issue all three elements of the Oceanic Clearance prior to entry into the New York East FIR Oceanic CTA.~~ Flights entering the southern portion of New York East FIR from Piarco CTA will be issued all three components of the oceanic clearances prior to entering New York OCA.

5.6.9 In cases where aircraft have been cleared via a ~~North Atlantic Organized Track (~~NAT track ~~OTS)~~, the ~~Track Message Identification (~~TMI~~)~~ number will be confirmed prior to reaching the NAT track ~~OTS~~ entry fix.

5.6.10 ~~If any difficulty is encountered obtaining the elements of the Oceanic Clearance, the pilot should not hold while awaiting a Clearance unless so instructed by ATC. The pilot should proceed on the cleared route into the NAT HLA and continue to request the Clearance elements needed.~~

5.7 CLEARANCES INCLUDING VARIABLE FLIGHT LEVEL

5.7.1 Clearances which include ~~V~~variable ~~F~~flight ~~L~~level may ~~on occasions~~ be requested and granted, traffic permitting. Clearance requests for a variable flight level may be made by voice or CPDLC. ~~Clearances requests which include a variable Flight Level may be made by voice or using CPDLC. The trials and results leading to the inclusion of these facilities in NAT operations are referenced in this document in paragraph 1.10.15~~.

5.7.1 Within [MC11]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~~, however, does not always seem to be fully understood~~ 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.**

Note: *ICAO defines cruise climb as follows:* "*An aeroplane cruising technique resulting in a net increase in altitude as the aeroplane mass decreases*".

5.7.2 ~~ICAO defines cruise climb as follows: "*An aeroplane cruising technique resulting in a net increase in altitude as the aeroplane mass decreases*". As far as is known, no current aircraft have the capability to automatically conduct a cruise climb. Cruise climb can however be approximated by the pilot instructing the aircraft to climb in small incremental steps (for example 100 or 200 feet at a time) as the weight of the aircraft decreases and the optimum flight level increases.~~

5.7.3 ~~PANS-ATM section 5.3.4.1 specifies the following:~~

~~*5.3.4.1 An aircraft may be cleared to a level previously occupied by another aircraft after the latter has reported vacating it, except when:*~~

~~..........~~

~~*b) the higher aircraft is effecting a cruise climb;*~~

~~..........~~

~~*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.*~~

5.7.4 ~~Accordingly, when an aircraft is executing a cruise climb and reports at a specific level, the controller will release the airspace that is more than 1000 feet (in RVSM airspace) below the aircraft and may assign that airspace to another aircraft. The flight level report may be received by ATC in a position report delivered by the pilot, by radar or ADS-B information or in an ADS-C periodic or event report. If the aircraft is within ATS surveillance airspace or is using ADS-C the pilot must be aware that ATC is periodically being informed about the aircraft level and the controller will adjust the aircraft's protected airspace accordingly.~~

5.7.5 ~~It is therefore imperative that aircraft conducting a cruise climb **do not under any circumstances descend**. A cruise climbing aircraft may only climb or maintain a level.~~

5.7.6 ~~By contrast, when an aircraft is cleared into a block of flight levels the pilot may operate anywhere within the block of levels and may climb and/or descend within the block as desired. ATC will not release the protection of the block of flight levels, regardless of flight level reports from the aircraft, until the block clearance is cancelled.~~

~~***CPDLC message elements for cruise climb***~~

5.7.7 ~~Pilots may request a cruise climb clearance by using the following message element:~~

~~DM 8: REQUEST CRUISE CLIMB TO [level]~~

5.7.8 ~~The controller will issue a cruise climb clearance using the following message element:~~

~~UM 34: CRUISE CLIMB TO [level]~~

~~CPDLC message elements for block of flight levels~~

5.7.9 ~~Pilots may request a clearance to operate within a block of flight levels by using the following message element:~~

~~DM 7: REQUEST BLOCK [level] TO [level]~~

5.7.10 ~~The controller will issue a clearance to operate within a block of flight levels using one of the following message elements:~~

~~UM 30: MAINTAIN BLOCK [level] TO [level]~~

~~UM 31: CLIMB TO AND MAINTAIN BLOCK [level] TO [level]~~

~~UM 32: DESCEND TO AND MAINTAIN BLOCK [level] TO [level]~~

5.7.11 ~~When a pilot desires to operate with a “flexible” vertical profile the following should be kept in mind when making the request to ATC:~~

- ✓ ~~Request a cruise climb when the desire is to gradually climb as the aircraft weight decreases and the optimum flight level increases.~~

- ✓ ~~Request a block of flight levels when there is a requirement to vary the aircrafts altitude up or down for instance due to factors such as turbulence or icing.~~

Note: ~~Requesting a block of flight levels when the intention is to only climb results in an inefficient use of airspace and may deny other aircraft to receive economic flight profiles.~~

5.7.11 A block of flight levels 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, or when the aircraft’s altitude varies up or down due to factors such as turbulence or icing. Consideration should be given to:

- The limitation of aircraft conducting a cruise climb not being able to descend under any circumstances may not always be feasible;
- ATC will still make the most efficient use of airspace with the block of levels by adjusting the clearance as levels are cleared; and
- Unlike cruise climbs, ATC might be able to coordinate with adjacent units the block of levels profile via AIDC (ATC Interfacility Data Communication).

~~CRUISE CLIMB VS. BLOCK OF FLIGHT LEVELS~~
~~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.~~

5.8 ERRORS ASSOCIATED WITH OCEANIC CLEARANCES

5.8.1 ~~Navigation e~~Errors associated with ~~O~~oceanic ~~C~~clearances fall into several categories of which the most significant are ATC System Loop errors and Waypoint Insertion errors.

~~ATC System Loop~~Communication Errors

5.8.2 ~~An ATC system loop~~ A communication error is any error caused by a misunderstanding between the flight crew ~~pilot~~ and the controller regarding the assigned flight level, speed, ~~Mach Number~~ or route to be followed. Such errors can arise from: incorrect interpretation of the NAT ~~T~~track ~~M~~message by dispatchers; errors in coordination between OACCs; or misinterpretation by flight crews ~~pilots~~ of ~~O~~oceanic ~~C~~clearances or re-clearances. Errors of this nature, which are detected by ATC from flight crew ~~pilot~~ 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 ~~SATCOM Voice~~ SATVOICE communications.

Waypoint Insertion Errors

5.8.3 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 ~~ATC~~ cleared route;
- failure to load waypoint information ~~carefully~~ correctly; or
- failure to cross-check on-board navigation systems.

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

5.8.5 More detailed guidance on this subject is contained in Chapter 8 and Chapter 15.

CHAPTER 6

COMMUNICATIONS AND POSITION REPORTING PROCEDURES

6.1 ATS COMMUNICATIONS

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

6.1.2 There are six radio stations in the NAT: ~~In the North Atlantic Region there are six aeronautical radio stations, one associated with each of the Oceanic Control Areas. They are:~~ Bodø Radio (Norway~~, Bodø ACC~~), Gander Radio (Canada~~, Gander OACC~~), Iceland Radio (Iceland~~, Reykjavik ACC~~), New York Radio (USA~~, New York OACC~~), Santa Maria Radio (Portugal~~, Santa Maria OACC~~) and Shanwick Radio (Ireland~~, Shanwick OACC~~). ~~However, the aeradio stations and OACs are not necessarily co-located. For example, in the case of Shanwick operations, the OAC is located at Prestwick in Scotland whilst the associated aeradio station is at Ballygirreen in the Republic of Ireland. In addition to those six aeronautical stations, there are two other stations that operate NAT frequencies. They are Canarias Radio which serves Canarias ACC and Arctic Radio serving Edmonton, Winnipeg and Montreal ACC's.~~

HF Voice Communications

6.1.3 Even with the growing use of data link ~~datalink~~ 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 ~~Region~~, twenty-four HF frequencies have been allocated, in bands ranging from 2.8 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.

6.1.4 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 ~~7~~ 6 MHz are utilised at night and frequencies of greater than ~~8~~ 5 MHz during the day.

6.1.5 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 ~~F~~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 ~~ae~~radio station is contained in the **"HF Management Guidance Material for the North ~~Atalntic~~ Atlantic Region"** (NAT Doc 003) ~~(Appendices B – 1 thru 6)~~, available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT Doc 003".

6.1.6 Each individual flight ~~aircraft is normally~~ may be allocated a primary and a secondary HF frequency~~, either when it receives its clearance or by domestic controllers shortly~~ before the oceanic boundary.

6.1.7 ~~When initiating contact with an aeradio station the pilot should state the HF frequency in use. HF~~ Radio operators usually maintain a listening 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. ~~Identification by the calling pilot of the particular frequency being used is helpful to the radio operator.~~

SELCAL

6.1.8 When using HF, SATVOICE, or CPDLC, ~~communications~~ **~~and even when using ADS-C and/or CPDLC~~**~~,~~ flight crews ~~pilots~~ should maintain a listening watch on the assigned frequency, unless SELCAL equipped ~~is fitted~~, 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 refiling of the flight plan or submitting a modification message (CHG) which includes ~~passing~~ the new registration and SELCAL ~~information to the OAC~~);

b) check the operation of the SELCAL equipment, at or prior to entry into oceanic ~~Oceanic~~ airspace, with the appropriate ~~ae~~radio station. (This SELCAL check must be completed prior to commencing SELCAL watch); and

c) maintain thereafter a SELCAL watch.

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

6.1.10 Flight management staff and flight crews of aircraft equipped with ~~12-tone~~ SELCAL equipment should be made aware that SELCAL code assignment is predicated on the usual geographical area of operation of th~~ate~~ 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.

6.1.11 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. ~~In the latter instance, if 12-tone equipment is involved, the Registrar should be consulted when there is any question as to the likely geographical area of operation and the possibility of code duplication.~~

6.1.12 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/.

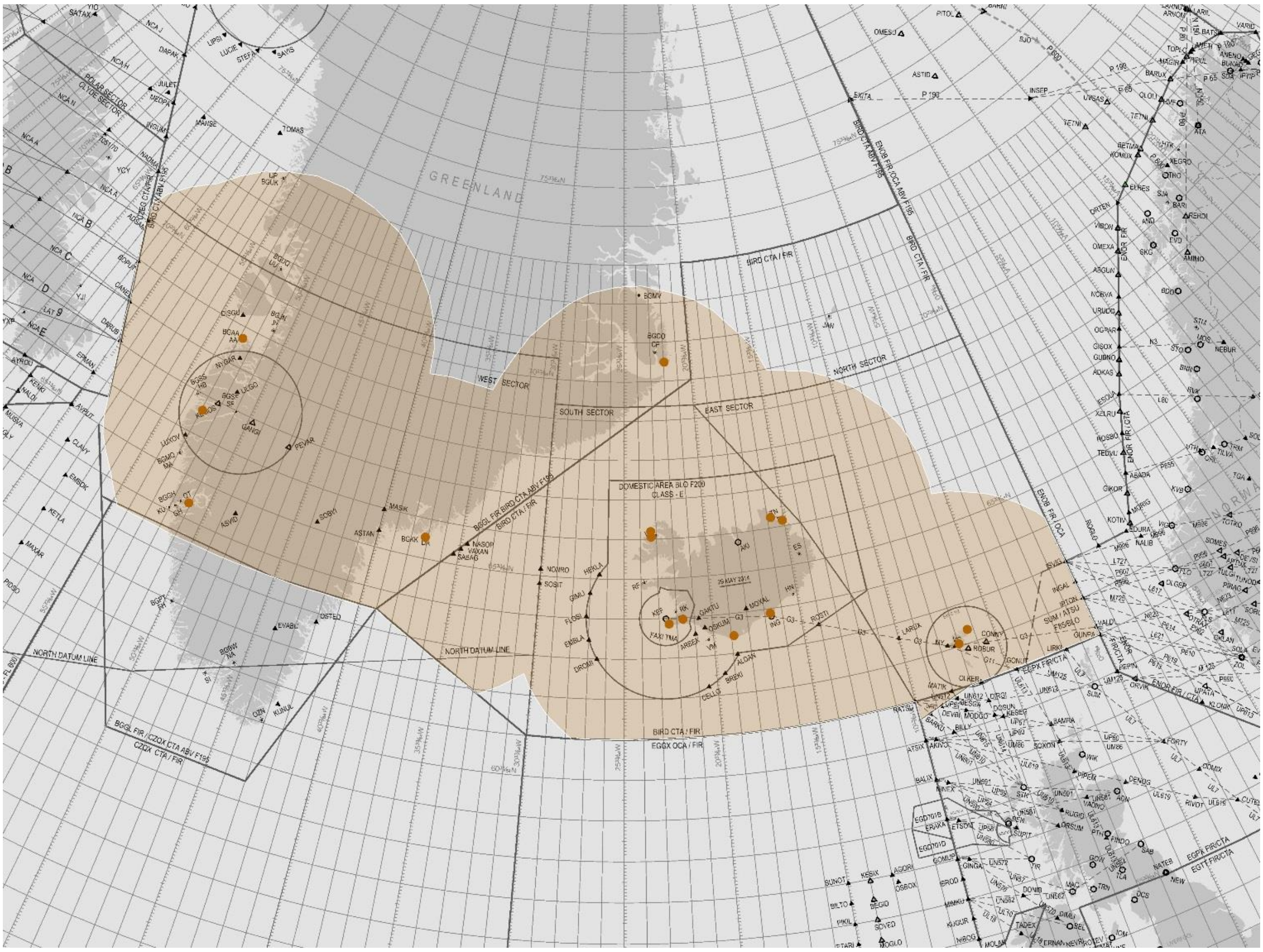
VHF Voice Communications

6.1.13 ~~Aeradio~~ 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 OACCs. 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 ~~remotely controlled from~~ Gander ~~Aeradio~~ Radio ~~station~~, and at Kangerlussuaq (Nuuk)~~Qaqatoqaq~~, Kulusuk, several locations in Iceland and the Faroes, via Iceland Radio. Theoretical VHF coverage charts are shown at Attachment 5. ~~When using GP/VHF frequencies in areas of fringe coverage however, care should be taken to maintain a SELCAL watch on HF thus ensuring that if VHF contact is lost the aeradio station is still able to contact the aircraft.~~ It is important for the flight crew ~~pilot~~ to appreciate that when using GP/VHF, as with HF and ~~SATCOM Voice~~ SATVOICE, these communications are with a~~n ae~~radio station and the flight crew ~~pilot~~ is not in direct contact with ATC. However, contact between the flight crew and ATC ~~Direct Controller/Pilot Communications (DCPC)~~ can be arranged, if necessary, via patch-through on HF or ~~some~~ GP/VHF frequencies by Iceland Radio and Shanwick Radio.

6.1.14 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 the map below. Those stations are used to provide tactical procedural control and ATS ~~s~~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 ~~pilot~~ is communicating directly with an air traffic controller. The callsign of Iceland radio is *"Iceland radio"* ~~or just *"Iceland"*~~ and indicates that the flight crew ~~pilot~~ is communicating with a radio operator who is relaying messages between the flight crew ~~pilot~~ and the appropriate control facility.

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

Figure 6-1



6.1.15 Gander OACC operates a number of VHF remote outlets in the southern part of Greenland and in the adjacent eastern seaboard of Canada, providing DCPC service for ADS-B operations in those parts of its airspace. For details of this ADS-B service, participation requirements and coverage charts, operators should consult the Canadian AIP ~~AIS~~. A brief description of the service is provided in Chapter 10 of this document.

6.1.16 The carriage of HF communications equipment is mandatory for flight in the Shanwick OCA. Aircraft with only functioning VHF communications equipment should plan their route outside the Shanwick OCA and ensure that they remain within VHF coverage of appropriate ground stations throughout the flight. Details of communication requirements are published in State AIPs and ICAO publications.

~~SATCOM Voice~~ SATVOICE Communication

6.1.17 ~~In 2011 following successful trials, it was agreed that~~ The Aeronautical Mobile Satellite (Route) Service (AMS(R)S), more commonly referred to as SATCOM Voice SATVOICE, can be used as a supplement to HF & CPDLC communications throughout the NAT region ~~Region~~ for any routine, non-routine or emergency ATS air/ground communications. NAT ATS ~~P~~provider State AIPs contain the necessary telephone numbers and/or short-codes for air-initiated call access to ~~ae~~radio stations and/or direct to OACCs. Since oceanic traffic typically communicates with ATC through ~~ae~~radio facilities, routine ~~SATCOM Voice~~ SATVOICE calls should be made to such a facility rather than the ATC Centre. Only when the urgency of the communication dictates otherwise should ~~SATCOM Voice~~ SATVOICE calls be made to the ATC Centre. ~~SATCOM voice~~ 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 (ICAO Doc 10038).

6.1.18 The provisions governing the use of ~~SATCOM Voice~~ SATVOICE for ATS communications in the NAT region ~~Region~~ are contained in ~~ICAO NAT SUPPS (~~Doc.7030~~/5)~~ ~~Section 3.4~~. These provisions include that even when using ~~SATCOM~~ SATVOICE, ~~pilots~~ flight crews must simultaneously operate SELCAL or maintain a listening watch on the assigned HF/VHF frequency.

6.1.19 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 ~~SATCOM~~ SATVOICE as redundancy for HF equipage. However, in other instances MMEL remarks for HF systems do provide relief for ~~SATCOM Voice~~ SATVOICE equipped aircraft, thereby making the requirement for the carriage of fully serviceable/redundant HF communications equipment less of an issue (See also Section 6.6 ~~below~~ regarding the use of SATVOICE in the event of "HF Communications Failure").

6.1.20 ~~In 2012 the ICAO Planning and Implementation Groups for the Asia/Pacific and North Atlantic Regions (APANPIRG & NAT SPG) jointly approved a document, "**Satellite Voice Guidance Material (SVGM)**". This document provides a comprehensive update of various regional and State guidance material for ANSPs and aircraft operators to use SATVOICE for ATS communications. The document is available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "SATVOICE Guidance Material (SVGM)".~~

Data Link Communications

6.1.21 Data link communications ~~are~~ have been gradually ~~being~~ introduced into the NAT ~~environment~~ for position reporting (via ~~FANS 1/A~~ ADS-C & CPDLC) and ~~for other~~ air/ground ATS~~S~~C communications ~~exchanges (~~using FANS 1/A CPDLC~~)~~. ~~NAT Region specific guidance may be published in when deemed necessary by the NAT SPG. and the operational~~ Operational procedures ~~to be used~~ are specified in ~~the~~ ICAO Doc 10037, "Global Operational Data Link ~~Document~~ (GOLD) Manual"~~., both of which can be downloaded from www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents"~~. AIS publications of the NAT ATS Pprovider States should be consulted to determine the extent of current implementation in each of the North Atlantic OCAs.

6.1.22 ~~On first contact with the initial aeradio stations crews of participating aircraft should expect to receive the instruction "VOICE POSITION REPORTS NOT REQUIRED"~~. 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.

6.1.23 Similar to ~~SATCOM Voice~~ SATVOICE usage, flight crews ~~Pilots~~ electing to use Data link communications for regular ATS communications in the ICAO NAT region ~~Region~~ remain responsible for operating SELCAL (including completion of a SELCAL Check), or maintaining a listening watch on the assigned HF frequency outside VHF coverage.

6.1.24 Flights equipped with ~~FANS~~ CPDLC and /or ADS-C should ensure that the data link system is logged on to the appropriate OACC ~~control area~~ ~~when operating within the NAT south of 80 North~~. This applies even when the aircraft is provided with ATS ~~s~~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 ~~pilot~~ is maintaining a listening watch on the assigned DCPC VHF frequency. ADS-C furthermore enables ATC to perform route conformance monitoring for downstream waypoints.

6.1.25 ~~Phase 2A of the NAT Data Link Mandate was implemented 05 February 2015. In this phase the NAT DLM airspace was expanded to include all OTS tracks at FLs **350** to 390, inclusive. Only aircraft with functioning CPDLC and ADS-C may plan and/or fly in the height band FL350-390 inclusive on any OTS Track.~~

6.1.26 ~~If a flight experiences an equipment failure AFTER departure which renders the aircraft non-DLM compliant, requests to operate in the NAT Region Data Link Airspace will be considered on a tactical basis. Such flights must indicate their non-DLM status prior to entering the airspace. If the failure occurs while the flight is in NAT Region Data Link Mandate 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.~~

6.1.27 ~~If a flight experiences an equipment failure PRIOR to departure which renders the aircraft non-DLM compliant, the flight should not flight plan to enter the NAT Regional DLM Airspace.~~

6.2 INTER-PILOT AIR-TO-AIR VHF FACILITY 123.450 MHZ AND EMERGENCY FREQUENCY 121.5 MHZ

6.2.1 The frequency 121.5 MHz should be continuously monitored by all aircraft operating in the NAT region ~~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 ~~pilots~~ 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 121.5 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 121.5 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 ~~Air Traffic Control~~ ATC, position reports from flights on routes which are not defined by designated reporting points should be made at the significant points listed in the flight plan.

6.3.2 ~~Air Traffic Control~~ ATC may require any flight to report its position at any intermediate waypoints ~~operating in a North/South direction to report its position at any intermediate parallel of latitude~~ 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 ~~Pilots~~ 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 where FRA has been prescribed by the appropriate ATS authority, F~~[JV12][5]for 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 ~~(as per examples below)~~.

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 ~~pilot~~ 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

6.3.9 Standard air/ground message types and formats are used within the NAT region ~~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 ~~pilots~~ should observe the following rules:

[5] Secretariat Note: To be reviewed, (NAT SPG/54 Report, para. 5.3.8 refers).

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**.

6.3.10 The message types are shown below with examples:

~~POSITION~~

~~Example: *"Position, Swissair 100, on 8831, RESNO at 1235, Flight Level 330 Estimating 56 North 020 West at 1310, 56 North 030 West Next"*~~

~~REQUEST CLEARANCE~~

~~Example: *"Request Clearance, American 123, on 8831, 56 North 020 West at 1308, Flight Level 330, Estimating 56 North 030 West at 1340, 56 North 040 West Next. Request Flight Level 350"*~~

~~or if a position report is not required~~

~~*"Request Clearance, Speedbird 212 on 3476, Request Flight Level 370"*~~

~~REVISED ESTIMATE~~

~~Example: *"Revised Estimate, Speedbird 212 on 3476, 57 North 040 West at 0305"*~~

~~MISCELLANEOUS~~

~~Plain language – free format~~

POSITION

Pilot: *"Shanwick Radio, Swissair 100, Position on 8831"*

Radio operator: *"Swissair 100, Shanwick Radio"*

Pilot: *"Shanwick Radio, Swissair 100, 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

~~***Addressing of Position Reports***~~

6.3.11 ~~Position reports for aircraft operating on tracks through successive points on the mutual boundary of two OCAs (e.g. when routing along the 45ºN parallel), should be made to both relevant OACs. (In practice this only requires an addition to the address. (e.g. "Shanwick copy Santa Maria".)~~

6.4 "WHEN ABLE HIGHER" (WAH) REPORTS

6.4.1 Prior advice to ATC of the time or position that a flight will be able to accept the next higher level can assist ATC in ensuring optimal usage of available altitudes. A WAH ~~R~~report must be provided by all flights entering the NAT HLA portion of the New York OCA and entering the Santa Maria OCA. Due to the higher number of ~~step~~ climb requests on the generally longer NAT route segments that transit New York and Santa Maria OCAs and also because of the greater frequency of crossing traffic situations here, the strategy of issuing "coast-out to coast-in" conflict-free clearances is not employed by these two oceanic control centres. Here, air traffic control of a more tactical nature is exercised. The provision of WAH ~~R~~reports in these circumstances allows the controllers to more effectively utilise their airspace and provide aircraft more fuel efficient profiles. Provision of WAH ~~R~~reports on entering other NAT OCAs is optional or they may be requested by any OACC.

6.4.2 When required or when otherwise provided, upon entering an oceanic FIR, flight crews ~~pilots~~ should include in the initial position report the time or location that the flight will be able to accept the next higher altitude. The report may include more than one altitude if that information is available.

Example: *"Global Air 543, 40 North 040 West at 1010, Flight Level 350,*
Estimating 40 North 050 West at 1110, 40 North 060 West Next.
Able Flight Level 360 at 1035, Able Flight Level 370 at 1145,
Able Flight Level 390 at 1300"

6.4.3 Information thus provided of the aircraft's future altitude "ability" will not automatically be interpreted by ATC as an advance "request" for a ~~step~~ climb. It will be used as previously indicated to assist ATC in planning airspace utilisation. However, should the flight crew ~~pilot~~ wish to register a request for one or more future ~~step~~ climbs, this may be incorporated in the WAH report by appropriately substituting the word "Request" for the word "Able".

Example: *"Global Air 543, 42 North 040 West at 1215, Flight Level 330,*
Estimating 40 North 050 West at 1310, 38 North 060 West Next.
Request Flight Level 340 at 1235, Able Flight Level 350 at 1325,
Request Flight Level 360 at 1415"

6.4.4 Although optimal use of the WAH reports is in conjunction with a Position Report, a WAH report can be made or updated separately at any time.

Example: "*Global Air 543, Able Flight Level 360 at 1035, Request Flight Level*
370 at 1145, Able Flight Level 390 at 1300"

6.4.5 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 ~~Amendment 75 to~~ ICAO Annex 3 - *Meteorological Service for International Air Navigation*, ~~with effect from 18 November 2010~~ 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 event contract with an aircraft to provide ADS–C position reports, it may also establish an additional periodic report contract (e.g. with a 30 mins interval). Such ADS–C periodic reports, unlike event reports, contain wind and temperature data and thereby 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 ~~pilot~~ 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 ~~co-ordinates~~.

6.5.3 *VOLMET Services*

This is a 24 hour, 365 day-a-year 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 ICAO DOC 003 HF Guidance Material for broadcast information.

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 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 ~~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.

6.6.3 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 ~~SATCOM Voice~~ SATVOICE for regular air-ground ATS communications in the NAT region ~~Region~~, all flight crews ~~pilots~~ 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 ~~pilots~~ should still exercise appropriate caution when HF blackout conditions are encountered.**

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

General Provisions

1. The flight crew ~~pilot~~ 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 should use ~~Satellite Voice Communications~~ SATVOICE to contact the responsible ~~ae~~radio station via special telephone numbers/short codes published in State AIPs (see also NAT Doc 003, "~~HF~~ High Frequency Management Guidance Material for the NAT 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 ~~SATCOM Voice~~ SATVOICE then the flight crew ~~pilot~~ 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 121.5 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 ~~R~~region, flight crews ~~pilots~~ 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.

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

6.6.6 Use ~~SATCOM Voice~~ SATVOICE communications, if so equipped. (See General Provisions 2. above).

6.6.7 If not ~~SATCOM Voice~~ SATVOICE equipped try VHF relay via another aircraft (See 6.6.5 ~~General Provisions 3. & 4 above~~).

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 ~~SATCOM Voice~~ SATVOICE communications are unaffected by most ionospheric disturbances. Therefore, when so equipped, an aircraft may use ~~SATCOM Voice~~ SATVOICE for ATC communications (See 6.6.5 ~~General Provisions 2 above~~).

6.6.10 If not ~~SATCOM Voice~~ SATVOICE equipped, in some circumstances it may be feasible to seek the assistance, via VHF, of a nearby ~~SATCOM Voice~~ SATVOICE equipped aircraft to relay communications with ATC (See 6.6.5~~, General Provisions 3. & 4. above~~).

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 ~~pilots~~ then broadcast their position reports on the air-to-air VHF frequency 123.450 MHz. Given the density of traffic in the NAT region ~~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 ~~SATCOM Voice~~ SATVOICE contact also broadcast their position reports.

6.6.12 If for whatever reason ~~SATCOM Voice~~ 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 ~~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 ~~ae~~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 ~~pilots~~ should first try using alternative HF frequencies to contact the intended ~~ae~~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 ~~ae~~radio station, thus rendering communications with that station impossible on any HF frequency. But the ~~ae~~radio stations providing air-ground services in the NAT region ~~Region~~ do co-operate as a network and it may, even then, still be possible to communicate with another ~~ae~~radio station in the NAT network on HF and request that they relay communications. Efforts should therefore be made to contact other NAT ~~ae~~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 ~~ae~~radio station within the NAT region ~~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 ~~Region~~, unique operational procedures have been established ~~here~~ to be followed by flight crews ~~pilots~~ whenever communications are lost with ATC. ~~These procedures and the rationale for their development follow.~~ 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.

~~*Tactical ATC Environment*~~

6.6.17 ~~In a tactical ATC environment,, such as one in which ATS Surveillance and VHF voice communications are used, ATC has continuous real-time data on the position/progress of all relevant traffic and the intentions of any individual aircraft with which ATC may have lost communications can be inferred from that aircraft's filed flight plan. Hence, in such an environment, when voice communications with a single aircraft fail, the relevant published "lost comms procedures" normally require that aircraft to "land at a suitable aerodrome or continue the flight and adjust level and speed in accordance with the filed flight plan". Communications blackouts affecting multiple aircraft, are not a feature of this type of VHF environment and hence in these circumstances, if required, ATC will be able to re-clear other traffic to ensure safe separations are maintained.~~

~~*Procedural ATC Environment*~~

6.6.18 ~~However, in a (largely) non-ATS surveillance environment such as the North Atlantic, ATC must rely significantly upon the HF Voice Position Reports communicated by each aircraft for position, progress and intent data. Communications equipment failures and/or poor propagation conditions can interrupt the provision of this information. Therefore, to mitigate against such occurrences in the busy NAT HLA, outside of VHF coverage, ATC often employs strategic traffic planning and issues Oceanic Clearances which have been pre-co-ordinated with downstream OACs. Flights that continue to follow such a pre-coordinated strategic oceanic clearance are thereby guaranteed conflict-free progress to oceanic exit, even if no ATS communications are subsequently possible with any one, or even with all, of those strategically planned aircraft.~~

6.6.19 ~~Every effort is made by the initial NAT OAC to clear aircraft as per their filed flight plans. However, this is not always possible, particularly during peak traffic flow periods. Aircraft may receive clearances at flight levels or speeds other than those flight planned or, less frequently, may be cleared on oceanic tracks via entry or exit points other than those contained in the filed flight plan. Also it must be recognized that while a filed NAT flight plan may contain one or more step climbs for execution within the NAT Region, the initially issued oceanic clearance, or even any subsequently updated clearance (i.e. re-clearance), has only been co-ordinated for a single (i.e. initial or current) flight level. It must therefore be appreciated that it is only the flight routing and profile contained in the last received clearance that ATC has probed for conflicts. Unless this clearance is precisely the same as the filed flight plan, in any lost communications situation in the NAT Region, if a pilot in receipt of a clearance unilaterally reverts to his/her filed flight plan (even by simply executing a later step climb), then no guarantee of conflict-free progress exists. Consequently, if a NAT aircraft loses the possibility of communications with the relevant at any time after receiving and acknowledging a clearance, and the pilot elects to continue the flight, then the aircraft must adhere strictly to the routing and profile of the last received clearance until exiting the NAT Region. Pilots must not unilaterally 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

6.6.20 Due to the potential length of time in oceanic airspace, it is strongly recommended that a flight crew ~~pilot~~, experiencing an HF communications equipment failure prior to entering the NAT, while ~~whilst~~ still in domestic airspace and still in VHF contact with the domestic ATC Unit, does not enter NAT airspace but adopts the procedure specified in the appropriate domestic AIP and lands at a suitable airport. Should the flight crew ~~pilot~~, nevertheless, elect to continue the flight then every effort must be made to obtain an oceanic clearance and the routing, initial level and speed contained in that clearance must be maintained throughout the entire oceanic segment. Any level or speed changes required to comply with the ~~O~~oceanic ~~C~~clearance must be completed within the vicinity of the oceanic entry point.

6.6.21 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 <u>initial</u> oceanic level and speed included in the filed flight plan must be maintained until landfall.** Any subsequent ~~step-~~climbs included in the filed flight plan **must not** be executed.

HF Blackout

6.6.22 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.

6.6.23 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.

6.6.24 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 ~~pilots~~ 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.

6.6.25 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 ~~pilots~~ 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 ~~Domestic~~ and** oceanic ~~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 following Loss of HF Communications after Entering the NAT

6.6.26 If the HF communications equipment failure occurs or HF Blackout conditions are encountered after entering the NAT then : -

> The flight crew ~~pilot~~ must proceed in accordance with the last received and acknowledged ~~O~~oceanic ~~C~~clearance, including level and speed, to the last specified oceanic route point (normally landfall). After passing this point, the flight crew ~~pilot~~ 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 ~~Flight Plan~~ route are specified in detail in the appropriate State AIP.*

6.6.27 Aircraft with a destination within the NAT region ~~Region~~ should 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.

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

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

- Equipment Failure before receiving an ~~O~~oceanic ~~C~~clearance:-
  Divert or fly the flight plan ~~Flight Plan~~ route, speed and initial planned oceanic level to landfall.
- Blackout encountered (in an HF comms Domestic ATC environment) before receiving an ~~O~~oceanic ~~C~~clearance:-

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

- Equipment Failure or Blackout after receiving an ~~O~~oceanic ~~C~~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.

6.7 CONTINGENCY SITUATIONS AFFECTING ATM PROVISION IN THE NAT REGION

6.7.1 In the anticipation of situations arising which might result in the partial or total disruption of Air Traffic Services within the NAT region ~~Region~~, NAT ATS ~~P~~providers have developed arrangements which would, in such events, be put in place to ensure, as far as possible, the continued safety of air navigation. Such arrangements include required actions by flight crews ~~pilots~~ and operators of affected flights. These arrangements 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". Operators and flight crews ~~Pilots~~ planning and conducting operations in North Atlantic region should ensure their familiarity with these arrangements and in particular with the actions expected of flight crews ~~pilots~~ in such contingency situations.

6.7.2 The plan is presented in two parts. The first deals with contingency arrangements necessary when only one NAT ATS unit is affected. While the second addresses events which are likely to affect more than one facility within the NAT region, for example the contamination of the airspace by volcanic ash. Where available, information is also provided outlining the steps taken by ANSPs to deal with any long-term unavailability of an ATC facility.

6.8 OPERATION OF TRANSPONDERS

6.8.1 All aircraft operating as IFR flights in the NAT region ~~Region~~ shall be equipped with a pressure- altitude reporting SSR transponder. Unless otherwise directed by ATC, flight crews ~~pilots~~ flying in the NAT FIRs will operate transponders continuously in Mode A/C Code 2000, except that the last assigned code will be retained for a period of 30 minutes after entry into NAT airspace or after leaving a radar service area. Flight crews ~~Pilots~~ should note that it is important to change from the last assigned domestic code to the Mode A/C Code 2000 since the original domestic code may not be recognised by the subsequent Domestic Radar Service on exit from the oceanic airspace. One exception to this requirement should be noted. Because of the limited time spent in the NAT HLA, when flying on Route Tango 9, the change from the last assigned domestic code to Code 2000 should be made Northbound 10 minutes after passing BEGAS and Southbound 10 minutes after passing LASNO.

6.8.2 It should be noted that 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.

6.8.3 Reykjavik ACC provides a radar control service in the south-eastern part of its area and consequently transponder codes issued by Reykjavik ACC must be retained throughout the Reykjavik OCA until advised by ATC.

6.9 AIRBORNE COLLISION AVOIDANCE SYSTEMS (ACAS)

6.9.1 ~~From 1 January 2005, all t~~Turbine-engined aircraft ~~aeroplanes~~ having a maximum certificated take-off mass exceeding 5,700 kg or authorized to carry more than 19 passengers ~~have been~~ are required to carry ~~and operate~~ ACAS II in the NAT region ~~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. ~~With effect from 1 January 2017, all ACAS units must comply with this requirement.~~

6.9.2 Flight crews ~~Pilots~~ should report all ACAS/TCAS Resolution Advisories which occur in the NAT region ~~Region~~ to the controlling authority for the airspace involved. (See ~~further on this in~~ Chapter 13.)

CHAPTER 7

APPLICATION OF MACH NUMBER TECHNIQUE

7.1 DESCRIPTION OF TERMS

7.1.1 ~~The term~~ ~~'~~Mach Number Technique~~'~~ (MNT) is ~~used to describe~~ a technique whereby ~~subsonic~~ turbojet aircraft operating successively along suitable routes are cleared by ATC to maintain a ~~appropriate~~ Mach ~~N~~number~~s~~ for a ~~relevant~~ portion of the ~~en-route~~ enroute phase of ~~their~~ flight.

7.2 OBJECTIVE

7.2.1 ~~The principal objective of the use of Mach Number Technique is to achieve improved utilisation of the airspace on long route segments where ATC has no means, other than position reports, of ensuring that the longitudinal separation between successive aircraft is not reduced below the established minimum. Practical experience has shown that when two or more turbojet aircraft, operating along the same route at the same flight level, maintain the same Mach Number, they are more likely to maintain a constant time interval between each other than when using other methods. This is due to the fact that the aircraft concerned are normally subject to approximately the same wind and air temperature conditions, and minor variations in ground speed, which might increase and decrease the spacing between them, tend to be neutralised over long periods of flight.~~ MNT ~~Mach Number Technique~~ is used to improve the utilisation of airspace on long route segments where ATC has only position reports to ensure longitudinal separation between flights is maintained. 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.

7.2.2 ~~For many aircraft types the cockpit instrument displays the True Mach being flown. However, for some types the AFM notes a correction that must be made to the Indicated Mach to provide the True Mach. It is important to recognise that the The maintenance of longitudinal separations depends upon the assumption that the ATC assigned Mach numbers maintained by all aircraft are True Mach numbers. Pilots must therefore ensure that any required corrections to indicated Mach are taken into account when complying with the True Mach number specified in the ATC clearance.~~

7.3 PROCEDURES IN NAT OCEANIC AIRSPACE

7.3.1 ~~The Oceanic Clearance includes the assigned (True) Mach Number which is to be maintained. It is therefore necessary that information on the desired Mach Number be included in the flight plan for turbojet aircraft intending to fly in NAT oceanic airspace. ATC uses Mach Number together with pilot position reports to calculate estimated times for significant points along track. These times provide the basis for longitudinal separation between aircraft and for co-ordination with adjacent ATC units~~. Oceanic ~~C~~clearances include assigned Mach numbers (when required) which are to be maintained. Turbojet aircraft intending to fly in NAT oceanic airspace must flight plan their requested Mach number. ATC uses assigned Mach number along with position reports 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 ~~pilot~~/dispatcher requested or flight planned Mach ~~N~~numbers when issuing ~~O~~oceanic ~~C~~clearances. It is rare that ATC will assign a Mach ~~N~~number more than 0.01 faster or 0.02 slower than that requested.

7.3.3 ~~The prescribed longitudinal separation between successive aircraft flying a particular track at the same flight level is established over the oceanic entry point. Successive aircraft following the same track may be assigned different Mach Numbers but these will be such as to ensure that prescribed~~

~~minimum separations are assured throughout the oceanic crossing. Intervention by ATC thereafter should normally only be necessary if an aircraft is required to change its Mach Number due to conflicting traffic or to change its flight level~~. The monitoring and maintenance of longitudinal separation is dependent upon the provision of accurate times in position reports. ~~NAT HLA flights must use accurate and synchronised clocks based on UTC.~~

7.3.4 ~~It is, however, important to recognise that the establishment and subsequent monitoring of longitudinal separation is totally reliant upon aircraft providing accurate waypoint passing times in position reports. It is therefore essential that pilots conducting flights in the NAT HLA utilise accurate clocks and synchronise these with a standard time signal, based on UTC, prior to entering the NAT HLA. It should be noted that some aircraft clocks can only be re-set while the aircraft is on the ground. (See further comments on time-keeping/longitudinal navigation in Chapter 1 and Chapter 8.)~~

7.3.5 ~~In the application of Mach Number Technique, pilots must adhere strictly to their assigned True Mach Numbers unless a specific re-clearance is obtained from the appropriate ATC unit. However, as the aircraft weight reduces it may be more fuel efficient to adjust the Mach Number. Since the in-trail and crossing track separations between individual aircraft are established on the basis of ETAs passed to, or calculated by, ATC, it is essential that ATC approval is requested prior to effecting any change in cruise Mach Number. Such approval will be given if traffic conditions permit.~~ ~~**Pilots must recognise that adherence to the assigned Mach Number is essential. No tolerance is provided for. Pilots must not utilise Long Range Cruise or ECON FMC modes when transiting the NAT HLA**~~. ~~If an immediate temporary change in the Mach Number is essential, e.g. due to turbulence, ATC must be notified as soon as possible. Pilots with experience of flying in oceanic airspaces other than the North Atlantic, may be familiar with a procedure in those areas which permits pilots to unilaterally elect to change their cruising mach number by up to 0.02M, without prior ATC approval.~~ ~~**This is not the case in the North Atlantic HLA.**~~ **The assigned Mach number must be maintained.** If an immediate temporary change in the Mach number is essential (due to turbulence for example), ATC must be so informed.

~~*Note — In 2010/2011 Flight trials were conducted to assess the impact of variable Mach and altitude in the North Atlantic and within a defined corridor. These trials, entitled ENGAGE (Europe North America Go ADS-B for a Greener Environment) were initially conducted by NAVCANADA and UK NATS in the Gander and Shanwick OCAs. Aircraft within surveillance coverage of Automatic Dependent Surveillance – Broadcast (ADS-B) were able to climb earlier, thus releasing flight levels which could be assigned to aircraft not yet in surveillance coverage. This also provided opportunities for aircraft not yet in surveillance coverage to vary their Mach so as to maintain more fuel efficient speeds. These ENGAGE trials were subsequently extended to include ISAVIA and NAV Portugal. They were concluded in July 2013. Significant fuel savings and reduced carbon emissions were effected.. The trial application of Reduced Longitudinal Separation of 5 minutes between ADS- C/CPDLC equipped aircraft (RLongSM), also creates more opportunities to apply variable flight level or allow changes to the assigned Mach*~~.

7.3.6 Flight crews ~~Pilots~~ should maintain their last assigned Mach ~~N~~number during ~~step-~~climbs in oceanic airspace. If due to aircraft performance this is not feasible ATC should be advised at the time of the request for the ~~step~~ climb.

7.4 PROCEDURE AFTER LEAVING OCEANIC AIRSPACE

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

CHAPTER 8

NAT HLA/~~MNPS~~ FLIGHT OPERATION & NAVIGATION PROCEDURES

8.1 INTRODUCTION

8.1.1 The aircraft navigation systems necessary for flying in the NAT HLA ~~(MNPSA)~~ are capable of high-performance standards. However, it is essential that stringent cross-checking 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.

8.1.2 ~~Navigation systems are continually evolving and early editions of the NAT MNPSA Operations Manual concentrated on offering specific guidance on the use of individual approved long range navigation systems. The current philosophy within~~ ICAO ~~is to specify~~ 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 RNP-X, where X represents an accuracy of 95% containment in X NM~~m~~s. However, specifications requiring the same accuracies but not requiring on-board monitoring/alerting are referred to as RNAV-X.

8.1.3 ~~MNPS was used in the NAT Region for almost forty years. It did not require on-board automatic monitoring and alerting functions. Instead, pilots were required to remain vigilant and to employ rigorous routine manual monitoring procedures. In the 1990's a navigation requirements system was introduced for use originally in the Pacific Region. Like the MNPS, it too did not include any requirement for on-board automatic monitoring. Its introduction was long before the PBN concept was developed and it was then annotated as "RNP 10".~~ Large numbers of aircraft worldwide are now in receipt of "RNP 10" approvals. To conform with the PBN standard terminology, as indicated above, this system should actually be designated as "RNAV10". 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 "RNAV10".

8.1.4 With current technology, on-board automatic performance monitoring can only be carried out using ~~GPS~~GNSS. Hence ~~GPS~~ 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 ICAO Document Doc 9613 – 'Performance Based Navigation Manual'.

8.1.5 ~~MNPS was established primarily with the NAT OTS environment in mind. The defining waypoints of OTS tracks were specified by whole degrees of latitude and, using an effective 60 NM lateral separation standard, most adjacent tracks are separated by only one degree of latitude at each ten-degree meridian. The traffic density in the OTS is higher than in any other oceanic airspace. In such a densely populated flexible track system (one that changes twice every day), it is essential that crews avoid (whole degree) waypoint insertion errors. Such errors in the NAT HLA/MNPSA inevitably result in a conflict with traffic on an adjacent track. For this reason the Minimum Navigation Performance Specifications had to include not just the technical navigation accuracy of the Long-range Navigation Systems used on the aircraft but also the crew navigation and cross-checking procedures employed. The MNPS statement thus involved both cockpit/flight deck procedures and crew training requirements. These further requirements continue to apply for Approvals in the now re-designated NAT HLA. In the early days of the RNP concept, it was these additional requirements that separated MNPS from RNP. However, RNP has come a long way since its inception and the development of the RNP 10 approvals for PAC operations brought it much closer to the original MNPS concept. The ICAO North Atlantic Region is in the process of transitioning from MNPS to~~

~~PBN operations. This will allow for improved airspace capacities through the use of reduced separation minima. Although to achieve these reductions while maintaining or improving system safety, requires additionally performance enhancements in both communications and surveillance. Plans for these other advances constitute a "NAT Region Performance Based Communications & Surveillance (PBCS) Plan". Details of the NAT Region plans for MNPS to PBN Transition and the introduction of PBCS are available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "Planning documents supporting separation reductions and other initiatives". With effect from January 2015 the technical/equipage elements of all new State Approvals for operations in the NAT MNPSA have been based on PBN specifications and from February 2016 the NAT MNPS Airspace is re-designated as the NAT HLA .~~

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

8.1.6 ~~Obviously, there are several combinations of airborne sensors, receivers, computers with navigation data bases and displays which are capable of producing like accuracies, and which with inputs to automatic flight control systems provide track guidance. However, r~~Regardless of how sophisticated or mature a system is, it is still essential that stringent navigation and cross checking procedures are maintained if Gross Navigation Errors (GNEs) are to be avoided. A GNE within NAT airspace ~~Airspace~~ is defined as a deviation from cleared track of 10 NM or more ~~(note the change from ≥ 25 NM post implementation of the RLatSM trials). Some of these errors are detected by means of long range radars as aircraft leave oceanic airspace. Other such errors may also be identified through the scrutiny of routine position reports from aircraft.~~

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

8.1.8 ~~Unfortunately, human failings produce the vast majority of navigation errors in the North Atlantic Region. As indicated above, while the flexible OTS structure and the employment of a 60 NM lateral separation standard, provide for highly efficient use of NAT airspace, they also bring with them a demand for strictly disciplined navigation procedures.~~ About half of NAT flights route via an OTS track and a large portion of the remaining random flights follow routes that at some point approach within one or two degrees of 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 definition will very likely lead to a conflict with another aircraft which is routing correctly via the resulting common significant point. ~~Ironically, the~~ The risk of an actual collision between two aircraft routing via a common point, as is the case when such errors are made, is further exacerbated by the improved technical accuracy of the modern navigation and height keeping equipment employed.

8.1.9 ~~Today in North Atlantic operations the predominant source of aircraft positioning information is that of GPS. This includes aircraft that use stand-alone GPS equipment and aircraft where GPS positioning information is integrated into the system navigation solution (e.g. a GPS / IRS mix). The accuracy of GPS navigation is such that the actual flight paths of any two GPS equipped aircraft navigating to a common point will almost certainly pass that point within less than a wingspan of each other. Given that the North Atlantic is the most heavily used oceanic airspace anywhere in the world, it must therefore be appreciated that even a single digit error in just one waypoint can result in a significant conflict potential.~~

8.1.10 The importance of employing strict navigation system operating procedures designed to avoid the insertion of wrong waypoints or misunderstandings between ~~pilots~~ the flight crew and ATC over cleared routes cannot be over-emphasised. ~~The principles embodied in many of the procedures described in this Chapter are aimed squarely at the prevention of such problems.~~

8.1.11 Many of the procedures listed in this ~~C~~chapter are not equipment specific and others may not be pertinent to every aircraft. For specific equipment, reference should be made to Manufacturers' and operators' handbooks and manuals.

8.1.12 There are various references in this material to two flight crew members ~~pilots~~; however, when carried, a third flight crew member should be involved in all cross check procedures to the extent practicable.

8.1.13 Maintenance of a high standard of navigation performance is absolutely essential to the maintenance of safety in the NAT HLA.

Sample Oceanic Checklist

8.1.14 ICAO North Atlantic Working Groups composed of industry, ATC and state regulators have created a Sample Oceanic Checklist. This checklist represents lessons learned from decades of NAT operations and internationally accepted best practices. It is provided as guidance and is not intended to replace an operator's oceanic checklist. However, all operators are strongly encouraged to review the Sample Oceanic Checklist, either for guidance in developing their own checklist or as a means of assessing the thoroughness of their checklist. Operators can tailor the NAT checklist to their specific needs and approvals. This checklist focuses on an orderly flow and ways to reduce oceanic errors. The details behind, and the rationale for, the proposed actions listed in the sample checklist are described in the Expanded Check List. These checklists, along with the NAT Oceanic Errors Safety Bulletin, are available on the ICAO website at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT OPS Bulletins".

8.2 GENERAL PROCEDURES

Presentation of Navigation Information

8.2.1 A significant proportion of navigation errors result from the use of incorrect data. To minimize the problem, source data must be clearly legible under the worst cockpit lighting conditions and presented in a format suitable for error-free use in the cockpit environment. In this context, the following considerations apply:

a) on navigation charts, all position coordinates ~~co-ordinates~~, e.g. ramp position, ATC waypoints, radio navaid positions, etc., should ideally be printed in dark blue or black numerals against a white background. Where such coordinates ~~co-ordinates~~ would normally appear against a locally tinted background, they should be enclosed in a white box. Absolutely no information should be overprinted on top of position coordinates ~~co-ordinates~~. In situations where groups of position co- ordinates must appear in close proximity to each other, the position to which each set of coordinates ~~co-ordinates~~ applies should be clearly indicated by means of a leader;

b) navigational documents, such as NAT track messages or flight plans, should be double-spaced or "boxed", to minimize the possibility of line slippage when the information is read; and

c) it is advisable to provide flight crews ~~pilots~~ with a simple plotting chart of suitable scale (1 inch equals 120 NM has been used successfully on NAT routes) in order to facilitate a visual presentation of the intended route that, otherwise, is defined only in terms of navigational co- ordinates.

Importance of Accurate Time

8.2.2 ~~It must be recognised that proper operation of a correctly functioning LRNS will ensure that the aircraft follows its cleared track. ATC applies standard separations between cleared tracks and thereby assures the safe **lateral** separation of aircraft. However,~~ ~~l~~Longitudinal separations between subsequent aircraft following the same track and between aircraft on intersecting tracks are assessed in terms of differences in ETAs/ATAs at common waypoints. Aircraft clock errors resulting in position report time errors can therefore lead to an erosion of actual longitudinal separations between aircraft. **It is thus vitally important that prior to entry into the NAT HLA the time reference system to be used during the flight is accurately synchronised to UTC and that the calculation of waypoint ETAs and the reporting of waypoint ATAs are always referenced to this system**. [v13]~~Many modern aircraft master clocks (typically the FMS) can only be reset while the aircraft is on the ground. Thus the~~ Pre-flight Procedures for any NAT HLA flight **must include** [v14]a UTC time check and resynchronisation of the aircraft master clock. Lists of acceptable time sources for this purpose have been promulgated by NAT ATS ~~P~~provider States.

8.2.3 The following are examples of acceptable time standards:

- GPS (Corrected to UTC) - Available at all times to those flight crews who can access time via approved on-board GPS (TSO-C129 or later standard) equipment.
- WWV - National Institute of Standards (NIST - Fort Collins, Colorado). WWV operates continually H24 on 2500, 5000, 10,000, 15,000 and 20,000 kHz (AM/SSB) and provides UTC (voice) once every minute.
- CHU - National Research Council (NRC - Ottawa, Canada) - CHU operates continually H24 on 3330, ~~7335~~ 7850 and 14,670 kHz (SSB) and provides UTC (voice) once every minute (English even minutes, French odd minutes).
- Telephone Talking Clock Facility - English (+16137451576) or French (+16137459426)
- BBC - British Broadcasting Corporation (United Kingdom). The BBC transmits on a number of domestic and world-wide frequencies and transmits the Greenwich time signal (referenced to UTC) once every hour on most frequencies, although there are some exceptions.

8.2.4 Further details of these and other acceptable time references can be found in AIS documentation of the NAT ATS ~~P~~provider States. In general, the use of any other source of UTC that can be shown to the State of the ~~O~~operator or the State of Registry of the aircraft to be equivalent, may be allowed for this purpose.

The Use of a Master Document

8.2.5 Navigation procedures must include the establishment of some form of master working document to be used on the flight deck. This document may be based upon the flight plan, navigation log, or other suitable document which lists sequentially the waypoints defining the route, the track and distance between each waypoint, and other information relevant to navigation along the cleared track. When mentioned subsequently in this guidance material, this document will be referred to as the 'Master Document'.

8.2.6 Misuse of the Master Document can result in GNEs occurring and for this reason strict procedures regarding its use should be established. These procedures should include the following:

a) Only one Master Document is to be used on the flight deck. However, this does not preclude other flight crew members maintaining a separate flight log.

b) On INS equipped aircraft a waypoint numbering sequence should be established from the outset of the flight and entered on the Master Document. The identical numbering sequence should be used for storing waypoints in the navigation computers.

c) For aircraft equipped with FMS data bases, FMS generated or inserted waypoints should be carefully compared to Master Document waypoints and cross checked by both flight crew members ~~pilots~~.

d) An appropriate symbology should be adopted to indicate the status of each waypoint listed on the Master Document.

8.2.7 The following is a typical example of Master Document annotation. An individual operator's procedures may differ slightly but the same principles should be applied:

a) The waypoint number is entered against the relevant waypoint coordinates ~~co-ordinates~~ to indicate that the waypoint has been inserted into the navigation computers.

b) The waypoint number is circled, to signify that insertion of the correct coordinates ~~co-ordinates~~ in the navigation computers has been double-checked independently by another flight crew member.

c) The circled waypoint number is ticked, to signify that the relevant track and distance information has been double-checked.

d) The circled waypoint number is crossed out, to signify that the aircraft has overflown the waypoint concerned.

8.2.8 All navigational information appearing on the Master Document must be checked against the best available prime source data. When a re-route is necessary, some regulators recommended that a new Master Document is prepared for the changed portion of the flight. In cases where the original Master Document is to be used, the old waypoints must be clearly crossed out and the new ones carefully entered in their place. The checks listed in the previous paragraph must be carried out in respect of all new or revised waypoints.

8.2.9 When ATC clearances or re-clearances are being obtained, headsets should be worn. The inferior clarity of loud-speakers has, in the past, caused errors during receipt. Two qualified flight crew members should monitor such clearances; one of them recording the clearance on the Master Document as it is received, the other cross-checking the receipt and read-back. All waypoint coordinates ~~co-ordinates~~ should be read back in detail, adhering strictly to standard ICAO phraseology, except where approved local procedures make this unnecessary. Detailed procedures pertaining to abbreviated clearances/read-backs are contained in the appropriate AIPs, and in this Manual at Chapter 5 - Oceanic ATC Clearances.

Position Plotting

8.2.10 An aeronautical ~~simple plotting~~ chart can provide~~s~~ a visual presentation of the intended route which~~,~~ is defined otherwise only in terms of navigational coordinates ~~co-ordinates~~. Plotting the intended route on such a chart may reveal errors and discrepancies in the navigational coordinates ~~co-ordinates~~ which can then be corrected immediately, before they reveal themselves in terms of a deviation from the ATC cleared route. As the flight progresses, plotting the aircraft's present position on this chart will also serve the purpose of a navigation cross check, provided that the scale and graticule are suitable.

8.2.11 As the flight progresses in oceanic airspace, plotting the aircraft's position on ~~this~~ a chart will help to confirm (when it falls precisely on track) that the flight is proceeding in accordance with its clearance. However, if the plotted position is laterally offset, the flight may be deviating unintentionally, and this possibility should be investigated at once.

8.2.12 Plotting the aircraft's progress on a chart can be a useful tool for contingency situations. In the event of a total loss of long range navigation capability, a completed plotting chart will assist in the necessary reversion to ~~D~~dead ~~R~~reckoning. In other contingency situations it can help ~~is~~ in assessing separation assurance from other ~~busy~~ tracks or from high terrain (e.g over Greenland).

8.2.13 ~~It is recommended that a chart with an appropriate scale be used for plotting~~The chart must be of a scale appropriate for plotting. Many company Progress Charts are of the wrong scale or too small. It has been noted that the use of plotting charts that are small can lead to oceanic errors. EAG Chart AT (H) 1; No 1 AIDU (MOD) Charts AT(H)1, 2, 3 & 4 and the Jeppesen North/Mid Atlantic Plotting Charts are all useful compromises between scale and overall chart size; while the *NOAA/FAA North Atlantic Route Chart* has the advantage, for plotting purposes, of a 1° latitude/longitude graticule.

Provision of ~~Step-~~Climbs

8.2.14 Tactical ATS ~~S~~surveillance control and tactical procedural control are exercised in some areas of the NAT HLA. However, oceanic clearances for many NAT flights are of a strategic nature. Although such strategic clearances normally specify a single flight level for the entire crossing, there is often scope for ~~en-route~~ enroute ~~step-~~climb re-clearances as fuel burn-off makes higher levels more optimal. Controllers will accommodate requests for ~~step-~~climbs whenever possible. When so re-cleared, flight crews ~~pilots~~ should initiate the climb without delay (unless their discretion was invited or unless a conditional clearance was issued) and those aircraft not using CPDLC/ADS-C should **always** report to ATC immediately upon **leaving** the old and on **reaching** the new cruising levels.

Relief Flight Crew Members

8.2.15 ~~Very~~ ~~l~~Long range operations may include the use of relief flight crew. In such cases it is necessary to ensure that procedures are such that the continuity of the operation is not interrupted, particularly in respect of the handling and treatment of the navigational information.

8.3 PRE-FLIGHT PROCEDURES

RNP Approval Status

8.3.1 ~~As previously indicated in Chapter 4 (see para 4.1.16) NAT HLA Aircraft planning to fly in RLatSM airspace or intending to benefit from the 50 NMs separations offered in the New York Oceanic East or Santa Maria Oceanic FIRs or the reduced lateral and longitudinal separations which may be applied in the adjacent WATRS Plus airspace, must ensure that its RNP Approval status is included in the Flight Plan~~. 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 to RNP aircraft, the aircraft's RNP approval status must be accurately reflected in Item 18 of the ATC flight plan. Flight crews shall also verify that the corresponding RNP value is entered in the Flight Management Computer, 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

Inertial Navigation Systems

Insertion of Initial Latitude and Longitude

8.3.2 Unless inertial navigation systems are properly aligned on the ground, to include inputting the exact aircraft position, systematic errors will be introduced.~~Two fundamental principles concerning the operation of an IRS are: that it needs to be accurately aligned before flight; and that the actual position of the aircraft, at alignment, is set into the system. If either of these principles is violated, systematic errors will be introduced.~~ These errors can be corrected while ~~whilst~~ the aircraft is on the ground but it is not possible to adequately recover from them while ~~whilst~~ the aircraft is in flight, despite any indications to the contrary. Correct insertion of the initial position must therefore be checked before inertial systems are aligned and the position should be recorded in the flight log and/or Master Document. It is recommended that subsequent 'silent' checks of the present position and of the inertial velocity outputs (e.g. ground speed registering zero) be carried out independently by both flight crew members ~~pilots~~ during (an early stage of) the pre-flight checks and again just before the aircraft is moved. Any discrepancies should be investigated.

8.3.3 With regard to the insertion of the initial coordinates ~~co-ordinates~~ while ~~whilst~~ on the ramp, the following points should be taken into account:

- in some inertial systems, insertion errors exceeding about one degree of latitude will illuminate a malfunction light. It should be noted that very few systems provide protection against longitude insertion errors.
- at all times, but particularly in the vicinity of the Zero Degree E/W (Greenwich) Meridian or near to the Equator, care should be taken to ensure that the coordinates ~~co-ordinates~~ inserted are correct. (i.e. E/W or N/S).

<u>*System Alignment*</u>

8.3.4 The alignment of inertial systems must be completed and the equipment put into navigation mode prior to releasing the parking brake at the ramp. Some systems will align in about 10 minutes, others can take 15 minutes or more; expect alignment to take longer in extreme cold or at higher latitudes or when the aircraft (and hence the inertial platform) is buffeted by winds or rocked during cargo loading. A rapid realignment feature is sometimes provided but should only be used if, during an intermediate stop, it becomes necessary to increase the system accuracy. The aircraft must be stationary during rapid realignment which typically will take about one minute.

8.3.5 ~~To ensure that there is adequate time for the initial alignment, the first crew member on the flight deck should normally put the inertial system(s) into the align mode as soon as practicable.~~

GNSS (GPS) Systems

8.3.6 As with all LRNS operations, GPS LRNS operations must be approved by the State of the ~~O~~operator (or the State of Registry for International General Aviation operations) as part of the NAT HLA operational approval. When both the LRNSs required for unrestricted NAT HLA operations are GPSs the approval of their operation will include the requirement to carry out Pre-Departure Satellite Navigation Prediction Programme (as shown below). When only one of the two LRNSs required is a GPS, or for multi-sensor navigation systems, State Authorities vary as to whether they require their operators to conduct such pre-departure programmes.

<u>Satellite Availability</u>

8.3.7 The following specify the numbers of satellites required:

- Four satellites are required to determine 3-D position;
- For Receiver Autonomous Integrity Monitoring (RAIM) purposes, five satellites are required to detect the presence of a single faulty satellite;
- For Fault Detection and Exclusion (FDE) purposes, six satellites are required to identify a faulty satellite and exclude it from participating in further navigation solution calculations.

~~To determine 3-D position:~~

- ~~Four satellites are required;~~

~~For Receiver Autonomous Integrity Monitoring (RAIM) purposes:~~

- ~~Five satellites are required to detect the presence of a single faulty satellite;~~

~~For Fault Detection and Exclusion (FDE) purposes:~~

- ~~Six satellites are required to identify a faulty satellite and exclude it from participating in further navigation solution calculations.~~

Note 1: An FDE algorithm is normally associated with a RAIM algorithm.

Note 2: The above numbers of satellites (for RAIM and FDE purposes only) may in each case be reduced by one if barometric aiding is used.

Satellite Navigation Prediction

8.3.8 When so required, operators intending to conduct GPS navigation in the NAT HLA must utilise a Satellite Navigation Availability Prediction Programme specifically designated for the GPS equipment installed. This prediction programme must be capable of predicting, prior to departure for flight on a "specified route"*, the following:

a) Any loss of navigation coverage (meaning that less than 3 satellites will be in view to the receiver); and

b) Any loss of the RAIM/FDE function and its duration.

*Note: *"specified route" is defined by a series of waypoints (to perhaps include the route to any required alternate), with the time between waypoints based on planned speeds. Since flight planned ground speeds and/or departure times may not be met, the pre-departure prediction must be performed for a range of expected ground speeds.*

8.3.9 This prediction programme must use appropriate parameters from the RAIM/FDE algorithm employed by the installed GPS equipment. In order to perform the predictions this programme must provide the capability to manually designate satellites that are scheduled to be unavailable. Such information is not included in the GPS almanac or ephemeris data in the navigation message (i.e. the GPS receiver does not receive this information). Information on GPS satellite outages is promulgated via the U.S. NOTAM Office. The KNMH transmitting station (US Coast Guard Station, Washington D.C.) is responsible for release (in NOTAM format) of information relating to the operating condition of the GPS constellation satellites. These NOTAMs can be obtained through direct query to the USA data bank, via the AFTN, using the following service message format: SVC RQ INT LOC = KNMH addressed to KDZZNAXX. Such information can also be found on the US Coast~~guard~~ Guard Web site at www.navcen.uscg.gov."

8.3.10 When GPS is being used as a supplementary navigation means or when GPS is only one of the two LRNSs required for NAT HLA approval ~~Approval~~ (e.g. when the second LRNS is an IRS/INS installation) or in the case of multi-sensor navigation systems, then some States of Registry may not require the operator to conduct pre-flight RAIM/FDE prediction checks.

Operational Control Restrictions

The Capability to ~~d~~Determine a GPS ~~p~~Position

8.3.11 When so required, prior to departure, the operator must use the prediction programme to first demonstrate that forecast satellite outages will not result in a loss of navigation coverage (i.e. the capability to determine position) on any part of the specified route of flight. If such outages are detected by the programme, the flight will need to be re-routed, delayed or cancelled.

Determination of the Availability of RAIM/FDE

8.3.12 Once the position determination function is assured (i.e. no loss in navigation coverage for the route has been predicted), the operator must run the RAIM/FDE outage prediction programme. Any continuous outage of RAIM/FDE capability of greater than 51 minutes in the NAT HLA (or greater than 25 minutes for flights on RLatSM tracks ~~Tracks~~) means again that the flight should be re-routed, delayed or cancelled. It is understood that some prediction programmes carry out both these checks together.

Note: Derivation of the 51& 25 minute limits – At the instant the RAIM/FDE capability is lost, it is assumed that the GPS navigation solution proceeds to direct the aircraft away from track at a speed of 35 knots. With the current NAT HLA nominal track spacing of 60 nautical miles (30 NMs for RLatSM tracks ~~Tracks~~), it is further assumed that aircraft on adjacent tracks have a lateral "safety buffer" of 30 nautical miles (15 NMs for RLatSM tracks ~~Tracks~~). At 35 knots it will take an aircraft 51(or 25) minutes to exit this "safety buffer". It should be noted that this is a very conservative methodology and it is thought unlikely that a RAIM/FDE outage alone could cause such errant navigation behaviour The equivalent outage limit for RNAV 10 (RNP 10) operations is 34 minutes.

Loading of Initial Waypoints

8.3.13 The manual entry of waypoint data into the navigation systems must be a co-ordinated operation by two persons, working **in sequence and independently**: one should key in and insert the data, and subsequently the other should recall it and confirm it against source information. **It is not sufficient for one flight crew member just to observe or assist another flight crew member inserting the data**. (See Chapter 16 for waypoint verification procedures)

8.3.14 The ramp position of the aircraft, plus at least two additional waypoints, or, if the onboard equipment allows, all the waypoints relevant to the flight, should be loaded while the aircraft is at the ramp. However, it is more important initially to ensure that the first enroute ~~en-route~~ waypoint is inserted accurately.

Note: For aircraft equipped with GPS, the position provided by each of the aircraft's GPS receivers should be compared to the ramp coordinates. A difference between GPS and ramp position greater than 100 meters should be investigated before departure. ~~The vast majority of commercial air transport aircraft operating in the NAT HLA have an IRS/INS as part of their Long Range navigation fit. An increasing number of those with IRS/INS also have GPS and whilst GPS may then be considered the primary LRNS, these aircraft are still required to input the ramp position. This should then be compared with the GPS solution. For those few aircraft with GPS as the only LRNS, whilst there may be no need to actually load the ramp position, it is good airmanship and recommended operational practice to compare the published ramp position with the GPS derived position. Without selective availability GPS should give a position within 30 metres of the published ramp position. If the GPS position is more than 100 metres from the published ground position, then the cause should be investigated. If sufficient satellites are in view the most likely causes are GPS receiver error, atmospheric interference, or, incorrect ramp co-ordinates.~~

8.3.15 During flight, at least two current waypoints beyond the leg being navigated should be maintained in the Control Display Units (CDUs) until the destination ramp coordinates ~~co-ordinates~~ are loaded. Two flight crew members ~~pilots~~ should be responsible for loading, recalling and checking the accuracy of the inserted waypoints; one loading and the other subsequently recalling and checking them independently. However, this process should not be permitted to engage the attention of both flight crew members ~~pilots~~ simultaneously during the flight. Where remote loading of the units is possible, this permits one flight crew member ~~pilot~~ to cross-check that the data inserted automatically is indeed accurate.

8.3.16 An alternative and acceptable procedure is for the two flight crew members ~~pilots~~ silently and independently to load their own initial waypoints and then cross-check them. The flight crew member ~~pilot~~ responsible for carrying out the verification should work from the CDU display to the Master Document rather than in the opposite direction. This may lessen the risk of the flight crew member ~~pilot~~ 'seeing what is expected to be seen' rather than what is actually displayed.

Flight Plan Check

8.3.17 The purpose of this check is to ensure complete compatibility between the data in the Master Document and the calculated output from the navigation systems. Typical actions could include:

a) checking the distance from the ramp position to the first waypoint. Some systems will account for the track distance involved in an ATC SID; in others, an appropriate allowance for a SID may have to be made to the great circle distance indicated in order to match that in the Master Document. If there is significant disagreement, rechecking initial position and waypoint coordinates ~~co-ordinates~~ may be necessary.

b) selecting track waypoint 1 to waypoint 2 and doing the following:
- checking accuracy of the indicated distance against that in the Master Document;
- checking, when data available, that the track displayed is as listed in the Master Document. (This check will show up any errors made in lat/long designators (i.e. N/S or E/W).)

c) similar checks should be carried out for subsequent pairs of waypoints and any discrepancies between the Master Document and displayed data checked for possible waypoint insertion errors. These checks can be coordinated between the two flight crew members ~~pilots~~ checking against the information in the Master Document.

d) when each leg of the flight has been checked in this manner it should be annotated on the Master Document by means of a suitable symbology as previously suggested (See "The Use of a Master Document” above).

e) some systems have integral navigation databases and it is essential that the recency of the database being used is known. It must be recognised that even the coordinates ~~co-ordinates~~ of waypoint positions contained in a data base have been keyed in at some point by another human. The possibility of input errors is always present. **Do not assume the infallibility of navigation databases and always maintain the same thorough principles which are applied in the checking of your own manual inputs.**

Leaving the Ramp

8.3.18 Movement of the aircraft prior to completion of inertial systems alignment may, depending on system characteristics, result in faulty inertial system operation. ~~The aircraft must not be moved prior to the navigation mode being initiated, otherwise inertial navigation systems must be realigned.~~ Prior to leaving the ramp Zero Ground Speed indications from the LRNS should be confirmed. Any excessive Ground Speeds noted while on chocks should be resolved by checking fault codes, the currency of data bases and RAIM (if GPS is employed).

8.3.19 Inertial groundspeeds should also be checked during taxi. A significantly erroneous reading and/or malfunction codes should be investigated prior to takeoff. Flight crews ~~Pilots~~ of aircraft with electronic map displays should confirm the derived position agrees with the actual position on the airfield. ~~After leaving the ramp, inertial groundspeeds should be checked (a significantly erroneous reading may indicate a faulty or less reliable inertial unit). A check should be made on any malfunction codes whilst the aircraft is stopped but after it has taxied at least part of the way to the take-off position; any significant ground-speed indications whilst stationary may indicate a faulty inertial unit such as a tilted platform. Prior to take-off, operators with an avionic fit which employs an electronic map display should confirm that the derived position indicates that the aircraft is at the start of the runway.~~

8.3.20 Many modern aircraft are equipped with FMS navigation systems (i.e. Flight Management Computers fed by multiple navigation sensors.). Once the FMS is put into 'Nav' mode, the system decides on the most appropriate (i.e. accurate) navigation sensors to use for position determination. If GPS is part of the solution, then the position is normally predominantly based on GPS inputs with the IRS/INS in a supporting role. It may therefore be difficult to know exactly what component of the navigation solution (IRS, GPS, DME etc) is being used to derive position at any one time. With an FMS-based system, or a GPS stand-alone system, the “Leaving the Ramp” checks should be designed to provide assurance that the navigation information presented is indeed 'sensible'.

8.4 IN FLIGHT PROCEDURES

~~Initial flight~~En Route to Oceanic Entry

8.4.1 ~~It is recommended that d~~During the initial part of the flight, while en route to oceanic entry, ground navaids should be used to verify the performance of the LRNSs. Large or unusual ‘map shifts’ in FMS output, or other discrepancies in navigation data, could be due to inertial platform misalignment or initialisation errors. Position updates to the FMS will not correct these errors despite possible indications to the contrary. If such a situation is encountered when INS/IRS are the primary LRNSs then it would be unwise to continue into the NAT HLA. Flight crews ~~Pilots~~ should consider landing in order to investigate the cause and then perhaps be in a position to correct the problem.

8.4.2 ~~It is recommended that a~~ A compass heading check should also be ~~presented~~ performed and the results recorded. This check is particularly helpful when using inertial systems. The check can also aid in determining the most accurate compass if a problem develops later in the crossing.

ATC Oceanic Clearance and ~~s~~Subsequent Re-clearances

8.4.3 Where practicable, two flight crew members should listen to and record every ATC clearance and both agree that the recording is correct. Standard Operating Procedures (SOPs) for LRNS must include independent clearance copy, data entry (~~C~~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. ~~This task cannot be delegated.~~ Any doubt should be resolved by requesting clarification from ATC.

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

8.4.5 If the ATC oceanic cleared route is identical to the flight planned track, it should be drawn on the plotting chart and verified by the other flight crew member ~~pilot~~.

8.4.6 If the aircraft is cleared by ATC on a different track from that flight planned, some regulators recommend that a new Master Document be prepared showing the details of the cleared track. Overwriting of the existing flight plan can cause difficulties in reading the waypoint numbers and the new coordinates ~~co-ordinates~~. For this purpose, it is helpful if a blank pro-forma Master Document (flight plan) is carried with the flight documents. One flight crew member should transcribe track and distance data from the appropriate reference source onto the new Master Document pro-forma and this should be checked by another flight crew member. If necessary, a new plotting chart may be used on which to draw the new track. The new document(s) should be used for the oceanic crossing. If the subsequent domestic portion of the flight corresponds to that contained in the original flight plan, it should be possible to revert to the original Master Document at the appropriate point.

8.4.7 Experience has clearly shown that when ATC issues an initial oceanic clearance that differs from the flight plan, or subsequently during the flight issues a re-clearance involving re-routing and new waypoints, there is a consequential increase in the risk of errors being made. Indeed, errors associated with re-clearances continue to be the most frequent cause of Gross Navigation Errors in the North Atlantic HLA. Therefore, in both of these circumstances the situation should be treated virtually as the start of a new flight and the procedures employed with respect to the following, should all be identical to those procedures employed at the beginning of a flight (see paragraph 8.3.17 ~~above~~):

a) copying the ATC re-clearance;

b) amending the Master Document;

c) loading and checking waypoints;

d) extracting and verifying flight plan information, tracks and distances, etc.; and

e) preparing a new plotting chart.

8.4.8 When reviewing the causes of navigation errors, the NAT CMA has noted that numerous operator reports make reference to flight crew breaks in their explanation of the circumstances of the error. In all dimensions, errors are more likely to occur where a clearance or re-route, speed or level change has been communicated to a flight crew and either not been actioned completely, or has been incorrectly or incompletely processed before a relief flight crew member has started duty. Operators' SOPs are generally consistent in regard to the importance of properly handing over, and taking control, and if adopted with due diligence, would forestall the development of an error. However, human factors often confound the best laid SOPs, and distraction or human failings can contribute to the omission of all, or a part of, the process handed over by the departed flight crew member for subsequent action. Flights requiring flight crew augmentation~~, particularly, ultra- long-haul flights~~ present specific issues as regards to flight crew relief. With the requirement to have the aircraft commander and the designated co-pilot on duty for critical stages of the flight i.e.: take off and landing, sometimes flight crew changes then occur during times when critical information is being received such as oceanic clearances or conditional clearances and/or company communications such as re-dispatch etc. It is imperative that during these flight crew changes, a thorough turnover briefing takes place so that the incoming flight crew is aware of all clearances and requirements for the segment of the flight, especially those involving conditional re-clearances such as a change of level at specific points or times.

8.4.9 Strict adherence to all the above procedures should minimise the risk of error. However, flight deck management should be such that one flight crew member ~~pilot~~ is designated to be responsible for flying the aircraft while ~~whilst~~ the other flight crew member ~~pilot~~ carries out any required amendments to documentation and reprogramming of the navigation systems - appropriately monitored by the flight crew member ~~pilot~~ flying the aircraft, as and when necessary.

Approaching the Ocean

8.4.10 Prior to entering the NAT HLA, the accuracy of the LRNSs should be ~~thoroughly~~ checked by any means available~~, if necessary by using independent navigation aids~~. For example, INS position can be checked by reference to ~~en-route~~ enroute or proximate VOR/DMEs, etc. However, with a modern FMS, the system decides which LRNS is to be used, and indeed, the FMS may be taking information from DMEs (and possibly VORs) as well as the LRNS carried. ~~Nevertheless, in spite of all this modern technology and e~~Even if the FMS is using GPS, it is still worthwhile to carry out a 'reasonableness' check of the FMS/GPS position, using (for example) DME/VOR distance and bearing.

Note: It should be recognized, however, that "distance & bearing" checks in the western portion of the North Atlantic can be problematic. It has been noted that the navigation information data bases used on-board aircraft; in Flight Planning Systems; and in ATS Ground Systems do not always define the same (large) Magnetic Variation for the same location in this airspace.

8.4.11 When appropriate and possible, the navigation system which, in the opinion of the flight crew ~~pilot~~, has performed most accurately since departure should be selected for automatic navigation steering.

8.4.12 In view of the importance of following the correct track in oceanic airspace, it is advisable at this stage of flight that, if carried, a third ~~pilot~~ or equivalent flight crew member should check the clearance waypoints which have been inserted into the navigation system, using source information such as the NAT track message or data link clearance if applicable.

8.4.13 ~~Just prior, or at entry to, the ocean~~ ~~pilots~~ Flight crews should attempt to determine the offsets (if any) being flown by aircraft immediately ahead on the same track one flight level above and one flight level below. They should then select an offset which differs from the other aircraft. If this is not possible, or practical, then flight crews ~~pilots~~ should randomly ~~chose~~ choose one of the ~~three~~ flight path options. See Chapter 8 ~~Section 8.5~~ for rationale and more details.

Entering the NAT HLA and Reaching an Oceanic Waypoint

8.4.14 When passing waypoints, the following checks should be carried out:

~~a) just prior to the waypoint, check the present position co-ordinates of each navigation system against the cleared route in the Master Document, and~~

b) just prior to the waypoint, check the next two waypoints in each navigation system against the Master Document.

c) at the waypoint, check the distance to the next waypoint, confirm that the aircraft turns in the correct direction and takes up a new heading and track appropriate to the leg to the next waypoint.

d) before transmitting the position report to ATC, verify the waypoint coordinates ~~co-ordinates~~ against the Master Document and those in the steering navigation system. When feasible the position report "next" and "next plus 1" waypoint coordinates ~~co-ordinates~~ should be read from the CDU of the navigation system coupled to the autopilot.

8.4.15 Even if automatic waypoint position reporting via data link (e.g. ADS-C ~~or CPDLC~~) is being used to provide position reports to ATC the above checks should still be performed.

8.4.16 ~~The crew should be prepared for possible ATC follow-up to the position report.~~

8.4.17 Flight Ccrews should also be aware that in the NAT region ~~Region~~ ADS-C conformance monitoring is commonly employed. ATC establishes event contracts that will result in automatic alerts whenever the aircraft diverges from its cleared profile. Unless previously advised by the flight crew ~~pilot~~ of the need for such a divergence, flight crews should expect ATC to query the situation. Standardised CPDLC alert messages have been developed for use here.

Routine Monitoring

8.4.18 It is important to remember that there are a number of ways in which the autopilot may unobtrusively become disconnected from the steering mode. Therefore, regular checks of correct engagement with the navigation system should be made.

8.4.19 ~~It is recommended that where possible the navigation system coupled to the autopilot should display the present position co-ordinates throughout the flight. If these are then plotted as suggested above, they will provide confirmation that the aircraft is tracking in accordance with its ATC clearance. Distance to go information should be available on the instrument panel, whilst a waypoint alert light, where fitted, provides a reminder of the aircraft's imminent arrival over the next waypoint.~~

8.4.20 A position check should be made at each waypoint and the present position plotted 10 minutes after passing each waypoint. For a generally east-west flight, this 10 minute point will be approximately 2 degrees of longitude beyond the oceanic waypoint. It may therefore in fact be simpler to plot a present position 2 degrees of longitude after each 10 degree waypoint. There may be circumstances, (e.g. when, due to equipment failure, only one LRNS remains serviceable) in which additional plots midway between each waypoint may be justified.

8.4.21 It is good practice to cross check winds midway between oceanic waypoints by comparing the flight plan, LRNS and upper milli-bar wind charts data. Such a cross check will also aid flight crews in case there is a subsequent contingency situation requiring the use of ~~D~~dead ~~R~~reckoning.

8.4.22 The navigation system not being used to steer the aircraft should display cross-track distance and track angle error. Both of these should be monitored, with cross-track distance being displayed on the HSI where feasible.

Approaching Landfall

8.4.23 When the aircraft is within range of land based navaids, and the flight crew is confident that these navaids are providing reliable navigation information, consideration should be given to updating the LRNSs. Automatic updating of the LRNSs from other navaids should be closely monitored, and before entry into airspace where different navigation requirements have been specified (e.g. RNP5 in European BRNAV airspace), flight crews should use all aids (including VORs and DMEs) to confirm that the in-use navigation system is operating to the required accuracy. If there is any doubt regarding system accuracy, the appropriate ATC unit should be informed.

8.5 SPECIAL IN-FLIGHT PROCEDURES

CPDLC Route Clearance Uplinks

8.5.1 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. All ANSPs in the NAT are progressing to have full functionality soon.

8.5.2 As per ICAO Doc 10037 GOLD Manual there are 4 possible CPDLC route clearance uplinks that can be used as described in the table below:

CPDLC Route Clearance Uplink	**GOLD Description**	**Route Discontinuity**
UM74 / RTEU-2	PROCEED DIRECT TO [position]*	No
UM79 / RTEU-6	CLEARED TO [position] VIA [route clearance]	Yes if [position] is not part of FMS flight plan
UM80 / RTEU-7	CLEARED [route clearance]	Entire FMS routing is replaced
UM83 / RETU-9	AT [position] CLEARED [route clearance]	After [position] entire FMS routing is replaced

*****Not loadable by some Airbus aircraft

8.5.3 Flight crews should ensure that the CPDLC route clearance uplink properly "loads" before sending WILCO.

8.5.4 There has been flight crew misunderstanding on some aircraft for those CPDLC uplinks that contain [route clearance]. The "details" of the [route clearance] are not displayed to the flight crew until they LOAD the uplink into the FMS. For example, prior to loading the CPDLC uplink UM79 / RTEU-6, the display to the flight crew is "CLEARED TO [position] VIA ROUTE CLEARANCE. This has been misinterpreted to mean "Cleared directly to the position" and thus not abiding by the "route clearance" which may contain several other waypoints.

8.5.5 To mitigate the display ambiguity, flight crews should always LOAD the CPDLC uplink first to ensure proper load and to be able to verify the routing on the FMS before sending WILCO and executing the clearance.

8.5.6 Weather data (winds and temperature) may be lost after executing the CPDLC route clearance uplink. Flight crews should replace the data as required to ensure proper ADS-C reporting.

8.5.7 Flight crews should revert to voice if in doubt about any CPDLC uplink

Strategic Lateral Offset Procedures (SLOP)

8.5.8 ATC clearances are designed to ensure that separation standards are continually maintained for all traffic. However, the chain of clearance definition, delivery and execution involves a series of technical system processes and human actions. Errors are very rare but they do occur. Neither flight crews ~~pilots~~ nor controllers are infallible. Gross Navigation Errors (usually involving whole latitude degree mistakes in route waypoints) are made, and aircraft are sometimes flown at flight levels other than those expected by the controller. When such errors are made, ironically, the extreme accuracies of modern navigation and height keeping systems themselves increase the risk of an actual collision. Within an ATS ~~s~~Surveillance environment the controller is alerted to such errors and can, using VHF voice communications, intervene in a timely fashion. This is not the case in oceanic ~~Oceanic~~ airspace, such as the North Atlantic, where the controller's awareness of the disposition of a significant proportion of the traffic is reliant largely upon flight crew ~~pilot~~ position reports through communication links utilising HF or ~~SATCOM Voice~~ SATVOICE via third party radio operators. And furthermore, even among that proportion of traffic utilising data link for automated position reporting, and perhaps ATS communications, navigation errors continue to occur. Consequently, it has been determined that allowing aircraft conducting oceanic flight to fly self-selected lateral offsets will provide an additional safety margin and mitigate the risk of traffic conflict when non-normal events such as aircraft navigation errors, height deviation errors and turbulence induced altitude-keeping errors do occur. Collision risk is significantly reduced by application of these offsets. These procedures are known as "Strategic Lateral Offset Procedures (SLOP)".

8.5.9 This procedure provides for offsets within the following guidelines:

a) along a route or track there will be three positions that an aircraft may fly: centreline or one or two miles right *(Note: SLOP provisions as specified in ICAO PANS-ATM Doc.4444 were amended 13 November 2014 to include the use of "micro-offsets of 0.1 NMs ~~Nms~~ for those aircraft with this FMS capabilty. Appropriate guidance for the use of this amended procedure in the North Atlantic is under study and hence pending);*

b) offsets will not exceed 2 NM right of centreline; and

c) offsets **left** of centreline **must <u>not</u> be made**.

8.5.10 Distributing aircraft laterally and equally across the three available positions adds an additional safety margin and reduces collision risk. SLOP is now **a standard operating procedure** for the entire NAT region ~~Region~~ and flight crews ~~pilots~~ **are required** to adopt this procedure as is appropriate. In this connection, it should be noted that:

a) Aircraft without automatic offset programming capability must fly the centreline.
b) To achieve an equal distribution of flying the centreline or 1 NM (one nautical mile) right or 2 NM (two nautical miles) right of centerline, it is recommended that flight crews ~~pilots~~ of aircraft capable of programming automatic offsets should randomly select flying centreline or an offset. ~~*(See Note in 8.5.2 a) above)*~~ In order to obtain lateral spacing from nearby aircraft (i.e. those immediately above and/or below), flight crews ~~pilots~~ should use whatever means are available (e.g. ACAS/TCAS, communications, visual acquisition, GPWS) to determine the best flight path to fly.

c) An aircraft overtaking another aircraft should offset within the confines of this procedure, if capable, so as to create the least amount of wake turbulence for the aircraft being overtaken.

d) For wake turbulence purposes, flight crews ~~pilots~~ should fly one of the three positions shown above. Flight crews ~~Pilots~~ should not offset to the left of centreline nor offset more than 2 NM right of centreline. Flight crews ~~Pilots~~ 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 ~~pilot~~ will use their ~~his/her~~ 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 ~~aeroplane~~. See also Chapter 13~~, paragraph 13.5.~~)* As indicated below, contact with ATC is not required.

e) Flight crews ~~Pilots~~ 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.

f) Aircraft transiting ATS Surveillance-controlled airspace mid-ocean should remain on their already established offset positions.

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 F285 in the Reykjavik CTA.

8.5.11 ~~SLOP has been implemented as a standard operating procedure in the NAT Region since 2004. An indication of the proportion of pilots adopting a SLOP offset here is obtained through study of ADS-C position reports. Such study has shown that during 2012 more than 40% of aircraft flying in the NAT MNPS Airspace selected the 1NM Right option and about 20% chose the 2NM Right option. As indicated above, system safety would be further enhanced if aircraft were more evenly distributed between the centreline, 1 and 2 NM Right options. As proposed in paragraph 8.5.10 b) above, Pilots~~ Flight crews should attempt to determine the offsets (if any) being flown by aircraft immediately ahead on the same track one flight level above and one flight level below. And then select an offset which differs from those. If this is not possible or practical, then flight crews ~~pilots~~ should randomly choose one of the three flight path options.

8.5.12 ~~The previously mentioned study of ADS-C position reports has also shown that some aircraft continue to adopt an offset LEFT of cleared track centre-line. The standard SLOP procedures are designed to provide safety enhancements for both uni-directional and bi-directional flows.~~ On bi-directional routes a LEFT offset will INCREASE collision risk rather than decrease it. There are areas in the NAT region ~~Region~~ where bi-directional traffic flows are routinely used. And there are times when opposite direction traffic may be encountered in any part of the region ~~Region~~. ~~Pilots~~ Flight crews must therefore recognise that **LEFT offsets from the cleared track centre-line must not be adopted**. ~~After the introduction of RVSM and before the adoption of SLOP, a NAT offsetting procedure was promulgated for wake turbulence avoidance. This procedure allowed both right and left offsets to be flown. The procedure was developed primarily with a view to the unique traffic flows of the NAT OTS, where uni-directional traffic occupied every flight level from FL310 to FL390. That wake turbulence avoidance specific procedure is no longer in place.~~ The avoidance of wake turbulence (even in the OTS) can be accomplished effectively within the confines of the SLOP procedures, as specified in paragraph 8.5.1010 d) above. ~~Pilots~~ Flight crews should communicate with the other aircraft involved to co-ordinate a pair of mutual offsets from within the allowed three options, in order to mitigate any wake-turbulence issue.

Monitoring during Distractions from Routine

8.5.13 Training and drills should ensure that minor emergencies or interruptions to normal routine are not allowed to distract the flight crew to the extent that the navigation system is mishandled.

8.5.14 If during flight the autopilot is disconnected (e.g. because of turbulence), care must be taken when the navigation steering is re-engaged to ensure that the correct procedure is followed. If the system in use sets specific limits on automatic capture, the across-track indications should be monitored to ensure proper recapture of the programmed flight path/profile.

8.5.15 Where flight crews have set low angles of bank, perhaps 10° or less, say for passenger comfort considerations, it is essential to be particularly alert to possible imperceptible departures from cleared track.

Avoiding Confusion between Magnetic and True Track Reference

8.5.16 To cover all navigation requirements, some operators produce flight plans giving both magnetic and true tracks. However, especially if flight crews are changing to a new system, there is a risk that at some stage (e.g. during partial system failure, re-clearances, etc.), confusion may arise in selecting the correct values. Operators should therefore devise procedures which will reduce this risk, as well as ensuring that the subject is covered during training.

8.5.17 Flight ~~C~~crews who decide to check or update their LRNSs by reference to VORs should remember that in the Canadian Northern Domestic airspace ~~Airspace~~ these may be oriented with reference to true north, rather than magnetic north.

Navigation in the Area of Compass Unreliability

8.5.18 As aircraft move towards the Earth's North magnetic pole the horizontal field strength reduces and the ability of the compass to accurately sense magnetic North is reduced. It is generally recognised that when the horizontal magnetic field strength falls below 6000 nanotesla, the magnetic compass can no longer be considered to be reliable. Moreover, when the horizontal magnetic field strength falls below 3000 nanotesla, the magnetic compass is considered to be unusable. ~~Within the NAT HLA the North West of Greenland is an area of Compass Unreliability and adjoining a~~Areas of Canadian airspace include areas where the magnetic ~~C~~compass is unusable. ~~En-route~~ Enroute charts for the North Atlantic and North Polar areas show the areas where the compass is either unreliable or unusable.

8.5.19 In areas where the compass is unreliable or unusable, basic inertial navigation requires no special procedures. Different manufacturers may offer their own solutions to the special problems existing in such areas. However, such solutions should not involve the use of charts and manual measurement of direction.

8.5.20 ~~Furthermore, Operators/Pilots are reminded that before operating in an area of Compass Unreliability they are responsible for checking with their State Authorities whether specific regulatory approval or training is required.~~ Some State authorities require operators obtain specific approval and/or training prior to operations in areas of compass unreliability. Operators should confirm this prior to flights in those areas.

Deliberate Deviation from Track

8.5.21 Deliberate temporary deviations from track are sometimes necessary, usually to avoid severe weather.~~;~~ ~~w~~Whenever possible, ~~prior~~ ATC approval should be obtained before deviating from the assigned track (See Chapter 13 ~~Section 13.4~~). Nevertheless, ~~S~~such deviations have often been the source of gross errors as a consequence of failing to re-engage the autopilot with the navigation system. It should also be noted that selection of the 'turbulence' mode of the autopilot on some aircraft may have the effect of disengaging it from the aircraft navigation system. After use of the turbulence mode, extra care should be taken to ensure that the desired track is recaptured by the steering navigation system.

~~8.6 POST-FLIGHT PROCEDURES~~

~~Inertial Navigation System Accuracy Check~~

8.6.1 ~~At the end of each flight, an evaluation of accuracy of the aircraft's navigation systems should be carried out. Equipment operating manuals specify maxima for radial errors before a system is considered to be unserviceable. For early gimballed-platform inertial systems these are in the order of 2 NM per hour. One method used to determine radial error is to input the shutdown ramp position; in other systems error messages are output giving differences between raw inertial reference positions and computed radio navigation updated positions. Whatever method is used, a record should be kept of the performance of each INS.~~

8.7 HORIZONTAL NAVIGATION PERFORMANCE MONITORING

8.7.1 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/.

8.7.2 Flight crews ~~Pilots~~ and 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.

8.7.3 The CMA also maintains a database ~~data base~~ of all NAT HLA approvals ~~Approvals~~. The CMA runs a continuous monitoring process to compare this approvals ~~Approvals~~ list with the records of all aircraft flying in the NAT HLA. The approval ~~Approval~~ status of any aircraft involved in a track deviation is specifically checked against the database ~~data base~~ 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 also to minimise the consequences of equipment failures and possible human errors. Should any of the required components fail, ATC must be so informed.

9.1.2 ~~As is the case with lateral navigation systems, technical failures of altimetry and/or height keeping systems are extremely rare within the NAT HLA. However, less rare in the NAT HLA are situations in which an aircraft is flown at a level other than that cleared by ATC. ATC Loop Errors, when there is a misunderstanding or miscommunication between ATC and the pilot over the actual cleared level, unfortunately do occur. In an SSR ATS Surveillance environment ATC are is alerted immediately when aircraft departs from the cleared level. Furthermore, with Direct Controller Pilot Communications (DCPC) the controller can instantly intervene to resolve the situation and/or to provide potential conflict warnings to other traffic. In the NAT HLA SSR ATS Surveillance coverage is very limited and regular air/ground ATC Vvoice communications are usually sometimes conducted via a third party radio operator.~~

9.1.3 In the event of severe turbulence, RVSM procedures may be suspended. ~~Severe turbulence in the NAT HLA is uncommon but mountain waves in the vicinity of Greenland and clear air turbulence associated with jet streams are not unknown do occur. Aircraft encountering such conditions can inadvertently depart from their cleared levels or the pilot may elect to change level to avoid the effects of the turbulence. Other circumstances also occur in which the pilot will be forced to change level, before an appropriate ATC re-clearance can be obtained, e.g. power or pressurisation failure, freezing fuel, etc. Again, without ATS Ssurveillance or DCPC, there can be a significant lag between the aircraft's departure from its cleared level and any possible action from the controller to provide separation from any other potentially conflicting traffic.~~

9.1.4 ~~It must be appreciated that the NAT HLA is the busiest oceanic airspace in the world. Furthermore, NAT traffic is comprised of a very wide range of aircraft types, flying a wide range of sector lengths and carrying a significant range of loads. As a result, optimum flight levels vary over the whole jet cruising range and nearly all the flight levels of the core tracks of the OTS, during peak hours, are fully occupied. Also, the Mach Numbers flown can vary significantly (e.g. typically between M0.78 and M0.86), resulting in up to 20 minutes variation in NAT transit times. Given that the nominal longitudinal separation standard employed in the NAT HLA is 10 minutes, o One consequence of the foregoing is that it is rare for any NAT OTS flight to transit the NAT without overtaking, or being overtaken, by another aircraft at an adjacent level on the same track. It will therefore be seen that any on-track departure from cleared level in the NAT HLA will involve a significant risk of conflicting with other traffic. Furthermore, given the extreme accuracy of lateral track-keeping provided by modern LRNSs (e.g. GPS) such conflict risk can translate to a collision risk.~~ **It is primarily with this in mind that the Strategic Lateral Offset Procedures** (see ~~"Strategic Lateral Offset Procedures (SLOP)" above in Chapter 8~~ **have been established as a standard ~~operating procedure in the NAT Region~~**.

Pre-Flight

9.1.5 For flight through the NAT HLA the aircraft and the operator must have the appropriate State approvals ~~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 ICAO Doc 9574 (Manual on implementation of a

300m (1,000ft) Vertical Separation Minimum between FL290 and FL410 inclusive~~.~~) and detailed in FAA Advisory Circular (AC) 91-85 which can currently be accessed through: ~~http://www.faa.gov/air_traffic/separation_standards/rvsm/documents/AC_91-85A_7-21-2016.pdf.~~ http://www.faa.gov/documentlibrary/media/advisory_circular/AC_91-85A. 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 http://www.eurocontrol.int/articles/library ~~(paragraph 17.2.4 also refers)~~.

9.1.6 ~~The Minimum Equipment List (MEL) for RVSM operations must be strictly observed.~~

9.1.7 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.~~; the letter 'X' must still be included to show that the aircraft satisfies NAT HLA lateral navigation performance requirements.~~

~~*Note: Reduced lateral separation standards are currently implemented in the New York East and Santa Maria FIRs and in the WATRS Plus Airspace. RNAV 10 (RNP 10) or RNP 4 Approval is required in order to benefit from these reduced separations employed here. Any NAT HLA Aircraft intending to also fly through these airspaces should ensure that its RNP Approval status is also included in the filed Flight Plan. Specifically such operators should:*~~

~~i) *annotate ICAO Flight Plan Item 10 (Equipment) with the letters "R" and "Z", and*~~

~~ii) *annotate Item 18 (Other Information) with, as appropriate, "PBN/A1" or "PBN/L1" (no spaces).*~~

9.1.8 ~~Most flights through the NAT HLA enter via European and/or North American RVSM airspace. These flights will have been~~ For operations in NAT HLA, flight crews are required to perform standard pre-flight checks of altimeters ~~for their initial operations in those continental RVSM areas~~. ~~Other flights departing directly into the NAT Region should ensure that such checks are made.~~

9.1.9 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 ~~Region~~. Both such arrangements are explained in Chapter 1 ~~above~~ (See Special Arrangements for Non-RVSM Approved Aircraft – Section 1.6).

In-Flight – Before Operating in the NAT HLA

9.1.10 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. ~~An altimeter cross check should be carried out;~~ ~~**at least two primary altimeters must agree within plus or minus 200 ft.**~~ 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 ~~subsequent~~ contingency situations.

In-Flight – Entering and Flying in the NAT HLA

9.1.11 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.

9.1.12 When passing waypoints, or at intervals not exceeding 60 minutes (whichever occurs earlier), or on reaching a new cleared flight level, a cross-check 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 so informed ~~as soon as possible.~~

9.1.13 To prevent unwanted TCAS/ACAS warnings or alerts, when first approaching any cleared flight level in NAT RVSM airspace, flight crews ~~pilots~~ 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 ~~aeroplane~~ aircraft neither undershoots nor overshoots the cleared level by more than 150 ft.

9.1.14 ~~Abnormal operational circumstances (e.g. engine failures, pressurisation problems, freezing fuel, turbulence, etc.), sometimes require a pilot to change level prior to obtaining a re-clearance from ATC. Such a timely re-clearance is more difficult to obtain in oceanic or remote areas where DCPC are not necessarily available. This is indeed the case in the NAT HLA, in which ATS voice communications are conducted indirectly through a third party radio operator, utilising HF, SATCOM Voice or GP/VHF facilities. As previously indicated, extreme caution and vigilance should be exercised when executing any such (uncleared) level changes, as the potential collision risk (particularly in the OTS) is significant.~~

9.1.15 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 ~~pilot~~ 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 ~~pilots~~ not using CPDLC/ADS-C always report to ATC immediately on leaving the current cruising level and on reaching any new cruising level**.

9.1.16 ~~The Strategic Lateral Offset Procedures (SLOP) described in Section 8.5 have been established as a standard operating procedure in the NAT Region to assist in mitigating the potential risks of any of the foregoing height deviations or errors.~~

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 ~~in the Bodø, Reykjavik, Gander, Santa Maria, Shanwick, and New York oceanic East areas,~~ where radar, ADS-B or multilateration coverage exists in accordance with ATS Surveillance procedures in the PANS ATM (Doc 4444). (See Attachment 9)

10.1.2 ~~The carriage of~~ ADS-B equipage is ~~has~~ not ~~been~~ mandated in the NAT. ~~Even though ADS-B equipage level is already high (above 80%) in the NAT Region , there are some aircraft that cannot be seen on ADS-B. As a consequence ANSPs will continue to provide procedural separation between non-ADS-B equipped aircraft and any other aircraft in ADS-B airspace that is not also covered by radar or multilateration~~.

10.1.3 ~~The ATS Surveillance services are provided in accordance with the ATS Surveillance services procedures in the PANS ATM (DOC 4444).~~

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. Radar control services are provided in particular portions of the NAT Region (e.g. the southern and eastern portions of Reykjavik OCA). Here, transponder Transponder codes issued by the controlling authority must be retained until advised. Otherwise, unless directed by ATC, pilots flying in the NAT FIRs will operate transponders continuously in Mode A/C Code 2000, except that the last assigned code will be retained for a period of 30 min after entry into NAT airspace or after leaving a radar service area. Pilots should recognise that it is important to change from the last assigned domestic code to the Mode A/C Code 2000 since the original domestic code may not be recognised by the subsequent Domestic Radar Service on exit from the oceanic airspace. (One exception Exceptions to this requirement should be noted. 1. Because of the limited time spent in the NAT HLA when flying on Route Tango 9, the change from the last assigned domestic code to Code 2000 should be made Northbound 10 minutes after passing BEGAS and Southbound 10 minutes after passing LASNO.), and 2. For all eastbound flights routing Reykjavik – Shanwick – Scottish, ten minutes after entering EGGX airspace, shall squawk Mode A Code 2000.)~~ All aircraft operating as IFR flights in the NAT region shall be equipped with a pressure- altitude reporting SSR transponder. Where radar services are provided in the NAT region, transponder codes issued by the control unit must be retained while operating in radar airspace and for a period of 30 minutes after entry into NAT airspace or after exiting a radar service area. After the 30 minute time frame, transponders must be operated continuously in Mode A/C code 2000.

Note 1: Because of the limited time spent in NAT HLA when flying on Route Tango 9, change to code 2000 should be made 10 minutes after passing BEGAS northbound and 10 minutes after passing LASNO southbound.

Note 2: All eastbound flights routing Reykjavik – Shanwick – Scottish shall squawk Mode A Code 2000 ten minutes after entering EGGX airspace.

10.2.2 ~~It should be noted that this~~ 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 crews~~

Note: Flight ~~C~~crews ~~must~~ should exercise ~~CAUTION~~ caution when selecting ~~C~~codes so as not to inadvertently cycle through any of ~~these~~ the 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 ~~Region~~ as well as within some portions of the NAT HLA~~, specifically in the Gander, Reykjavik and Santa Maria OCAs~~.

10.3.2 Eligibility for ADS-B service in the NAT is based upon the provisions in the ~~NAT Regional Supplementary Procedures (ICAO~~ Doc 7030~~)~~ section 5.5.

Note: The following documents provide guidance for the installation and airworthiness approval of ADS-B OUT system in aircraft ~~and ensure compliance with a) above~~:

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 procedures contained in 10.3.5 below shall be applicable in those portions of the following FIRs where an ADS-B-based ATS surveillance service is provided:~~

10.3.4 ~~Reykjavik FIR, Søndrestrøm FIR, Bodø FIR, Gander Oceanic FIR, New York Oceanic East FIR and Santa Maria Oceanic FIR.~~ 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 ~~packages~~ 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.

10.3.5 ~~An aircraft carrying 1090 MHz extended squitter (1090ES) ADS-B equipment shall disable ADS-B transmission unless:~~

~~a) the aircraft emits position information of an accuracy and integrity consistent with the transmitted values of the position quality indicator; or~~

~~b) the aircraft always transmits a value of 0 (zero) for one or more of the position quality indicators (NUCp, NIC, NAC or SIL), when the requirements of a) above cannot be met; or~~

c) ~~the operator has received an exemption granted by the appropriate ATS authority.~~

~~Note. The following documents provide guidance for the installation and airworthiness approval of ADS-B OUT system in aircraft and ensure compliance with a) above:~~

~~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.~~

10.3.6 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.

10.3.7 ~~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 via a cockpit interface. 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 packages 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.*~~

10.3.8 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 ~~pilot~~ 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 North Atlantic Data Link Mandate Airspace~~

10.4.1 ~~In each of the phases of the NAT Data Link Mandate implementation plan, areas/level bands are defined, within which, to plan and/or fly, the aircraft must be equipped with FANS 1/A (or equivalent) CPDLC and ADS-C. However, where ATS surveillance service is provided using either SSR or ADS-B, appropriately equipped aircraft (i.e. with Mode A/C transponders or ADS-B transmitters, respectively) are exempt from the DLM requirement for FANS 1/A equipage. Two charts, The chart shown in Attachment 9 (still pending) to this document, gives a general indication of the Radar and ADS-B coverage in the NAT Region. However, when planning a NAT flight and intending to perhaps benefit from the terms of any DLM exemption, Operators must consult the current AIS of all the relevant NAT ANSP States.~~

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 ~~pilots~~, ~~O~~operators and ATS ~~P~~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 ~~O~~operator in co-operation with flight crews;

b) monitoring of ~~O~~operators by the State having jurisdiction over those ~~O~~operators in order to ensure that acceptable operating procedures are being applied by the ~~O~~operator while conducting authorised flight operations;

c) monitoring of actual aircraft systems performance in normal flight operations, as observed by means of ATS ~~s~~Surveillance by the ATC units of States providing service in the NAT ~~R~~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 ~~O~~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 ~~P~~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 ~~O~~operators. In deciding what records should be kept, ~~O~~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 ~~pilot~~;

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; and

h) where available, navigational and performance data contained in the aircraft's flight data recorders.

i) retention of aircraft flight data ~~(FDR)~~ 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 ~~O~~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 ~~O~~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 ~~data base~~ database of all NAT HLA approvals ~~Approvals~~. The CMA runs a continuous monitoring process to compare this approvals ~~Approvals~~ list with the records of all aircraft flying in the NAT HLA. The approval ~~Approval~~ status of any aircraft involved in a track deviation is specifically checked against the ~~data base~~ 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 OACC 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 ~~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 ~~ATS surveillance stations~~ ANSPs capable of monitoring the boundaries of the NAT region ~~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 ~~whilst~~ the latter provides a wider appreciation of navigation in the NAT region ~~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 25NM has been detected by the ATS ~~P~~provider State or has been reported to ATC by the flight crew ~~pilot~~, that ATS ~~P~~provider unit will, in co-operation with the ~~O~~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/~~O~~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 ~~administration~~ 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 ~~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 OACC 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 ~~pilots~~, 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 ~~whilst~~ 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 ~~Region~~, to assess whether the relevant TLS is being maintained.

Monitoring of Operational Height-keeping Performance

11.3.6 The introduction of RVSM airspace ~~Airspace~~ into the NAT region ~~Region~~ has increased the necessity for consistent and accurate reporting by flight crews ~~pilots~~ 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 ~~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 ~~pilots~~ and controllers should complete an ACAS II RA report. Aircraft ~~O~~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 ~~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 ~~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 ~~Pilots~~ who are uncertain of, or are unable to confirm their approval status, are issued a clearance to operate outside NAT HLA/RVSM airspace ~~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 ~~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 ~~Region~~. It is composed of ATS provider and airspace user representatives and Regulators. It directs safety oversight and management in the NAT region ~~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 ~~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 ~~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 ~~Region~~. It provides participating States, ICAO and other selected ~~O~~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 ~~P~~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;~~
- 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 ~~P~~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 ~~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, ~~and~~ 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 ~~pilot~~ 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) and also that an error report will be processed; any comment made by the pilot at the time of notification should be recorded;~~

c) the ~~O~~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 ~~(facsimile, AFTN, etc.)~~ and with the least possible delay~~. This will be followed as soon as possible by a written confirmation. All notifications will be copied to the CMA~~; and

d) where an observed deviation is equal to or greater than 10~~25~~NM the appropriate State of Registry or the State of the ~~O~~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 ~~co- operation~~ 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 ~~pilot~~ of the aircraft concerned of the observed error and also that an error report may be processed; any comment made by the flight crew ~~pilot~~ at the time of notification should be recorded;

b) where the observed deviation from track is ~~50~~ 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~~25~~ NM or more but less than 20~~50~~ NM, the observing ATC unit, or other agency designated by the State, will notify the CMA of the deviation with the least possible delay ~~using facsimile, AFTN, etc~~. ~~This will be followed by a written confirmation. The CMA will then advise the State of operator or State of Registry.~~

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 ~~O~~operator and a designated agency of the State having responsibility for the ATC unit which observed the deviation, on the understanding that:

11.7.14 ~~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 Ooperator 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~~25~~ NM or more but less than 20~~50~~ NM occurring outside the NAT HLA) will not normally require further action;

b) the State of Registry or the State of the ~~O~~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 ~~O~~operator concerned or the State of Registry.[MV(15]

Other Reports to the CMA

11.7.15 Details of the following occurrences should also be reported to the CMA by the ATS ~~P~~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 25NM

d) discrepancies of 3 minutes or more between an ETA/ATA at a waypoint; and

e) occasions when an ~~O~~operator is suspected of not being in possession of an NAT HLA/RVSM approval.

f) diversions or ~~T~~turnbacks, noting in particular whether the appropriate published contingency procedure was correctly adopted.

g) ACAS RAs

h) wake turbulence reports

i) incorrect application of the SLOP (e.g a left offset).

CHAPTER 12

PROCEDURES IN THE EVENT OF NAVIGATION SYSTEM DEGRADATION OR FAILURE

12.1 GENERAL

12.1.1 ~~The~~ Aircraft navigation systems ~~fitted to NAT HLA Aapproved aircraft~~ are generally very accurate and very reliable; ~~and GNEs~~, as a result, GNEs due to ~~of~~ system ~~technical~~ 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. ~~Nevertheless, t~~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. ~~As previously stated, actual failures of navigation systems or equipment in NAT HLA Approved aircraft occur very rarely. However, when they 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.~~ '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. ~~NAT HLA Approved aircraft which have suffered any equipment failures prior to NAT entry that result in only a single LRNS remaining serviceable may still be flight planned and flown through the NAT HLA but only on specified routes established for this purpose.~~ 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 ~~on these same specified~~ routes specified for this purpose (see paragraph 12.2) and on other particular routings serving individual traffic axes e.g. the Tango ~~R~~routes, ~~R~~routings between the Iberian Peninsula and the Azores/Madeira and ~~R~~routes between Iceland and Greenland (See Chapter 3 ~~of this Manual~~).

12.1.3 If ~~after take-off,~~ abnormal navigation indications relating to INS or IRS systems occur after take-off, they should be analysed to discover their cause. ~~Unless the flight can proceed safely using alternative approved navigation sources only, the pilot should consider landing at the nearest appropriate airfield to allow the problem to be fully investigated, using technical assistance if necessary.~~ Under no circumstances should a flight continue into oceanic ~~(NAT HLA)~~ airspace with unresolved navigation system errors, or with errors ~~which have been established to have been~~ caused by inertial platform misalignment or initial position insertion ~~error~~.

12.1.4 Flight ~~C~~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 ~~C~~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 ~~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.

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. ~~In such instances, ATC should be advised that the flight is experiencing navigation difficulties so that appropriate separation can be effected if necessary~~.

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. ~~As a generalisation, if there is a difference greater than 15 NM between two aircraft navigation systems (or between the three systems if it is not possible to detect which are the most reliable) it is advisable to split the difference between the readings when determining the aircraft's position. However, if the disparity exceeds 25 NM one or more of the navigation systems should be regarded as having failed, in which case ATC should be notified.~~

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 1NM 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.

~~GPS~~ GNSS Failures

12.1.10 ~~If the GPS displays a "loss of navigation function alert", the pilot should immediately revert to other available means of navigation, including DR procedures if necessary, until GPS navigation is~~

~~regained. The pilot must report the degraded navigation capability to ATC.~~ GNSS are also very accurate and typically very reliable. Unlike inertial systems, GNSS failures can come about as a result of malfunctions off 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 cross-check 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 ~~GPS~~ 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 ~~GPS~~ GNSS position with the position indicated by another LRNS sensor (i.e. other than ~~GPS~~ 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 ~~pilot~~ should adopt navigation system failure procedures as subsequently described, until the exclusion function or navigation integrity is regained~~,~~. ~~and should report degraded navigation capability to ATC.~~ The flight crew should follow flight manual procedures specified for this type of malfunction.

Fault Detection Alert

12.1.12 If the ~~GPS~~ GNSS receiver displays a fault detection alert (i.e. a failed satellite), the flight crew may choose to continue to operate using the ~~GPS~~-GNSS-generated position if the current estimate of position uncertainty displayed on the ~~GPS~~ GNSS from the FDE algorithm is actively monitored. If this exceeds 10 ~~nm~~ NM, the flight crew ~~pilot~~ should immediately begin using the following navigation system failure procedures, until the exclusion function or navigation integrity is regained~~,~~. ~~and should report degraded navigation capability to ATC.~~ 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 ~~pilot~~ 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 ~~as follows:~~ described in Chapter 3.

~~— 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 67°N 60°W – YXP *(VHF coverage exists. Non HF equipped aircraft can use this route)*~~

~~– OZN – 59°N 50°W – ALTOD - PRAWN – YDP~~

~~– OZN – 59°N 50°W – CUDDY - PORGY – HO~~

~~– OZN – 58°N 50°W – HOIST - LOACH – YYR~~

~~d) The following special routes may also be flown without an LRNS (i.e. with only short-range navigation equipment such as VOR, DME, ADF), but it must be noted that State approval for operation within the NAT HLA via these routes is still necessary:~~

~~– VALDI - MY (Myggenes) - ING – KFV (G3)~~

~~– PEMOS - MY (Myggenes) (G11)~~

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 navaids;

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.~~2.3~~ in AIP Iceland and in Section NAT 1.19 ~~RAC 11.22~~ 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 ~~2~~ 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 ~~pilot~~ 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 ~~pilot~~ should normally continue to operate the aircraft in accordance with the ~~O~~oceanic ~~C~~clearance already received, appreciating that the reliability of the total navigation system has been significantly reduced.

12.2.6 The flight crew ~~pilot~~ 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 ~~O~~oceanic ~~C~~clearance.

12.2.7 When the flight continues in accordance with its original clearance (especially if the distance ahead within the NAT HLA is significant), the flight crew ~~pilot~~ 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 OACC 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)
~~e.g. drift, groundspeed, wind details.~~

The Remaining System Fails After Entering the NAT HLA

12.2.8 The flight crew ~~pilot~~ 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 121.5 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 ~~NOAA/~~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 Situations can be anticipated in which the provision of Air Traffic Management to flights within the NAT region ~~Region~~ might be affected. NAT ATS ~~P~~providers have developed arrangements which would, in such events, be put in place to ensure, as far as possible, the continued safety of air navigation. These arrangements include required contingency actions by flight crews ~~pilots~~ and operators of any affected flights. They are detailed in 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" (See also Chapter 6 ~~section 6.7 above~~ for further details).

13.1.2 However, circumstances can also occur which only affect an individual aircraft. The remainder of this ~~C~~chapter details guidance to flight crews ~~pilots~~ on contingency actions to follow in such circumstances in order to protect the safety of the flight.

13.1.3 ~~The following procedures are intended for guidance only.~~ Although all possible contingencies cannot be covered, they provide for such cases as:

a) inability to maintain assigned level due to weather (for example severe turbulence);

b) aircraft performance problems; or

c) pressurisation failure.

13.1.4 They are applicable primarily when rapid descent, turn-back, or diversion to an alternate aerodrome is required. The flight crew's ~~pilot's~~ judgement will determine the specific sequence of actions taken, having regard to the prevailing circumstances.

13.1.5 The flight crew shall take action as necessary to ensure the safety of the aircraft, and the flight crew'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.

Note — If an aircraft is forced to deviate from the cleared track or route prior to obtaining a revised ATC clearance, the controller ceases to be responsible for providing separation between the deviating aircraft and other aircraft until a revised clearance comes into effect.

13.1.6 It is important to understand that safe separation between aircraft in the NAT is assured only when all aircraft are flying the track, airspeed, and altitude assigned by ATC. Inflight contingencies, which force flight crews ~~pilots~~ to deviate from their assigned track, speed and/or altitude, without prior coordination with ATC, can result in less than minimum prescribed separation between aircraft.

13.1.7 The flight crew's ~~pilot's~~ judgement of the situation and the need to ensure the safety of the aircraft will determine the actions taken. Factors for the flight crew to consider when diverting without an ATC clearance include but are not limited to: operation within a parallel track system where the aircraft's diversion path will likely cross adjacent tracks or routes, the potential for UPRs parallel to the aircraft's track or route, the nature of the contingency (e.g. aircraft system malfunction) and weather factors (e.g. convective weather at lower flight levels).

13.1.8 The procedures for descent below FL 290 are considered particularly applicable to operations where there is a predominant traffic flow (e.g. east-west) or parallel track system. 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.

13.2 GENERAL PROCEDURES

13.2.1 If an aircraft is unable to continue its flight in accordance with its ATC clearance, a revised clearance should be obtained~~, whenever possible,~~. ~~prior to initiating any action, using~~ The pilot should transmit the radio telephony distress (MAYDAY) signal or urgency (PAN PAN) signal as appropriate.

13.2.2 If prior clearance cannot be obtained, an ATC clearance should be obtained at the earliest possible time and, in the meantime, the aircraft should broadcast its position (including the ATS Route designator or the Track Code as appropriate) and its intentions, at frequent intervals on 121.5 MHz (with 123.450 MHz as a back-up frequency). It must be recognised that due to the types of communications used in North Atlantic operations (e,g, CPDLC, HF, VHF, and ~~station-to-station~~ SATVOICE ~~SATCOM Voice and SELCAL with HF~~), flight crews' ~~pilots'~~ situation awareness, of other potentially conflicting traffic, may be non-existent or incomplete. If, however, the aircraft is in an area where ATC communications are being conducted on VHF, pending receipt of any re-clearance, the position and intentions should be broadcast on the current control frequency, rather than 121.5 or 123.450 MHz.

13.2.3 It is appreciated that in such emergency situations communication with ATC may not be the highest priority for flight crews. Hence until a revised clearance is obtained the specified NAT in-flight contingency procedures should be carefully followed. Procedures for general use in oceanic ~~Oceanic~~ airspace are contained within the ICAO PANS ATM (Doc. 4444), ~~specifically Amendment 2 effective November 2009~~. Procedures particular to the NAT HLA environment are contained in ~~ICAO *NAT Regional Supplementary Procedures (Doc.7030)*~~ and appropriate NAT ~~P~~provider States' *AIPs*. ~~The procedures are paraphrased below~~.

13.2.4 In general terms, the aircraft should be flown at a flight level and/or on a track where other aircraft are least likely to be encountered. Maximum use of aircraft lighting should be made and a good look-out maintained. If ACAS/TCAS is operable~~carried~~, the displayed information should be used to assist in sighting proximate traffic.

13.3 SPECIAL PROCEDURES

13.3.1 The general concept of these oceanic ~~Oceanic~~ in-flight contingency procedures is, whenever operationally feasible, to offset from the assigned route by 15 NM and climb or descend to a level which differs from those normally used by 500 ft if below FL410 or by 1000 ft if above FL410.

Initial Action

13.3.2 The aircraft should leave its assigned route or track by initially turning at least 45° to the right or left whenever this is feasible. The direction of the turn should, where appropriate, be determined by the position of the aircraft relative to any organised route or track system (e.g. whether the aircraft is outside, at the edge of, or within the system). Other factors which may affect the direction of turn are: direction to an alternate airport, terrain clearance, levels allocated on adjacent routes or tracks and any known SLOP off sets adopted by other nearby traffic.

Subsequent Action

13.3.3 An aircraft that **is able to maintain its assigned flight level**, after deviating 10 NM from its original cleared track centreline and therefore laterally clear of any potentially conflicting traffic above or below following the same track, should :

a) climb or descend 1000 ft if above FL410

b) climb or descend 500 ft when below FL410

c) climb 1000 ft or descend 500 ft if at FL410

13.3.4 An aircraft that **is unable to maintain its assigned** flight level (e.g due to power loss, pressurization problems, freezing fuel, etc.) should, whenever possible, initially minimise its rate of descent when leaving its original track centreline and then when expected to be clear of any possible traffic following the same track at lower levels and while subsequently maintaining a same direction 15 NM offset track, descend to an operationally feasible flight level, which differs from those normally used by 500 ft if below (or by 1000 ft if above FL410).

13.3.5 Before commencing any diversion across the flow of adjacent traffic or before initiating any turn-back (180°), aircraft should, while subsequently maintaining a same direction 15 NM offset track , expedite climb above or descent below the vast majority of NAT traffic (i.e. to a level above FL410 or below ~~FL280~~ FL290), and then maintain a flight level which differs from those normally used: by 1000 ft if above FL410, or by 500 ft if below FL410. However, if the flight crew ~~pilot~~ is unable or unwilling to carry out a major climb or descent, then any diversion or turn-back manoeuvre should be carried out at a level 500 ft different from those in use within the NAT HLA, until a new ATC clearance is obtained.

13.3.6 If these contingency procedures are employed by a twin engine aircraft as a result of the shutdown of a power unit or the failure of a primary aircraft system the flight crew ~~pilot~~ should advise ATC as soon as practicable of the situation, reminding ATC of the type of aircraft involved and requesting expeditious handling.

13.4 DEVIATIONS AROUND SEVERE WEATHER

13.4.1 If the aircraft is required to deviate laterally from track to avoid weather (e.g. thunderstorms), the flight crew ~~pilot~~ should request a revised clearance from ATC and obtain essential traffic information prior to deviating. This is the case even when a flight crew ~~pilot~~ expects to have to deviate by a relatively small distance (e.g. less than 10 NM). However, if for any reason such prior revised ATC clearance cannot be obtained, and only in such a circumstance, the contingency procedures described at paragraph 13.4.4 below should be adopted. But, nevertheless, in the meantime efforts should be continued to obtain an appropriate revised ATC clearance.

13.4.2 Flight crews ~~Pilots~~ must appreciate that ATC can only provide a revised clearance which will continue to assure that minimum standard separations are maintained from all other traffic, including any on adjacent tracks. When this is not possible, ATC will advise the flight crew ~~pilot~~ “Unable” and will request the flight crew’s ~~pilot’s~~ intentions. The flight crew ~~pilot~~ should indicate the direction, anticipated magnitude and if appropriate the expected altitude change of the intended deviation.

13.4.3 If in receipt of a revised clearance, it should be followed in all its provisions. If such a revised clearance is received after the flight crew ~~pilot~~ has commenced the contingency procedures, this revised clearance will then supersede any and all of the provisions within the contingency procedures.

13.4.4 Only in the event that a revised ATC clearance has not been obtained, the following contingency deviation procedures should be adopted in their entirety:

a) If possible, deviate away from the organized track or route system;

b) Establish communications with and alert nearby aircraft broadcasting, at suitable intervals: aircraft identification, flight level, aircraft position (including ATS route designator or the track code) and intentions, on the frequency in use (when VHF) and on frequency 121.5 MHz (or, as a back-up, on the VHF inter-pilot air-to-air frequency 123.450 MHz);

c) Watch for conflicting traffic both visually and by reference to ACAS/TCAS (if equipped);

d) Turn on all aircraft exterior lights.

e) For deviations of less than 10 NM, aircraft should remain at the level assigned by ATC;

f) For deviations of greater than 10 NM, when the aircraft is approximately 10 NM from track, initiate a level change of 300 ft.

- ~~If flying generally Eastbound (i.e. a magnetic track of 000° to 179°) and deviating left (ie i.e. north) of track then descend 300 ft; if, however, deviating right (i.e. south) of track then climb 300 ft.~~
- ~~If flying generally Westbound (i.e. a magnetic track of 180° to 359°) and deviating left (i.e. south) of track then climb 300 ft; if, however, deviating right (i.e. north) of track then descend 300 ft.~~
  - If flying generally Eastbound (i.e. a magnetic track of 000° to 179°) and deviating left (~~ie~~ i.e. north) of track then descend 300 ft; if, however, deviating right (i.e. south) of track then climb 300 ft.
  - If flying generally Westbound (i.e. a magnetic track of 180° to 359°) and deviating left (i.e. south) of track then climb 300 ft; if, however, deviating right (i.e. north) of track then descend 300 ft.

~~i.e.~~

Route centre line track	*Deviations>19 km (10 NM)*	*Level change*
EAST (000° 179° magnetic)	LEFT RIGHT	DESCEND 90 m (300 ft) CLIMB 90 m (300 ft)
WEST (180° 359° magnetic)	LEFT RIGHT	CLIMB 90 m (300 ft) DESCEND 90 m (300 ft)

g) When returning to track, regain the last assigned flight level, **when the aircraft is within approximately 10 NM of centre line**.

13.4.5 The flight crew ~~pilot~~ should inform ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to the centre line (or previously adopted SLOP Offset) of its cleared route.

13.5 WAKE TURBULENCE

13.5.1 ~~ICAO established a worldwide programme in 2008 for collecting data on wave vortex encounters.. Most wake vortex encounters occur in terminal operations and indeed this is where the aircraft type wake categorization scheme is used to regulate separations. The ICAO programme was aimed at reviewing the categorization scheme in light of the recent introduction into service of a new type of very large aircraft.~~

13.5.2 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 ~~en-route~~ enroute, although less frequently. To accommodate the predominantly uni-directional diurnal traffic flows through the NAT ~~Region~~, 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, ~~en-route~~ enroute wake vortex encounters outside the NAT ~~Region~~ arise from opposite direction passings or route crossing situations. In the NAT ~~Region en-route~~ 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 ~~pilot~~ action is desirable/necessary. See Attachment 3 for the preferred wake vortex reporting form. ~~In the early days of RVSM implementation in the NAT Region a number of such reported encounters led to the development of a "wake turbulence offset procedure". This has now been subsumed into SLOP which is a standard operating procedure throughout the NAT Region and is primarily required to mitigate the collision risk arising from any vertical navigation errors. Any pilot who encounters a wake turbulence event when flying in NAT HLA should ensure that a detailed report is provided and that a copy is forwarded to the North Atlantic Central~~

~~Monitoring Agency. After the expiry of the current ICAO programme, and in the absence of any other relevant mandatory reporting arrangements, the reporting form included at Attachment 3 to this Manual could be used for this purpose.~~

13.5.3 The Strategic Lateral Offset Procedures (SLOP) (see Chapter 8) are now standard operating procedures throughout the NAT region ~~Region~~. Thus when flying within the NAT HLA, if the aircraft encounters wake turbulence and the flight crew ~~pilot~~ considers it necessary to offset from the current track then ~~the~~ they ~~pilot~~ may only elect to fly another of the three options allowable in SLOP (i.e. Cleared Track centre-line, or 1 NM or 2 NM right of centre-line). ~~It is no longer possible to o~~Offsets left of the track centre-line ~~to avoid wake turbulence~~are not authorized. If neither of the remaining SLOP offset tracks are upwind of the other aircraft which is causing the wake turbulence, then the flight crew ~~pilot~~ should co-ordinate with the other aircraft via the inter-pilot frequency 123.450 MHz, and perhaps request that the other aircraft adopt an alternative (SLOP) allowable downwind offset. If wake turbulence is encountered, even if it is subsequently avoided by judicious use of offsets, a report should still be made. ~~If turbulence is encountered but the pilot is unsure whether the cause is wake vortex or perhaps Clear Air Turbulence, a report should be submitted annotated to this effect.~~

13.6 ACAS/TCAS ALERTS AND WARNINGS

13.6.1 ~~With effect from 01 January 2005 a~~All turbine-engined aircraft with a certificated take-off mass exceeding 5,700 Kgs or authorised to carry more than 19 passengers are required to ~~carry and operate~~ be equipped with ACAS II in the NAT region ~~Region~~. ~~It should be noted that with effect from 01 January 2017 o~~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 & 11 and in the Procedures for Air Navigation Services (PANS) Ops & ATM. 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.

~~Possible traffic alerts resulting from ATC use of the 5 minutes GNSS climb/descent through procedure~~

13.6.4 ~~ACAS/TCAS registers targets up to 40 NM. Depending upon OAT/ambient air density, a Mach of about 0.85 equates to a TAS of approximately 480 Kts, or 8 NM per minute. Since the normal longitudinal separation standard employed in the North Atlantic is 10 minutes, pilots would consequently not usually expect their ACAS/TCAS to register targets at the same level, whether these may be in-trail, crossing, climbing or descending through their level. However, since January 2009, s~~Some ~~NAT ATC units are utilising a procedure specified in PANS/ATM Chapter 5, which permits ATC to clear an aircraft to climb or descend through the level of another aircraft, with as little as 5 minutes longitudinal separation, provided that both aircraft are using GNSS (GPS) for position determination and reporting. Many NAT aircraft request and are cleared at lesser Mach Numbers than 0.85. A 5 minutes in trail separation between two aircraft flying at M0.80 and experiencing a headwind component of 30 Kts (not unusual for W/B NAT flights), will equate to approximately 35 NM. Furthermore, depending upon the rounding/truncating protocols used by pilots, FMSs and/or ATC Flight Data Processing Systems (i.e for "minutes and seconds" to "minutes"), a nominal 5 minutes separation can in fact be close to an actual 4 minutes (it can, of course, also be nearly 6 minutes). In such a circumstance the actual longitudinal separation could be less than 30 NM. In these cases ACAS/TCAS may register targets but the generation of Traffic Alerts~~ is~~in unlikely.~~

13.6.5 ~~The rule allowing ATC to use this procedure includes a caveat that the climb or descent needs to be undertaken within 10 minutes of the time that the second aircraft in the pair has passed a common reporting point. Consequently, the pilot of an aircraft cleared for a climb or descent of more than a single flight level, should be alerted to the possibility of a potential ACAS/TCAS alert by the controller's use of any of the conditional phrases "By", "At or Before" or "Not Later Than" in the clearance received. However, the pilot of the "passive participant" aircraft of the 5 minutes separated pair, if it is the following aircraft, could be presented with a "pop-up" ACAS/TCAS target without such a warning. **NAT OPS Bulletin 2010-007*** provides crew guidance in respect of the use of this procedure in the North Atlantic. It includes the following instruction; "If there is any concern regarding the proximity of another aircraft, flight crews must not hesitate to clarify the situation and take *appropriate action* to ensure the safety of the flight." However, given the air/ground communications methods employed in the NAT, the pilot may not receive a response to such a request for "clarification" prior to the other aircraft passing its flight level. Nevertheless, However, even at these separations, Traffic Alerts and Resolution Advisories are not anticipated and it is not expected that pilots will consider deviating from their clearance as "*appropriate action*".~~

~~***Possible traffic targets resulting from ATC use of the 5 minutes longitudinal separation using ADS-C***~~

13.6.6 ~~With effect from 29 March 2018, A trial use ofGander and Shanwick OCAs will implement 5 minutes longitudinal separation between pairs of aircraft following the same track and providing position reports via ADS-C., is currently being conducted within the Gander and Shanwick OCAs. Pilots should be aware that, as explained above with respect to the 5 minutes GNSS based climb/descent through procedure, under certain circumstances there could be the possibility of the pair being separated by less than 40 NM and consequently the possibility of the following aircraft's ACAS/TCAS registering a target. But, as in the climb through case, it is not expected that Traffic Alerts will be generated.~~

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* *available at* www.icao.int/EURNAT/, *following "*EUR & NAT Documents*", then "*NAT Documents*", in folder "*NAT OPS Bulletins*"*

~~CHAPTER 14~~

~~CHECK LISTS FOR FLIGHT CREWS PILOTS OPERATING IN THE NAT HLA~~

~~14.1 INTRODUCTION~~

14.1.1 ~~The North Atlantic HLA is the busiest Oceanic environment anywhere in the world. To safely and efficiently accommodate the high traffic volumes here, unique traffic organization and management techniques are employed and pilots are required to rigorously utilize particular operating procedures. The following Check Lists are provided as guidance. Operators without an oceanic checklist are encouraged to use these and tailor them to their specific needs and approvals.~~

~~14.2 SPECIAL NAT HLA ITEMS~~

14.2.1 ~~To assist those flight crews pilots who are less familiar with operating in the NAT HLA, below is a list of questions which address the unique and/or particularly important NAT HLA check list elements.~~

1. ~~Are you sure that your State of Registry has granted approval for both RVSM and NAT HLA operations in connection with this flight by this aircraft? (See Chapter 1Chapter 1 – "Operational Approval and Aircraft System Requirements for flight in the NAT HLA")~~
2. ~~If it has, are the letters 'X' and 'W' in Item 10 of your flight plan?~~
3. ~~Regardless, Wwhether or not you are intending to follow an organized track, and bearing in mind that the OTS changes every 12 hours, do you have a copy of the valid NAT track message, including when applicable, any "TMI Alpha Suffixed" changes to it? (See Chapter 2 Section 2.3 – "The NAT Track Message".~~
4. ~~Are you familiar with the Mach Number Technique? (See Chapter 7 – "Application of Mach Number Technique")~~
5. ~~Have you had an accurate time check referenced to UTC, and is the system you will be using on the flight deck for NAT HLA operation also accurately referenced to UTC? Is this time accuracy going to be maintained for the planned duration of the flight? (See Chapter 8 in Section 0 – "Importance of Accurate Time")~~
6. ~~If using GPS, have you checked the latest NOTAMs regarding the serviceability of GPS satellites and have you performed a Satellite Navigation Availability Prediction Programme analysis? (See Chapter 8 – "NAT HLA/MNPS Flight Operation & Navigation Procedures")~~
7. ~~If flying via the special Greenland/Iceland routes, have you checked the serviceability of your one remaining LRNS and of your short range navigation systems plus the ground navigation aids which you will use? (See Chapter 12 Section 12.2 – "Loss of Navigation/FMS Capability")~~
8. ~~If flying a non-HF equipped aircraft, is your route approved for VHF only? (See Chapter 4 paragraph 4.2.14 – "Flights Planning to Operate Without Using HF Communications".)~~
9. ~~If flying other than on the special routes, are you sure that both your LRNSs are fully operational?~~
10. ~~Have you planned ahead for any actions you might need to take should you suffer a failure of one LRNS? (See Chapter 12 – "Procedures in the Event of Navigation System Degradation or Failure").~~

11. ~~Are you sure that both your primary altimetry systems and at least one altitude alerter and one autopilot are fully operational?~~

12. ~~Are you familiar with the required procedures for flight at RVSM levels? (See Chapter 9 – "RVSM Flight in THE NAT HLA").~~

13. ~~If the aircraft is FANS1/A equipped plan to utilize CPDLC and ADS-C throughout the NAT segment of the flight. and eEnsure that the appropriate descriptor (J2, J5 or J7) is inserted in Item 10a of the flight plan to indicate FANS 1/A interoperable equipment .~~

14. ~~If ADS-B equipped and planning to fly in entering ADS-B airspace in the NAT make sure your aircraft is approved for ADS-B services, i.e. that it is not one of the aircraft "excluded" from NAT ADS-B services because of failure to meet Doc 7030 technical criteria in the NAT (see Chapter 1 Section 1.7 – "ATS Surveillance Service Areas in the NAT Region").~~

15. ~~Have you correctly entered the Flight ID into the Transponder/FMS control panel? The Flight ID must exactly match the ACID entered in item 7 of the ICAO flight plan.~~

16. ~~Have you entered the appropriate descriptor B1 or B2 in Item 10b of the ICAO flight plan Flight Plan?~~

14.2.2 ~~If, as a pilot, you have any doubt about your answers to these questions, it may be necessary for you to consult with the Civil Aviation Department of your State of Registry.~~

~~14.3 SAMPLE NAT HLA CHECK LIST~~

14.3.1 ~~ICAO North Atlantic Working Groups composed of industry, ATC and state regulators have created a "Sample Oceanic Checklist". It is published on the ICAO website as a NAT Oceanic Error Safety (OES) Bulletin supplement and may be found at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT OPS Bulletins". It is provided as guidance and is not intended to replace an operator's oceanic checklist. However, Operators without an oceanic checklist are encouraged to use this sample and tailor it to their specific needs and approvals. The sample oceanic checklist represents lessons learned from decades of NAT operations and in general, internationally accepted best practices for oceanic operations. It is provided as guidance and is not intended to replace an operator's oceanic checklist. However, all operators are strongly encouraged to review the sample oceanic checklist, either for guidance in developing their own checklist or as a means of assessing the thoroughness of their checklist. Operators can tailor the NAT checklist to their specific needs and approvals. This checklist focuses on an orderly flow and ways to reduce oceanic errors. The details behind, of and the rationale for, the proposed actions listed in the sample checklist are described in the "Expanded Check List", which along with the "NAT Oceanic Errors Safety Bulletin" is also available via the website listed above. Operators are encouraged to review both of those documents. which is also published as a NAT OES Bulletin supplement and similarly available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT OES Bulletins". Operators should use an oceanic check list as part of their Safety Management System (SMS). Operators are also encouraged to study the "NAT Oceanic Errors Safety Bulletin" (OESB). The NAT OESB is also published as a NAT OES Bulletin , again available at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT OES Bulletins".~~

CHAPTER 15

GUARDING AGAINST ~~COMPLACENCY~~ COMMON ERRORS

15.1 INTRODUCTION

15.1.1 ~~Since 1977, when the MNPS rules were introduced,~~ ~~c~~Careful monitoring procedures ~~have provided~~ provide a good indication both of the frequency with which navigation errors occur and their causes. ~~Their frequency is low: only one flight in around ten thousand commits a serious navigation error. However~~, ~~because~~ As a result of the accuracy and reliability of modern navigation systems, the errors which do occur are ~~most~~ often ~~seen to be as a~~ the result of flight crew ~~aircrew~~ error.

15.1.2 Operational errors in the vertical plane also occur. Aircraft are sometimes flown at levels other than those for which ATC clearance has been issued. ~~In preparation for the introduction of RVSM in the NAT Region (1997) a comprehensive data collection programme for vertical deviations was implemented, together with a subsequent annual assessment of the resulting collision risks. As in the horizontal plane, the frequency of vertical errors is low. However, the~~ The potential collision risk of even a single incidence of flying at an un-cleared level can be ~~very~~ significant. The NAT ~~MNPSA (now~~ 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.

15.1.3 It is ~~therefore~~ 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 ~~from being an inevitability~~. ~~Specific reference should be made to~~ ~~All NAT flight crews should be familiar with~~ ~~the "Oceanic Errors Safety Bulletin" which is updated regularly and is available as a NAT OPS Bulletin to be found at www.icao.int/EURNAT/, following "EUR & NAT Documents", then "NAT Documents", in folder "NAT OPS Bulletins".~~

15.1.4 This chapter lists some of the errors that have been recorded in the NAT during recent years. Reconstructed scenarios exampling some such errors, together with some contingency situations, are also shown in an interactive DVD, "Track Wise – Targeting Risk within the Shanwick OCA"~~, which was published in October 2012 by UK NATS~~. ~~Like this Manual, it is aimed at pilots flight crews, dispatchers and others concerned in involved with flight operations in the North Atlantic.~~ It follows the progress of a westbound NAT flight through the Shanwick OCA. While the operational procedures ~~elements~~ in the DVD are specific to Shanwick, the majority of the DVD considers issues common to the whole ~~ICAO~~ NAT region ~~Region~~. ~~It is available at no charge to *bona fide* operators on application to: customerhelp@nats.co.uk.~~

15.1.5 The complete DVD is available at no charge to *bona fide* operators on application to: customerhelp@nats.co.uk.. The content of the DVD can be accessed at no charge from the European and North Atlantic (EUR/NAT) Office public pages on the ICAO website (www.icao.int/EURNAT/), following "EUR & NAT Documents", then "NAT Documents", then selecting "Trackwise for on-line ~~U-Tube~~ YouTube viewing". It is also available on YouTube™, looking for "**Trackwise - Targeting Risk Within The Shanwick OCA**", and also or directly at https://www.youtube.com/watch?v=EJTjwW5ZYas.

15.2 OPERATIONAL HEIGHT ERRORS

15.2.1 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.

~~a) executing an un-cleared climb:~~

~~e.g. Aircraft following an ATC clearance are assured of separation from other potentially conflicting traffic. If an aircraft unilaterally changes level, separation can no longer be assured;, however, if a climb without ATC clearance is imperative, then this should be treated as a contingency and the appropriate track offset should be flown and the published contingency procedures observed (see chapter 13).~~

~~*Example:* the crew of an aircraft entering Reykjavik OCA from Edmonton FIR encountered HF Bblackout conditions prior to reaching the Reykjavik OCA boundary and before receiving an Oceanic Clearance. During the subsequent more than two hours of flight in the NAT HLA MNPSA, the crew executed two step climbs before re-establishing contact with ATC.~~

~~Aircraft following an ATC clearance are assured of separation from other potentially conflicting traffic. In HF Blackout conditions if an aircraft unilaterally changes level, ATC has no means to advise or intervene with other traffic and separation can no longer be assured. In such a circumstance, if a climb without ATC clearance is imperative then this should be treated as a contingency and the appropriate track offset of 15 NM should be flown.~~

~~b) misinterpreting an ATC acknowledgement of a request as a clearance:~~

~~e.g. a When DCPC is unavailable and air/ground ATS communications are via a third party (whether radio operator or data link service provider) flight crews must be aware that acknowledgements of requests do not constitute approval.~~

~~*Example:* A flight crew requested a step climb from Shanwick OAC using HF Voice through~~

~~the Shannon aeradio station. The radio operator acknowledged the request to the aircraft and forwarded it to the Shanwick controller for review and action. The crew interpreted the radio operator's acknowledgement as an approval of the request and immediately executed the step climb. The controller subsequently denied the request due to conflicting traffic with inadequate longitudinal separation at the requested higher level. The requesting aircraft had reached the new level and therefore violated separation minima before receiving the denial. Similar incidents have occurred during NAT CPDLC trials when crews have misinterpreted a technical acknowledgement of a data link request for an ATC approval.~~

~~When DCPC is unavailable and air/ground ATS communications are via a third party (whether radio operator or data link service provider) crews must be aware that acknowledgements of requests do not constitute approval.~~

~~c) not climbing or descending as cleared:~~

~~Flight crews should be aware of the risks of non-compliance with a clearance, or with a restriction within a clearance. A significant number of height deviations have been reported where an aircraft had been cleared to change level after the next route waypoint but climbed immediately or had been cleared to change level immediately and had not done so until a later time. Such instances are often, but by no means exclusively, associated with misinterpretation of CPDLC message sets (a crew training/familiarity issue), whereby the words AT or BY are interpreted differently from their intended meaning. (ICAO Doc 10037 refers)~~

~~e.g. Example: a A flight crew was cleared for a to climb to FL350 after passing 40°N 30°W climb to cross 4030W at FL350. The flight crew misinterpreted the clearance and climbed immediately. took it to mean climb to cross 40°N 30°W (instead of 40° 30'W) at FL350.~~

~~While this was caused by a seemingly ambiguous clearance, crews must be on their guard and query the clearance if in any doubt. Crews should be aware of the risks of non-compliance with a clearance, or with a restriction within a clearance. A significant number of height deviations have been reported where an aircraft had been cleared to change level after the next route waypoint and has done so immediately or has been cleared to change level immediately and had not done so until a later time. Both cases can very easily result in the loss of safe separation with other traffic. Such instances are often, but by no means exclusively, associated with misinterpretation of CPDLC message sets (a crew training/familiarity issue) whereby the words AT or BY are interpreted differently from their intended meaning. This is a problem particularly (but not exclusively) with crew members whose first language is not English. It is compounded in the cases of languages which have no directly equivalent words to differentiate between AT or BY, or perhaps use the same word for each (this is apparently true of a number of European languages, for example). The dangers associated with misinterpretation of conditional clearances must be appreciated. If an aircraft climbs or descends too soon or too late it is almost inevitable that it will lose separation with the other traffic that was the reason for the condition being applied by ATC.~~

~~d) not following the correct contingency procedures:~~

~~When executing a contingency descent, flight crews must appreciate that there is a significant likelihood of conflict with other aircraft at lower levels unless the appropriate contingency offset procedure is adopted. This is especially important in the OTS. (See Chapter 13)~~

~~e.g. *Example:* fFollowing an engine failure, a crew descended the aircraft on track rather than carrying out the correct contingency procedures (see Chapter 12).~~

~~Particularly when flying in the OTS, crews must appreciate that there is a significant likelihood of conflict with other aircraft at lower levels unless the appropriate contingency offset procedure is adopted. (See paragraph 13.3.4)~~

e) ~~entering the NAT HLA/MNPSA at a level different from that contained in the received Oceanic Clearance:~~.

~~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. While adjacent ACCs generally use their best endeavours to get an aircraft to its oceanic level before the boundary, entry into NAT HLA at the cleared oceanic level is entirely the responsibility of the flight crew. Such requests must be made sufficiently early to allow the domestic ATC unit time to respond.~~

~~e.g. a~~~~*Example: A*~~ ~~flight crew flying through Brest FIR at FL310 en-route on route to the Shanwick OCA boundary received an oceanic clearance for FL330. The crew requested a climb from Brest but it had not been received when the aircraft reached the Shanwick boundary. The crew elected to continue into the NAT MNPSA HLA at FL310. Separation was immediately lost with a preceding aircraft at that flight level.~~

~~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. While adjacent ACCs generally use their best endeavours to get an aircraft to its oceanic level before the boundary, it must be recognized that entry into NAT MNPSA (now HLA) at the cleared oceanic level is entirely the responsibility of the crew. It does appear from the relative frequency of this type of error that this is not widely understood. It should also be appreciated that such requests must be made sufficiently early to allow the domestic ATC unit time to respond.~~

15.3 LATERAL NAVIGATION ERRORS

~~*More*~~ *Common Causes ~~O~~of Lateral Navigation Errors*

15.3.1 The most common causes of ~~GNEs~~lateral navigation errors, in approximate order of frequency, have been as follows:

a) having already inserted the filed flight plan route coordinates ~~co-ordinates~~ 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 ~~pilot~~ has heard not what was said, but what they were ~~he/she was~~ expecting to hear.

~~*Rare Causes O*~~*~~of Lateral Navigation Errors~~*

15.3.2 ~~To illustrate the surprising nature of things which can go wrong, the following are examples of some extremely rare faults which have occurred:~~

a) ~~the lat/long co-ordinates displayed near the gate position at one international airport were wrong.~~

b) ~~because of a defective component in one of the INS systems on an aircraft, although the correct forward waypoint latitude was inserted by the crew (51°) it subsequently jumped by one degree (to 52°).~~

c) ~~the aircraft was equipped with an advanced system with all the co-ordinates of the waypoints of the intended route already in a database; the crew assumed that these co-ordinates were correct, but one was not.~~

d) ~~when crossing longitude 40°W westbound the Captain asked what co-ordinates he should insert for the 50°W waypoint and was told 48 50. He wrongly assumed this to mean 48°50'N at 50°00W (when it really meant 48°N 50°W) and as a result deviated 50 NM from track.~~

e) ~~the flight crew had available to them the correct co-ordinates for their cleared track, but unfortunately the data which they inserted into the navigation computer was from the company flight plan, in which an error had been made.~~

f) ~~at least twice since 1989, longitude has been inserted with an error of magnitude of times 10. e.g. 100°W instead of 10°W, or 5°W instead of 50°W. Because of low angles of bank, the aircraft departed from track without the crews being aware, and both lateral and longitudinal separations with other aircraft were compromised.~~

g) ~~a crew based at and usually operating from London Heathrow was positioned at London Gatwick for a particular flight. One pilot inadvertently loaded the Heathrow co-ordinates into the INS, instead of those for Gatwick. This initialization error was only discovered when the aircraft had turned back within the NAT after experiencing a GNE.~~

h) ~~the pilot of a flight departing from the Caribbean area input the wrong departure airfield co- ordinates prior to departure. This error was discovered when deviation from cleared route seriously eroded separation with two other opposite direction aircraft.~~

15.4 LESSONS ~~TO BE~~ LEARNED

- **Perform navigation cross-check procedures throughout the ocean crossing.** ~~**Never**~~ Do not relax or otherwise skip steps when it comes to following those ~~be casual in respect of cross-check~~ procedures. ~~This is especially important towards the end of a long night flight.~~
- **Avoid casual R/T procedures**. A number of GNEs have been the result of a misunderstanding between flight crew ~~pilot~~ 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 ~~co-ordinates~~.
- **Make an independent check on the gate position**. Do not assume that the gate coordinates ~~co-ordinates~~ are correct without cross-checking with an authoritative source. Normally one expects co- ordinates 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 ~~Oceanic~~** airspace ~~Airspace~~**.** Make a careful check of LRNS positions at or near to the last navigation facility – or perhaps the last but one.
- ~~**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.~~
- ~~**Never**~~ **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.

- **Cross check waypoints by reading present position. Do not assume** [v16]that the aircraft is at a waypoint merely because the alert annunciator so indicates. Cross-check by reading present position.
- **Complete navigation cross checks with more than one flight crew member**. ~~**Perform Fflight deck procedures drills.**~~ 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~~, and the Captain should participate in all navigation cross-check procedures~~. All such cross-checks should be performed independently by at least two flight crew members ~~pilots~~.
- ~~**Initialisation**~~ **Follow inertial system alignment procedures** ~~**errors**~~**.** The inertial system alignment procedures for your aircraft must be followed precisely lest initialization errors ensue. 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.~~Always return to the ramp and re-initialize inertial systems if the aircraft is moved before the navigation mode is selected. If after getting airborne, it is found that during initialisation a longitude insertion error has been made, unless the crew thoroughly understand what they are doing, and have also either had recent training on the method or carry written drills on how to achieve the objective, the aircraft should not proceed into the NAT HLA, but should turn back or make an en-route stop.~~
- **Confirm ~~W~~waypoint loading**. Before departure, at least two flight crew members ~~pilots~~ 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 cross-checking, 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 ~~O~~oceanic ~~C~~clearance received and not any different previously entered planned or requested route.
- ~~**Use a**~~ **Complete flight progress charts periodically** ~~**on the flight deck.**~~ ~~It has been found~~ Making ~~that~~ ~~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.
- ~~**Consider making a simple use**~~ **Use** ~~**of**~~ **basic DR ~~N~~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** ~~**Always remember** that something absurd may have happened in the last half-hour.~~ 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 navaids, 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. ~~**Again, do**~~ **Do not assume.**
- **Advise ATC of any possible system degredation. If the flight crew suspects** [v17]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 16

THE PREVENTION OF LATERAL DEVIATIONS FROM TRACK ~~AS A RESULT OF WAYPOINT INSERTION~~

16.1 THE PROBLEM

16.1.1 ~~During the monitoring of navigation performance in the NAT HLA (and previously in the MNPSA) , a number of lateral deviations are reported. There were 57 in 2012 and 66 in 2013. A lateral deviation of 25NM or greater is classified as a Gross Navigation Error (GNE). Of the 57 lateral deviations in 2012 19 were GNE's and of the 66 lateral deviations in 2013 10 were GNE's. Such errors are normally detected by means of long range radars as aircraft leave oceanic airspace but are increasingly confirmed by means of ADS-C waypoint reporting. In addition, however, on 51 occasions in 2012 and 71 occasions in 2013, potential navigation errors were identified by ATC from routine aircraft position reports (from "next" or "next plus one" waypoints) and ATC were able to intervene to prevent incorrect routing by the aircraft.~~ Lateral deviations continue to occur in the NAT.~~-~~The vast majority ~~of these instances~~ ~~were~~ are attributable to ~~a~~ flight crew error, ~~of~~ following ~~of~~ 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.

16.1.2 ~~Investigations into the causes of all recent lateral deviations show that about 23% are attributable to equipment control errors by crews and that almost all of these errors are the result of programming the navigation system(s) with incorrect waypoint data – otherwise known as waypoint insertion errors (WIEs). The remainder comprise mainly of incorrect transcript of ATC clearance.~~

16.2 THE SOLUTION ~~CURE~~

16.2.1 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 oceanic clearance.

16.2.2 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 a 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 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.

16.2.3 ~~Waypoint insertion errors can~~ Lateral deviations from track could be virtually eliminated if all operators/flight crews adhere ~~at all times~~ to approved operating procedures and cross-checking 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 ~~fit~~.

16.2.4 Additionally, ~~The~~ 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 ~~co-ordinates~~, 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 ~~en-route~~ 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 ~~co-ordinates~~ 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 ~~co-ordinates~~ 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.

16.2.5 The procedures outlined in this ~~S~~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 ~~pilot~~ and controller over the actual route to be flown ~~(i.e. an ATC loop error has occurred)~~, 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 ~~waypoint insertion~~ 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 ~~pilot~~. Thorough and diligent checking and cross-checking, by more than one flight crew member, of the waypoints entered into the navigation computer, against the received oceanic clearance ~~Oceanic Clearance~~ would eliminate most of these unnecessary and avoidable errors.

CHAPTER 17

GUIDANCE FOR DISPATCHERS

17.1 GENERAL

17.1.1 The NAT ~~North Atlantic Region~~ 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. ~~The vertical dimension of the NAT HLA is between FL285 and FL420 (i.e. in terms of normally used cruising levels, from FL290 to FL410 inclusive).~~

17.1.2 ~~The lateral dimensions include the following Areas:~~

~~a) Those portions of the NEW YORK OCEANIC East north of 27°N~~

~~b) And all of the REYKJAVIK, GANDER, BODO OCEANIC and SANTA MARIA OCEANIC Control Areas (CTAs)~~

~~c) SHANWICK OCA but excluding the areas of BOTA and SOTA.~~

17.2 REGULATORY REQUIREMENTS AND CONSEQUENTIAL ROUTING LIMITATIONS

State Approvals (NAT HLA /RVSM)

17.2.1 Before planning any operations within the ~~North Atlantic~~ NAT HLA, operators ~~and pilots~~ must ensure that the specific State NAT HLA and RVSM ~~A~~approvals are in place. These requirements are addressed in Chapter 1 ~~of this Mmanual at paragraphs 1.1.1, 1.1.2 and 1.1.3.~~

17.2.2 Before planning any operations of ADS-B equipped aircraft into NAT ADS-B airspace operators ~~and~~ ~~pilots~~ must ensure that the aircraft is approved for flight in NAT ADS-B airspace. These requirements are addressed in Chapter 1 ~~section 1.7 of this Mmanual~~.

Minimum Equipage (Navigation/Altimetry/Communications)

17.2.3 ~~Section 1.3~~ Chapter 1 discusses the minimum navigation equipage requirements for unrestricted flight in the NAT HLA.

17.2.4 The Minimum Aircraft Systems Performance Specifications for RVSM operations are common world-wide standards and are contained in ICAO Doc 9574 (Manual on a 300m (1 000ft) Vertical Separation Minimum between FL290 and FL410 inclusive.). They are also detailed in FAA Advisory Circular AC91-85A, and in EASA CS-ACNS documentation; which can currently be accessed respectively through (~~paragraph 9.1.5~~ Chapter 9 also refers): http://www.faa.gov/air_traffic/separation_standards/rvsm/documents/AC_91-85A_7-21-2016.pdf, and http://www.eurocontrol.int/articles/library. However, notwithstanding the worldwide nature of RVSM MASPS, it must be recognised, as indicated in Chapter 1 ~~paragraph 1.2.2 above~~, 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**.

17.2.5 Many NAT air/ground ATC communications are still conducted on single side-band HF frequencies. For unrestricted operations in the NAT ~~R~~region fully functioning HF ~~C~~communications equipment is required. While ~~SATCOM Voice~~ SATVOICE and ~~D~~data link communications are now in widespread use in NAT operations, HF also constitutes a required back-up.

Special non-compliance routings

17.2.6 Aircraft not equipped with two functioning ~~L~~long ~~R~~-range ~~N~~-navigation ~~S~~-systems may only fly through the NAT HLA via special designated routes. This is discussed in Chapter 1 ~~at paragraph 1.4.~~ Details of these special routes are contained in Chapter 3 ~~paragraph 12.2.2~~ .

17.2.7 Aircraft not approved for NAT HLA /RVSM operations may climb and descend through NAT HLA/RVSM ~~A~~airspace and in very limited, specified circumstances a~~n~~ NAT HLA ~~A~~approved aircraft that is not ~~A~~approved for RVSM operations may be granted permission to flight plan and operate through the NAT HLA at RVSM levels. (See Chapter 1 ~~sections 1.5 and 1.6~~).

17.2.8 Routings that may be flight planned and operated through the NAT HLA by aircraft without functioning HF ~~C~~communications equipment may be limited by the State of Registry of the operator or by the ATC ~~P~~provider. This is discussed above in more detail in Chapter 4 ~~paragraph~~ .

17.3 ROUTE PLANNING

Lateral separation minima & resulting route definition conventions

17.3.1 For much of the NAT ~~North Atlantic~~ HLA the lateral separation standard is generally 60 NM. Since 60 NM is equivalent to one degree of latitude along any meridian and given that the vast majority of flights through this airspace are generally eastbound or westbound, this standard is deemed to be met by tracks separated by one degree of latitude at common meridians.-The letter 'X' must be included to show that the aircraft satisfies NAT HLA lateral navigation performance requirements

17.3.2 ~~Radar/ADS-B data is only available in very limited areas of the North Atlantic Region. Therefore,~~ Outside ATS Surveillance coverage ATC ~~must~~ 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 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 ~~section 4.2, Attachment 4 and paragraph 17.6.9 below for more detail~~.

OTS – Rationale, Structure, CDM & NAT Track Message

17.3.3 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.

17.3.4 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 energetic nature of the NAT weather patterns, including the presence of jet streams, consecutive eastbound and westbound minimum time tracks are seldom identical. The creation of a different organised track system is therefore necessary for each of the major flows. Separate ~~Organised Track System (~~OTS~~)~~ structures are therefore published each day for eastbound and westbound flows.

17.3.5 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 ~~at Section 2.2.~~

17.3.6 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 ~~at Section 2.3 above and examples are shown at the end of~~ Chapter 2.

17.3.7 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. ~~Currently about half of NAT flights utilise the OTS.~~

Random Routings

17.3.8 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 ~~whilst~~ ATC will make every effort to clear random traffic across the OTS at published levels, re-routes or significant changes in flight level from those planned are very likely to be necessary during most of the OTS peak traffic periods.

17.3.9 Outside of the OTS periods operators may flight plan any random routing, except that during the hour prior to each OTS period some additional restrictions apply. These are detailed in Chapter 4 ~~paragraph 4.1.7 above~~.

Adjacent Airspace, Route Structures, Links & Constraints

17.3.10 A large majority of flights through the NAT HLA enter and/or leave it via the North American region ~~Region~~. To facilitate these ~~busy~~ flows of traffic, various transitional airspaces and linking route structures have been established in and through the adjacent NAM region ~~Region~~. These are described in Chapter 3 above. Of particular significance are the NAR~~,~~ and NOROTS ~~and the US East Coast Link Route~~ structures. Details of these routes and their associated procedures are contained in the ~~AIS~~ AIP of the relevant State authorities and/or via their websites. The necessary Internet Links to obtain this information are listed above in Chapter 3. Account must be taken of these route structures in planning any flight through the NAT ~~R~~region that starts or ends in the North American ~~R~~region.

17.4 ALTITUDE & SPEED

Flight Levels

17.4.1 During the OTS Periods (eastbound 0100-0800 UTC, westbound 1130-1900 UTC) aircraft intending to follow an OTS track ~~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 ~~P~~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 6 below as the “North Atlantic Flight Level Allocation Scheme” (NAT FLAS). Hence, flight crews ~~pilots~~ 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 OACC prior to filing the flight plan to determine the likely availability of specific flight levels.

Mach Number

17.4.2 In the NAT HLA the Mach ~~N~~number technique is used to manage longitudinal separations between aircraft following the same track. Chapter 7 above provides more detailed information. Consequently, flight plans for the NAT HLA segment of flight must define aircraft speed in terms of a Mach ~~N~~number. This is true even if procedures dictate that aircraft speed be defined in terms of TAS for other (continental airspace) segments of that same flight. Oceanic ~~Oceanic~~ clearances include a True Mach ~~N~~number to follow and because this is used by ATC to regulate longitudinal separations, no tolerance is permissible. Consequently, NAT flights should ***not*** be planned or flown on the assumption that LRC or ECON fuel regimes may be used.

17.5 ~~ATC~~ FPL COMPLETION

17.5.1 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 ~~above~~. Correct completion and addressing of the filed ~~ATC~~ 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 ~~ATC~~ flight plans ~~Flight Plan~~ submitted in respect of flights through the North Atlantic region ~~Region~~ continue to contain errors. In some instances these errors are such that the flight plan ~~Flight Plan~~ is rejected and the ~~O~~operator is required to re-submit a corrected version. ~~Full and detailed explanations of how to complete an ATS flight plan Flight Plan in respect of the NAT portion of a flight are shown in Attachment 4 below. This Attachment highlights the more common completion errors that are made and includes example, correctly-completed ICAO flight plan Flight Plan elements.~~ 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.

17.5.2 The guidance in the paragraphs that follow here ~~and also that which is detailed in Attachment 4 to this Document~~ refer to the ICAO model flight plan ~~Flight Plan~~ ~~F~~form as described in Chapter 4 of ICAO PANS/ATM Doc.4444. ~~(Amendment No.1). However, it is very important to note that significant revisions to the format and content of the ICAO Flight Plan were effected from 15 November 2012. The changes applicable from that date are contained in a published Amendment No.1 to Doc.4444, which was approved by the ICAO Council on 27 May 2008. Mostly these changes relate to revised Communications and Navigation equipage codes for use in items 10 and 18; a detailed description of the changes is contained in the document "**Review of Amend 1 to PANS ATM**" available at www.icao.int/EURNAT/, following "Other Meetings Seminars and Workshops", then "Sub-Regional FPL2012 Workshop-Greece".~~

17.5.3 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 ~~Flight Level~~. If, however, no reasonable alternative level is available, or if the offered flight level ~~Flight Level~~ is unacceptable to the flight crew ~~pilot~~, then ATC will clear the aircraft via another OTS track. When filing the ATC flight plan ~~Flight Plan~~, the Dispatcher may enter the details of such an acceptable alternative track in Field 18 of the ICAO FPL. This will be taken into account by ATC if indeed having to clear the aircraft via a route other than that planned.

17.5.4 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.

17.5.5 For flights which intend to operate through the New York Oceanic East or West, or Santa Maria Oceanic FIRs ~~or through the WATRS Plus Airspace~~, RNAV 10 (RNP 10) or RNP- 4 approval is required in order to benefit from the reduced lateral separations employed here. Any NAT HLA aircraft intending to fly within these airspaces should ensure that its RNP approval status is also included in the flight plan. Specifically such operators should annotate ICAO flight plan ~~Flight Plan~~ Item 10 (Equipment) with the letter “R” and annotate Item 18 (Other Information) with, as appropriate, “PBN/A1 (for RNAV 10 (RNP 10) approval ~~Approval~~) or PBN/L1 (for RNP 4 approval ~~Approval~~)” (see Chapter 4 ~~paragraph 4.1.20 above~~).

17.5.6 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.

17.6 DISPATCH FUNCTIONS

General

17.6.1 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.

17.6.2 Nothing in this chapter should be construed as to take precedence over appropriate government regulations or individual company policy.

17.6.3 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~~ 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. A successful flight will always start with an intelligent, informed and conservative plan.

Flight Planning

Route Planning[MV(18]

17.6.4 The daily published OTS tracks provide near to optimum 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 ~~paragraphs 2.2.3 and 2.2.4 above~~).

17.6.5 The eastbound and westbound OTS structures are the subject of separate “NAT Track Messages” published via the AFTN. A detailed description of the NAT ~~T~~track message is provided in Chapter 2 above.

Planning[MV(19] *on an OTS Track*

17.6.6 Dispatchers must pay particular attention to defined coordinates ~~co-ordinates~~, domestic entry and exit routings, allowable altitudes, ~~NAT~~ ~~T~~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.

17.6.7 ~~Dispatchers should note that From 05 February 2015 Phase 2A of the NAT DLM was implemented. In this Phase CPDLC and ADS-C are required to plan or fly on any OTS track from **FL350** to 390 inclusive.~~

- The [v20]NAT region is implementing DLM in phases. To fly within the DLM airspace aircraft must be equipped with FANS 1/A or equivalent ADS-C and CPDLC. See Chapter 1.
- It is important for dispatchers to understand that transition routes specified in the NAT ~~T~~track message are as important as the tracks themselves. The transition route systems in North America – the North American Routes (NARs), the Northern Organised Track System (NOROTS) 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 ~~N~~number or flight level is requested must be specified as geographical coordinates ~~co-ordinates~~ in latitude and longitude or as a named point.
- For flights operating along the entire length of an OTS track, estimated elapsed times (EET/ in Item 18) are only required for the commencement point of the track and for oceanic ~~Oceanic~~ FIR boundaries.

Planning[MV(21] *a Random Route*

17.6.8 A ~~R~~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)

17.6.9 ~~A Random route is described as follows : -~~

- ~~For generally east-west flights operating at or south of 70°N, 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 or an Oceanic Exit Point within GOTA.~~
- ~~For generally east-west flights operating north of 70°N and at or south of 80°N, 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.~~
- ~~For generally east-west 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. Additional significant points should be established when deemed necessary due to aircraft speed or the angle at which the meridians are crossed, e.g.:~~

  ~~a. at intervals of 10 degrees of longitude (between 5°W and 65°W) for flights operating at or south of 70°N; and~~

~~b. 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.~~

- ~~When the flight time between successive such significant points is less than 30 minutes, one of these points may be omitted.~~
- ~~For flights operating north 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 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.~~
- ~~For generally north-south flights at or south of 80°N, 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.~~
- ~~For generally north – south flights operating north of 80°N, by significant points formed by the 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.~~

17.6.10 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 ~~co-ordinates~~ before/after valid OTS times.

17.6.11 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 FL280 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.

17.6.12 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 (FL260 or FL280) until east of 70˚W.

17.6.13 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.

17.6.14 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 30W at 1030 UTC or later; and Westbound traffic crossing 30W at 2400 UTC and later (See Chapter 4 ~~paragraph 4.1.7~~). If in any doubt it would be prudent to co-ordinate any such routes directly with appropriate OACCs.

Flight[MV(22] *Levels*

17.6.15 Flight ~~D~~dispatchers should be aware of the North Atlantic ~~Flight Level Allocation Scheme (~~FLAS~~)~~. This is subject to change and the current FLAS is published in the UK and Canadian AIPs and shown in Attachment 5 ~~at Attachment 6 below~~.

17.6.16 Chapter 2 and Chapter 4 contain details on RVSM flight level guidance. Since ~~virtually~~ all airspace adjoining the NAT HLA is now RVSM, transition problems are no longer a major issue for ATC or dispatchers. Nevertheless 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 ~~of this Manual~~.

17.6.17 RVSM allows more flight levels for planning and therefore provides better opportunity to fly closer to an optimum route/profile. ~~As aircraft fly towards their destination they become lighter as fuel on-board is consumed and they are then able to climb to more fuel efficient altitudes.~~ It is acceptable to plan and/or request ~~step~~ 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. ~~If a flight is planned without profiling a climb~~ Flight crews should be encouraged to request a climb as aircraft decreasing weight permits.

Communications[MV(23]

17.6.18 The availability of functioning HF ATS communications is mandatory for flights through the Shanwick OCA. Many States of Registry insist on two functioning long range communications systems for flights in oceanic ~~Oceanic~~ or remote ~~Remote~~ areas. Some States of Registry will allow their operators to substitute ~~SATCOM Voice~~ SATVOICE for one HF system. Dispatchers should ensure that they are fully aware of their State of Registry requirements in this regard. VHF communications (123.450 or 121.5 MHz) can be used as relay air-ground ATS communications as backup in case of en route ~~en-route~~ HF failure.

17.6.19 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 FANS1 or FANSA it should be utilised during the NAT segment of the flight and the appropriate descriptor should be inserted into the filed flight plan.

17.6.20 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*~~

~~a) 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. HF is required for entering the Shanwick OACC. Many airline Operations Specifications require dual HF for operation in remote Remote or oceanic Oceanic airspace , even when aircraft are SATCOM Voice equipped. However, some States may permit Dispatch with only one serviceable HF system providing the aircraft is equipped with SATCOM Voice.~~

~~b) 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.~~

~~c) If an aircraft MEL (navigation, communications or altitude alerting/reporting system) prohibits operations in the NAT HLA it will be necessary to modify an aircraft's originally intended route of flight. An example would be an aircraft not equipped with two Long Range Navigation Systems (or LRNS's that are fully serviceable). 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 Sections 1.4, 3.2, and 12.2~~

MEL[MV(24] *Compliance*

17.6.20[MV(25] 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. HF is required for entering the Shanwick OACC. Many airline Operations Specifications require dual HF for operation in remote ~~Remote~~ or oceanic ~~Oceanic~~ airspace , even when aircraft are SATCOM Voice equipped. However, some States may permit Dispatch with only one serviceable HF system providing the aircraft is equipped with SATCOM Voice.

17.6.21 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.

17.6.22 If an aircraft MEL (navigation, communications or altitude alerting/reporting system) prohibits operations in the NAT HLA it will be necessary to modify an aircraft's originally intended route of flight. An example would be an aircraft not equipped with two Long Range Navigation Systems (or LRNS's that are fully serviceable). 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[MV(26]*/EDTO*

17.6.20 A large portion of NAT crossings are ETOPS operations. ETOPS rules require that one or more suitable enroute ~~en-route~~ alternate airports are named prior to dispatch and then monitored while aircraft are enroute ~~en-route~~. Enroute ~~En-route~~ alternate airports in the NAT region ~~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

17.6.21 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 ~~en-route~~ airports, more stringent planning conditions may apply. Guidance can be obtained from appropriate government and industry websites.

Collaborative[MV(27)] *Decision Making (CDM) Tools*

17.6.22 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 ~~I~~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 ~~P~~password can be obtained from NAV CANADA. Track ~~L~~loading ~~I~~information is available and it is possible to view all filed flight plans ~~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, CDR routes, preferred routing schemes and transition routes.

  http://www.eurocontrol.int/network-operation

  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 www.fly.faa.gov . Also for CDM participants, the FAA Air Traffic Control System Command Center website (www.fly.faa.gov/flyfaa/usmap.jsp) is available.

Flight Monitoring

Oceanic[MV(28)] *ATC Clearances*

17.6.23 The flight crew ~~Pilot~~ can obtain ~~O~~oceanic clearances by GP, VHF, HF, ~~domestic ATC agencies~~ 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 ~~(Prestwick, Shannon, Glasgow, Dublin, Belfast, Bristol, Edinburgh, Gander, Goose Bay and St Johns, etc.)~~ oceanic clearances ~~must~~ 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. ~~Oceanic Clearances for some controlled f~~Flights leaving airports ~~within the region (i.e. airports~~ in Iceland, Faeroes, or Greenland~~)~~ will receive oceanic clearances ~~are issued by the relevant ATS unit~~ prior to departure.

17.6.24 It is important for dispatchers to verify the contents of the oceanic clearance 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[MV(29)] ~~*Use*~~

17.6.25 ~~All aircraft flying in the NAT HLA will set their transponders as follows:~~ All aircraft operating as IFR flights in the NAT region shall be equipped with a pressure-altitude reporting SSR transponder (see Chapter 10).

17.6.26 ~~Thirty minutes after oceanic entry crews should Squawk 2000, if applicable. There are some regional differences such as Crews transiting Reykjavik's airspace must maintain last assigned Squawk until advised by ATC. Also aircraft operating on airway Tango 9 North bound should squawk 2000 ten (10) minutes after passing BEGAS and South bound should squawk 2000 ten (10) minutes after passing LASNO.~~

Re-Routes.

17.6.27 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 ~~that may be stated in Field 18 of the ICAO flight plan~~. On an eastbound flight the flight crew ~~pilot~~ 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. ~~Many operators attach secondary flight plans on adjacent tracks that will include the preferred domestic routings. This will help flight crews evaluate and more quickly adjust when re-route situations are required.~~

~~*En-route*~~*En*[MV(30)] *route Contingencies*

17.6.28 Dispatchers must also be aware of special procedures for In-Flight contingencies as published in ~~Chapter 12~~ 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 offset from the assigned track by 15 NM and climb or descend to a level differing from those normally used by 500 ft if below FL410 or 1000 ft if above FL410.

17.6.29 Procedures for loss of communications and HF failure are contained in Chapter 6 ~~at paragraphs 6.6 of this manual~~.

Dispatcher guidance for NAT RVSM operations.

References[MV(31)]

17.6.30 The FAA Advisory Circular ~~Guidance~~ AC91-85A 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 ~~FAA Guidance~~ AC91-85A or an equivalent State document for approval of aircraft and operators to conduct RVSM operations. Appendices 4 and 5 of AC91-85A contain practices and procedures for flight crews ~~pilots~~ and dispatchers involved in RVSM operations. This particular dispatcher guidance, available at ~~www.faa.gov/air_traffic/separation_standards/rvsm/documents/AC_91-85A_7-21-2016.pdf~~, WWW.FAA.GOV/DOCUMENTLIBRARY/MEDIA/ADVISORY_CIRCULAR/AC_91-85A was developed using those appendices as the reference

Flight[MV(32)] *Planning*

NAT RVSM Airspace

This is defined as any airspace between FL 285 - FL 420 where 1,000 ft vertical separation is applied (i.e. FLs 290 thru 410 inclusive).

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 ~~Airspace~~ for the purpose of positioning the aircraft at a maintenance facility (see Chapter 1 ~~in this Manual~~). 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 each individual OACC. 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 ~~P~~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~~En[MV(33)] *Route Equipage Failures*

Prior to entering NAT RVSM airspace ~~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 ~~Airspace~~, the pilot-in-command will notify ATS and obtain a new ~~O~~oceanic ~~C~~clearance to fly above or below NAT RVSM airspace ~~Airspace~~. The flight crew ~~pilot~~ 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 ~~Airspace~~**.**

The appropriate State RVSM guidance material provides for flight crew ~~pilot~~ and controller actions if RVSM required aircraft equipment fails after entry into NAT RVSM airspace ~~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 ~~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. The pilot-in-command will maintain any offsets until a revised ATC clearance can be obtained.

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 ~~en-route~~, 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 ~~pilot~~ 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 ~~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 Field 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 ~~en-route~~, 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 ~~paragraph 1.6.2 above~~).

CHAPTER 18

FLIGHT OPERATIONS BELOW THE NAT HLA

18.1 INTRODUCTION

18.1.1 ~~The guidance contained in this Chapter primarily relates to flight operations below the NAT HLA.~~ This guidance ~~was initially developed by the North Atlantic Systems Planning Group (NAT SPG)~~ is meant to assist international general aviation (IGA) flight crews ~~pilots~~ 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 ~~Pilots~~ must consult relevant AIPs and Notices to Airmen (NOTAMs) when planning the flight and prior to departure.

18.1.2 ~~The largest proportion of IGA operations through the ICAO NAT Region is business jet flights in or above the NAT HLA. All the foregoing chapters of this document provide the relevant guidance for the flight crewspilots/planners/operators of such flights and for their State regulators. This Chapter primarily concentrates on the issues pertaining to the safe planning and conduct of flights through the NAT Region at lower levels.~~

18.2 ENVIRONMENTAL CONSIDERATIONS

~~*At FL290 and Above*~~

18.2.1 ~~Even at the mid and Northern latitudes of the North Atlantic, pilots must be aware of any convective activity or other weather related phenomena along their planned route, and shall ensure that they receive all proper weather related briefings prior to operating a Trans- Atlantic flight. Jet streams can be present here and flight planners will generally select Eastbound routes to take benefit of such tailwinds and Westbound routes to minimise the exposure to strong headwinds. This is the basic principle in the design of the daily OTS structure (see Chapter 2 above). Moderate or even severe clear air turbulence may be forecast or indeed present at the vertical and lateral boundaries of Jet streams. Turbulence of orographic origin can also be experienced downwind (i.e. to the east) of the Greenland Icecap. When areas of moderate/severe turbulence are forecast, the OTS will normally be planned to avoid them. When turbulence is repeatedly reported by pilots on particular tracks or through a noted area, ATC may temporarily suspend RVSM operations there and revert to standard 2,000 ft vertical separation. Particularly in the winter months, pilots should be aware that freezing fuel conditions may pertain.~~

Below FL290

18.2.2 For flights at ~~lower levels~~ F290 and below, the North Atlantic weather can be far from benign. Extreme seasonal weather variations and rapidly ~~exist in the North Atlantic. Rapidly~~ changing weather conditions ~~involving~~ 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 ~~will undoubtedly create problems for an ill-planned flight. Proper~~ preparation, including route and emergency situation planning, ~~will go a long way toward~~ important components for a successful ~~completion of a~~ flight~~. The NAT meteorological environment is complex and often quick changing.~~ Attachment 8 ~~below~~ provides further details of the general North Atlantic climate and the weather conditions and associated operational issues in particular areas.

18.3 NORTH ATLANTIC FLIGHT OPERATIONS

18.3.1 ~~Flights by general aviation aircraft across the North Atlantic have increased dramatically. Because of the harsh climate, dearth of VHF communications and ground-based navigational aids, as well as the immense distances involved, a trans-Atlantic flight is a serious undertaking. While IGA flights constitute a relatively small percentage of the overall North Atlantic traffic, they account for the vast majority of search and rescue operations and expenses. The information contained in this chapter and in Attachment 8 below is intended to assist the IGA pilot in completing a safe flight.~~

18.3.2 ~~Within the NAT Region there are both civil and military air traffic operations. The civil operations include a significant volume of commercial traffic, as well as an increasing number of IGA aircraft. In addition to routine trans-Atlantic military air traffic, at least twice annually large-scale joint-force military operations are conducted. These operations may restrict access by general aviation to portions of North Atlantic airspace.~~

18.3.3 Most of the airspace in oceanic ~~Oceanic~~ FIRs/CTAs is high seas airspace within which ~~the International Civil Aviation Organization (ICAO) Council has resolved that~~ the Rules of the Air~~, as specified in~~ (ICAO Annex 2) ~~to the ICAO Convention,~~ apply without exception. The majority of the airspace is also controlled airspace, and instrument flight rules (IFR) apply ~~to all flights in oceanic airspace~~ when ~~at or~~ above FL~~060~~055 ~~or 2000 ft. (600 m) above ground level (AGL), whichever is higher, even when not operating in Instrument Meteorological Conditions (IMC)~~.

18.3.4 This controlled airspace includes:

1. New York Oceanic East, Gander Oceanic, Shanwick Oceanic, Santa Maria Oceanic, Reykjavik Oceanic, GOTA and NOTA, and Bodø ~~Bodø Oceanic above FL195 and Reykjavik FIRs/CTAs~~;
2. Bodø Oceanic above F195 and ~~FIR/CTA~~ when operating more than 100 NM seaward from the shoreline;
3. ~~Søndrestrøm~~ Nuuk FIR when operating above FL195:
4. ~~Reykjavik FIR/CTA at or above FL060 in the Oceanic Area and above 3000 feet in the Domestic Area or within the TMA/CTR.~~ Faroes Islands above 7500 ft.;
5. Aberdeen ATSU above FL085 during operational hours (see AIP);
6. Jan Mayen 2000 ft. above ground level.

18.3.5 ~~It is important to keep in mind the following when considering a flight in this environment~~ Canada, Denmark and Iceland require that the flight crew and aircraft ~~must~~ 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.

* ~~When flying within Gander and Reykjavik Oceanic Canada, Denmark and Iceland require that flight crew pilot and aircraft must be IFR rated for trans-oceanic flight, regardless of the altitude to be flown. Other NAT States do not have this requirement at or below FL055.~~

~~* However, it is highly unlikely that you will remain VMC on a trans-Atlantic flight. **ITIS THEREFORE STRONGLY RECOMMENDED THAT PILOTS BE INSTRUMENT RATED AND FILE AND FLY IFR.** It is therefore strongly recommended that flight crews pilots be instrument rated and fly IFR.~~

18.4 REQUIREMENTS

18.4.1 Regulatory requirements are established by all States providing Air Traffic services in the ~~ICAO North Atlantic Region~~ NAT ~~aimed at ensuring that all flights through the Region are conducted safely~~.

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 ~~O~~operator. Most eastbound trans-Atlantic flights by light aircraft commence their oceanic crossing from Canada. ~~Following, as an example, are listed items that are required by~~ Transport Canada Aviation Regulations (CARs) ~~(CAR's)~~ 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. ~~For such flights this equipment is thus mandatory. Denmark/Greenland/Nuuk also require all the equipment mandated by these CARs. Operators must ensure that they are fully cognisant of the regulations imposed by any and all of the States through whose Airspace, or ICAO delegated International Airspace, their flight is planned~~.

~~*Example – Canadian Legislation*~~

18.4.2 ~~CAR 602.39 – States that no pilot-in-command of a single-engine aircraft, or of a multi-engine aircraft that would be unable to maintain flight in the event of the failure of an engine, shall commence a flight that will leave Canadian Domestic Airspace and enter airspace over the high seas unless the pilot-in-command complies with the following requirements:~~

~~A. Pilot Qualifications~~

18.4.3 ~~The Pilot-in-Command shall hold a valid pilot license endorsed with a valid instrument rating.~~

~~B. Aircraft Documentation~~

~~a) Certificate of Registration from the State of Registry;~~

~~b) Certificate of Airworthiness, Flight Permit, or Special Airworthiness Certificate;~~

~~c) Certification and special conditions issued by the State of Registry to allow over gross weight operation if applicable;~~

~~d) Certification issued by the State of Registry for fuel tank modification (e.g. FAA Form 337);~~

~~e) Revised weight and balance report in the case of aircraft modified to carry extra fuel.~~

~~*Cautionary Notes*~~

- ~~*An Export Certificate of Airworthiness does not constitute authority to operate an aircraft. It must be accompanied by one of the above authorities.*~~

- ~~*A Temporary Registration Certificate (FAA Pink Slip) is not valid for international operations.*~~

- ~~*All aircraft entering Canada or transiting through Canada on transoceanic flights, which are operating with restricted Certificates of Airworthiness or Flight Permits, must be issued with Canadian validations of these flight authorities before entering Canada. Canadian validations will be issued upon receipt of a valid or foreign flight authority, and information relating to the dates and routing for the flight. This procedure does not apply to aircraft operating with unrestricted Certificates of Airworthiness.*~~

~~C. Fuel Reserves~~

~~An aircraft operated under an IFR flight plan on a transoceanic flight shall carry an amount of fuel that is sufficient to allow the aircraft to fly to and execute an approach and a missed approach at the destination aerodrome; to fly to and land at the alternate aerodrome; to fly for an extra period of forty-five (45) minutes, and in addition, carry contingency fuel equal to at least ten (10) per cent of the fuel required to complete the flight to the destination aerodrome. (N.B. Iceland fuel reserve requirements are couched in different terms – i.e. Destination Fuel plus 3 hours.)~~

~~D. Aircraft Instruments and Equipment~~

18.4.4 ~~Aircraft must be approved for IFR flight, and equipped with the following instruments and equipment in serviceable condition.~~

- ~~a) a sensitive pressure altimeter adjustable for barometric pressure;~~
- ~~b) a magnetic compass that operates independently of the aircraft electrical generating system;~~
- ~~c) an airspeed indicator with a means of preventing malfunction due to icing (pitot heat);~~
- ~~d) a turn and slip indicator or turn coordinator;~~
- ~~e) an adequate source of electrical energy, and an adequate supply of fuses, if appropriate;~~
- ~~f) a stabilized magnetic direction indicator or a gyroscopic direction indicator;~~
- ~~g) an attitude indicator;~~
- ~~h) a vertical speed indictor;~~
- ~~i) an outside air temperature gauge;~~
- ~~j) appropriate engine power and performance indicating instruments;~~
- ~~k) a power failure warning device or vacuum indicator that shows the power available to gyroscopic instruments for each power source;~~
- ~~l) fuel tank quantity indicators;~~
- ~~m) an alternative source of static pressure for the altimeter, airspeed indicator and vertical speed indicator; and~~
- ~~n) if the flight is to be made at night;~~
  - ~~a means of illumination for all instruments used to operate the aircraft;~~
  - ~~when carrying passengers, a landing light; and~~
  - ~~navigation lights~~

~~***NOTE –***~~

~~*1 All equipment and cargo carried in the cabin shall be secured to prevent shifting in flight and placed so as not to block or restrict the exits*~~

~~*2 Consider carrying portable oxygen equipment. It would be useful when trying to avoid icing, and for additional height over the Greenland icecap.*~~

~~E. Communications Equipment~~

18.4.5 ~~**Very High Frequency Radio.** Sufficient radio communications equipment to permit the pilot, in the event of failure of any item of that equipment, to conduct two-way communications on the appropriate frequency.~~

18.4.6 ~~**High Frequency Radio.** An HF radio capable of transmitting and receiving on a minimum of two appropriate international air-ground general purpose frequencies. In general HF RTF communications equipment is mandatory outside of VHF coverage. However, in some circumstances, some States may allow a degree of MEL relief for HF Equipage, based on the carriage of Aeronautical Mobile Satellite (Route) Service (AMS(R)S), more commonly referred to as SATCOM Voice. (see 6.1.17 and 18.12.6). Operators must check the specific requirements of their State of Registry and or the relevant North Atlantic Air Traffic Services Provider States.~~

~~F. Navigation Equipment~~

~~ICAO Annex 2 requires an aircraft to be equipped with adequate navigation equipment to enable it to navigate in accordance with the flight plan and the air traffic control clearance.~~

18.4.7 ~~The CARs require that sufficient radio navigation equipment be installed to permit the pilot, in the event of the failure at any stage of the flight of any item of that equipment, including any associated flight instrument display.~~

~~a) to proceed to the destination aerodrome or proceed to another aerodrome that is suitable for landing, and~~

~~b) where the aircraft is operated in IMC, to complete an instrument approach, and if necessary, conduct a missed approach.~~

~~A suitable interpretation of the above would permit an aircraft equipped with VOR/ILS/ADF and a single GPS approved for en-route flight to operate on any of the North Atlantic routes below FL285.~~

~~G. Maps and Charts~~

18.4.8 ~~Each aircraft shall carry CURRENT aeronautical maps, charts, aerodrome data, and IFR approach plates covering the area over which the aircraft might be flown. This includes enroute and departure diversions as well as destination alternates. Whether planning to file VFR or IFR, there is always the potential for IMC in the NAT Region, therefore, pilots shall carry IFR publications.~~

18.4.9 ~~Aircraft landing at Narsarsuaq shall carry a topographical chart of large enough scale to permit map-reading up the fjord.~~

18.4.10 ~~Aircraft operators shall comply with the requirements of the State of Registry with regard to overwater safety equipment, and overland safety equipment designated for areas in which search and rescue would be especially difficult, for example, Labrador, Greenland, and Iceland.~~

18.4.11 ~~A. Overwater Survival Gear~~

~~1) ICAO Annex 6 and the CARs (relating to Canadian registered aircraft) require that the following be carried on single-engine flights over water beyond 100 NM gliding distance from land, or 200 NM in the case of multi-engine aircraft able to maintain flight on one engine:~~

~~- a) Hypothermia protection (survival suits) for each occupant;~~

~~- b) Life raft equipped with an attached survival kit, sufficient for the survival on water of each person on board the aircraft, given the geographical area, the season of the year and anticipated seasonal variations, that provides the means for:~~

~~**1)** Providing shelter,~~
~~**2)** Purifying water, and~~
~~**3)** Visually signalling distress~~

~~2) For U.S. registered aircraft, the 14 CFR Part 91 sea survival kit would be appropriate.~~

~~3) States AIP GEN 1.5. contains requirements for aircraft instruments, equipment and flight documents.~~

~~4) The sea temperatures in the North Atlantic rarely rise above 5 degrees Celsius, even in Summer summer months. It is important therefore to consider the following cold facts on how time and temperature dictates survival times, without an immersion suit, in these inhospitable waters:~~

~~Water Temperatures~~		~~No Protection~~	~~Expected Survival~~
~~Deg. C~~	~~Deg. F~~	~~Exhaustion/Unconsciousness Sets in within~~	~~Time (with flotation)~~
~~0°~~	~~32°~~	~~under 15 min.~~	~~under 15 to 45 min.~~
~~0-5~~	~~32-41~~	~~15 to 30 min.~~	~~30 to 90 min.~~
~~5-10~~	~~41-50~~	~~30 to 60 min~~	~~1 to 3 hours~~

~~5) In simple terms: The chances of surviving for more than an hour in North Atlantic waters without an immersion suit, are virtually zero. The ocean is therefore a very poor choice as a landing place. If a problem does develop consideration should be given to landing in Greenland, Iceland, the Faroe Islands or Scotland. Attachment 8 discusses particular issues pertaining to these choices.~~

18.4.12 ~~B. Overland Survival Gear~~

~~ICAO Standards Annex 6 and the CARs (relating to Canadian registered aircraft) require that the following The equipment to be carried on flight over or into the interior of Labrador, Greenland, Norway, and Iceland is to be found in AIP GEN 1.5 for each state. and Scotland providing the means for:~~

~~a) starting a fire;~~

~~b) providing shelter;~~

~~c) purifying water, and~~

~~d) visually signaling distress~~

18.5 OPERATIONAL CONSIDERATIONS

Sparsely Settled Areas

18.5.1 ~~Experience has shown that there is a tendency for Flight crews pilots who are not familiar with the problems of navigating and the potential dangers of operating in the sparsely settled areas of Canada, Greenland, Iceland, and Scotland to underestimate the difficulties involved.~~

18.5.2 ~~Some flight crews pilots assume that operating in these areas is no different than operating in the more populated areas. This can lead to a lack of proper planning and preparation which can result in the pilot-in-command exposing himself, his flight crew, his passengers, and his aircraft to unnecessary risks. This in turn can lead to considerable strain being placed on the limited local resources at stop-over or destination airports. Lengthy and expensive searches have resulted which, with careful planning and preparation, could have been avoided.~~

18.5.3 The potential dangers associated with operating in sparsely settled areas should not be underestimated. The fact is that in sparely 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.

18.5.4 In addition to the regulations concerning flight crew ~~pilot~~ qualifications and experience, it is recommended that the flight crew ~~pilot~~ 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

18.5.5 Freezing levels at or near the surface can be expected at any time of year over the NAT region ~~Region~~. The dangers of airframe and/or engine icing must always be taken into account, so flight crews~~pilots~~/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.

18.6 FLIGHT PLANNING

18.6.1 It is rare to be able to conduct a flight across the Atlantic and remain in visual meteorological conditions (VMC) for the entire flight.[MV(34] VFR flight in this airspace deprives the flight crew ~~pilot~~ of the flexibility of using the altitudes above FL055. The higher altitudes may enable a smoother flight, free of precipitation, icing or turbulence

18.6.2 IFR Flights (i.e. those operating in the NAT region ~~Region~~ at FL060 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 ICAO Document 4444, Appendix 2; and in State AIPs. Chapter 4 ~~and Attachment 4 below in this Manual (NAT Doc 007)~~ also provides ~~all~~ necessary guidance, with particular emphasis on NAT flight requirements.

18.6.3 ~~Prospective transoceanic fliers familiar with FAA flight plan formats should carefully review the ICAO flight plan instructions as they are quite different from domestic U.S. flight plan formats. International flight service stations can provide assistance in filing an ICAO flight plan.~~

18.6.4 Generally all eastbound or westbound aircraft in the NAT region ~~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 ~~P~~provider State AIPs.

18.6.5 Plan the flight using current aeronautical charts, the latest edition of pertinent flight supplements, and NOTAMs, both domestic and international ~~and particularly International NOTAMs. Flight crews Pilots 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 Pilot should consult the aviation authority officials at appropriate local aviation field offices before departure. Such officials, as well as local flight crews pilots 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 en-route weather conditions. Pre-flight planning must ensure the availability of fuel, food, and services that may be required at intermediate stops and at destination.~~

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.

18.6.6 ~~The majority of military activity takes place in the NAT below the NAT HLA. Military exercise particulars will be published in a NOTAM/International NOTAM, and should be reviewed during pre-flight briefing.~~

18.6.7 Planning a trans-Atlantic flight for the summertime will allow the flight crew ~~pilot~~/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.

18.6.8 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 ~~pilots~~ plan to make trans-Atlantic flights preferably during the summer months.

18.7 PHYSIOLOGICAL FACTORS

18.7.1 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.

18.8 CLEARANCES

18.8.1 All flights planned at or above ~~FL060~~ FL055 in oceanic CTAs (outside of southern Greenland) are required to obtain an IFR clearance prior to entering the NAT. ~~leaving the CTA floor, which generally starts at FL055. It is important to note that the airspace over Southern Greenland (South of 63°30'N) above FL195 is controlled by Gander OACC south of 63°30'N and Reykjavik OACC north of 63°30'N.~~

Note: The airspace over Greenland above FL195 is controlled by Gander OACC south of 63°30'N and Reykjavik OACC north of 63°30'N.

18.8.2 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. ~~In some NAT FIRs a change of true airspeed greater than 5% requires a re-clearance from ATC. In the Reykjavik FIR changes of airspeed of more than 5% must be notified to ATC.~~ Weather deviations of a mileage that exceeds the limits outlined in the Strategic Lateral Offset Procedure (SLOP) i.e. 2 NM, requires a re-clearance from ATC. If a flight crew ~~pilot~~ 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.

18.8.3 Obtaining a Clearance

Flight crews ~~Pilots~~ are required to obtain a clearance from the ATS unit responsible for their area of operation 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, ~~or~~ Montreal ACC, ~~or~~ through a flight service station, ~~depending on the route of flight~~ 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 ~~O~~oceanic ~~C~~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 (ISVIG), 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.

18.9 NAVIGATION

18.9.1 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 paragraphs 0 through 0 – "Navigation Equipment").~~ (See applicable AIPs and ICAO Annexes for details.)

18.9.2 ~~On the Northern routes it is important to note the pronounced magnetic variation - up to approximately 40 to 45 degrees - and the "pull" this variation has on your compass. When performing turns or accelerations, this "pull', termed the "dip effect", causes your compass to turn slower than you are used to in the lower latitudes.~~

18.9.3 ~~Even with a sophisticated navigation system such as GPS, it is still essential to maintain good navigation practices. Do not just blindly follow the numbers; awareness of the azimuth of the sun, cross-checking with other NAVAIDs and disposition of contrails from high level traffic are all obvious but~~

~~many errors have occurred which could have been prevented had the~~ ~~flight crew~~ ~~pilot shown more awareness.~~

18.10 ROUTE CONCERNS

18.10.1 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 ~~(Doc 007)~~ 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. ~~If the flight is intended to be operated without HF communications equipment then the issues detailed in paragraph 4.2.14 must be considered and appropriately addressed.~~

18.11 COMMUNICATIONS

18.11.1 The following text highlights a number of issues particular to air-ground ATS communications in the NAT region ~~Region~~. Further referral should be made to Chapter 6.

18.11.2 As mentioned earlier, VHF radio coverage is very limited in the NAT. Charts in Attachment 5, depict theoretical VHF coverage at FL100, FL200 and FL300. 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 ~~shall~~ can be tested by calling the nearest Aeronautical Radio or Flight Service Station for a ground radio check. If ~~a~~ contact cannot be made on the initial test frequency, try others. If no contact ~~can be~~ is made, have the equipment checked. Do not leave the ground until everything is working satisfactorily.

18.11.3 Flight crews ~~Pilots~~ 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.

18.11.4 Remember, flights above FL055~~060~~ must be operated under IFR procedures and therefore a continuous listening watch ~~with ATC~~ on appropriate frequency must be maintained.

18.11.5 An HF SELCAL device will ease the strain of a continuous listening watch on the designated HF R/T Frequency. Ensure that the SELCAL code selected in the aircraft is valid for the NAT region ~~Region~~ (see Chapter 6 ~~paragraph 6.1.10~~). Also ensure that the Code is included in Item 18 of the filed ICAO flight plan ~~Flight Plan~~.

18.11.6 Aeronautical Mobile Satellite (Route) Service (AMS(R)S), more commonly referred to as SATVOICE ~~SATCOM Voice~~, may ~~now~~ be used for any routine, non-routine or emergency ATS air/ground communications throughout the NAT region ~~Region~~. Remember to carry the SATCOM numbers for the areas (both ATC and radio) you are flying through. Requirements and procedures for use are detailed in Chapter 6 ~~above~~.

18.11.7 A listening watch should be maintained on the 121.5 MHz emergency frequency unless communications on another frequency prevents it. 121.5 MHz is not authorized for *routine* use.

> *Note- All civilian and military aircraft flying in the Elk area, as shown in the Chart in Attachment 8,* ***must*** *maintain listening watch on 121.5 MHz or 126.7 MHz.*

18.11.8 ~~Controller Pilot Data Link Communications (CPDLC) provides a means for aircraft operators to communicate directly with ATC via standard messages outlined in the ICAO Document 10037, Global Operational Data Link (GOLD) Manual. document, and Automatic Dependent Surveillance-Contract (ADS-C) enables operators to provide position reporting through an aircraft's Flight Management system (FMS) through connections established with each ANSP. It is important to note that s~~Such equipage does not relieve the operator from having mandatory communication equipment on the aircraft as outlined in the AIP of each state.~~

Communications failures

18.11.9 Procedures to follow in the event of radio communications failures in the NAT region ~~Region~~ **are not** those which are used in domestic airspaces. Chapter 6 and relevant national AIPs provide detail of the procedures to follow here.

18.11.10 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.

18.12 SURVEILLANCE

18.12.1 Radar and or ADS-B coverage in the NAT region ~~Region~~ is limited. ~~Nevertheless the importance of an operable transponder cannot be over emphasized.~~ All aircraft operating as IFR flights in the NAT region ~~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. ~~Unlike primary radar, secondary radar can only "see" aircraft that have an operating transponder: it cannot "paint" a target based on a radar echo from the aircraft's skin. Similarly you must be ADS-B equipped to be able to receive ADS-B surveillance services.~~ 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 ~~above~~ and coverage charts are shown at Attachment 9 ~~below (still pending)~~ and in individual national AIPs.

18.13 SEARCH & RESCUE (SAR)

18.13.1 ~~Air traffic services authorities must receive position information on all aircraft within their jurisdiction at least once per hour. If these hourly reports are not received,~~ 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.

18.13.2 Flight crews ~~Pilots~~ 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 121.5

continuously. SAR aircraft are generally equipped with homing devices sensitive to VHF 121.5 Mhz. If unable to reach any facility, flight crews ~~pilots~~ should attempt contact with other aircraft on the NAT air-to-air frequency 123.450 MHz or distress frequency 121.5 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 MHz beacon provides a more accurate position and ~~also~~ identification data, ~~both of which~~ ~~improve~~ improving SAR response efficiency.

18.13.3 ~~At many locations throughout the North Atlantic neither search and rescue personnel nor equipment is available on a 24 hour basis. Rescue/recovery from the ocean will likely be by a Maritime craft in the vicinity. The primary SAR asset often will be civilian aircraft chartered from private companies at great expense. These aircraft and their crews are frequently exposed to dangers which could have been avoided simply by better preparation on the part of IGA pilots. The general reasons for the alerts, the searches, and the fatalities, are most often poor planning, poor navigation, insufficient fuel, and the lack of knowledge of flying in the NAT Region.~~

18.13.4 ~~Should worse come to worse ditching be required and the aircraft must be ditched in the North Atlantic, the flight crew pilot must fully appreciate the predicament that is entailed. All the pre-flight planning, the inspection at Departure aerodrome and all the equipment carried are of little use, if the flight crew and passengers cannot survive long enough to allow SAR services to recover them reasonably intact. If nothing else, the first two principles of survival – PROTECTION and LOCATION – should be remembered. In the NAT Region at any time of year, the weather is the enemy, so wear protective garments at all times. It is much too late to be climbing into clothing, while presiding over an engine that is refusing to cooperate, and at the same time trying to contact a friendly 747 to explain that you have a problem.~~

18.13.5 With excellent satellite coverage of the region, ~~LOCATION is no problem~~ 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~~nm~~ from base without air to air re-fueling 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 ~~to find out what assistance can be provided by other~~ craft in the area. This would often include ships or boats. ~~Of particular help are merchant vessels contacted by means of the ship reporting system called AMVER.~~ The further section below on aircraft ditching provides more insights.

Hypothermia

18.13.6 Hypothermia is the most significant danger to the survivors of any ditching or forced/precautionary landing in the NAT region ~~Region~~. The causes, symptoms and preventative measures are covered in detail in Attachment 8 ~~below~~.

~~18.14 CHECKLIST~~

18.14.1 ~~A thorough pilot will make every attempt to avoid in-flight problems prior to departure. While each aircraft will require a different specific inspection, this section provides a general checklist for pre-flight preparation, inspection and in-flight contingencies.~~

18.14.2 ~~Be prepared for systems failure. Know what to do in advance. Always plan a way out of a situation. If a borderline decision has to 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.~~

18.14.3 ~~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.~~

18.14.4 ~~Allow sufficient time for a thorough briefing, planning, and administrative details. Try to put the airplane to bed ready to go, avoiding the possibility of last minute mistakes.~~

~~Pre-Flight Preparation~~

18.14.5 ~~The following checklist, cross-referenced to text appearing in this manual, will assist you during the preparation stages of your oceanic flight. It is not intended that this checklist address all aspects of oceanic flight preparation.~~

- ~~Have you obtained all the current departure, en-route arrival and topographical charts for your entire route of flight and your alternate? (Chapter 18)~~
- ~~Do you have an instrument rating and have you recently flown IFR? (Chapter 18)~~
- ~~What long range NAVAIDS are you planning to use? When did you last practice long range navigation? (Chapter 8)~~
- ~~What can you expect in terms of available daylight in Iceland, Greenland? (Chapter 18)~~
- ~~Has your aircraft been thoroughly inspected by a licensed mechanic for suitability for a long, over water crossing? Do you have the necessary aircraft documents? (Chapter 18)~~
- ~~If your flight will transit Canadian airspace, and chances are good that it will, do you have the required Sea/Polar Survival equipment necessary to adhere to Canadian Air Regulation 540? (Chapter 18)~~
- ~~What is the proper format to be used when filing an oceanic flight plan? (Chapter 4 & Attachment 4)~~
- ~~Are you aware of the proper procedures to be used in obtaining an oceanic clearance? (Chapter 5 & Attachment 7)~~
- ~~What do you know of hypothermia? How can it be prevented? (Chapter 18)~~
- ~~What can you expect in terms of VHF radio coverage in the NAT Region? (Chapter 6 & Attachment 5)~~
- ~~Do you know what to include in a position report? When should a revised estimate be forwarded to ATC? (Chapter 6)~~
- ~~Is the selected SELCAL Code valid for the FIRs in which you are planning to fly? (Chapter 6)~~
- ~~If the flight is planned for FL285 or above, has the State of Registry approved the flight in the NAT HLA through a letter of authorization or its equivalent? (Foreword & Chapter 1)~~
- ~~If your aircraft is ADS-B equipped, has the aircraft been approved for flight in ADS-B airspace? (Chapter 10).~~
- ~~Are you fully briefed on what to expect in the way of Search and Rescue services? Do you understand the importance of an operable ELT ? (Chapter 1 & Chapter 18)~~
- ~~Have you obtained the relevant meteorological information for your flight? (Chapter 18)~~
- ~~Have you checked current NOTAMs with special regard to the status of radio-navigation aids and airport restrictions? (Chapter 18)~~

~~*Pre-Flight Inspection*~~

18.14.6 ~~Pull the cowling 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~~

18.14.7 ~~Check compass on nearest runway heading to your course (on a compass rose if available within 30 days prior to departure).~~

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.~~

18.15 IN-FLIGHT CONTINGENCIES

18.15.1 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.

18.15.2 Make all position reports, as required ~~detailed in Section 6.3~~, 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.

18.15.3 If you encounter difficulty, report immediately on the appropriate VHF/HF frequency or on VHF 121.5. Don't delay in making this call, as it could take SAR forces up to four hours to reach your position.

18.15.4 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 above~~ Chapter 2). During daylight hours a Westbound OTS is in effect and at night an Eastbound structure is used. The location/coordinates ~~co-ordinates~~ 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.

18.15.5 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

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)

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 / OTS[1]
6. FLIGHT IDENTIFICATION AND TYPE
7. FLIGHT LEVEL ASSIGNED
8. OBSERVED / REPORTED[1] FINAL FLIGHT LEVEL[2] MODE “C” / PILOT REPORT[1]
9. DURATION AT FLIGHT LEVEL
10. CAUSE OF DEVIATION
11. OTHER TRAFFIC
12. CREW COMMENTS WHEN NOTIFIED
13. REMARKS[3]

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

natcma@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______________º Roll___________º Yaw______________º

4 What was the change in height if any?____________________ *INCREASE/DECREASE

Page 1 of 2

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?

*YE

S/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
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~~ATTACHMENT 4~~

~~ICAO FPL COMPLETION FOR A NAT FLIGHT~~

~~1. Introduction~~

~~This document outlines the requirements and procedures necessary for the correct filing of flight plans for flights operating in the North Atlantic Region. It includes examples of the more common errors which lead to a failure of automatic processing of these flight plans. Information is also provided on the availability of Flight Levels at various times.~~

~~This document is for guidance only and must be read in conjunction with the following publications, which detail the regulatory material relating to North Atlantic aircraft operations:~~

~~ICAO PANS/ATM (DOC 4444) Amendment No.1 (15 Nov 2012);~~

~~ICAO Regional Supplementary Procedures (DOC 7030/4) and~~

~~Relevant parts of State Aeronautical Information Publications (AIP) and Aeronautical Information Circulars (AIC).~~ ~~*(Individual Air Traffic Services (ATS) data systems may impose their own constraints on information in flight plans and any such constraints are notified in the relevant Aeronautical Information Publications (AIP).*~~

~~The ICAO Air Traffic Management Requirements and Performance Panel (ATMRPP) has developed a concept for a flight planning system to support future operations in accordance with the Global ATM Concept. Flight planning provisions had not been addressed for many years and did not accurately reflect advances that had been made in both airborne and ground-based systems. The concept that has been developed defines information requirements for flight planning, flow management and trajectory management and aims to facilitate the best possible integrated past, present and future ATM situation. This exchange of information will enable improved decision making by the ATM providers involved in the entire duration of a flight, i.e. gate-to-gate, thus facilitating 4-D trajectory operations.~~

~~Work is ongoing to develop the necessary standards and documentation, including implementation and transition guidance, to allow elements of the concept to be introduced as early as possible ahead of full implementation of the Collaborative Environment envisaged by the Global ATM Concept and the programme of Aviation System Block Upgrades initiated by ICAO, of which the future flight planning process is a part. As an interim step, ICAO published Amendment No.1 to the Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444) 15th Edition. This amendment allows the flight plan to accurately reflect the equipment on board the aircraft and the capabilities of both it and the crew and also changes the way certain other information elements are presented in the flight plan. These changes became globally applicable on 15 November 2012.~~

~~The amendment to the ICAO flight planning provisions is available on the ICAO European and North Atlantic website (www.paris.icao.int) by following the links to 'Other Meetings, Seminars & Workshops', then to 'FPL 2012 ICAO EUR Region Plan' and then to 'Documentation related to FPL 2012 Amendment'.~~

~~2. General~~

~~The guidance that follows here refers to the ICAO model Flight Plan Form as described in State AIPs and in Chapter 4 of ICAO PANS/ATM Doc. 4444.~~

~~2.1 General Principles~~

~~(a) USE BLOCK CAPITALS;~~

~~(b) Adhere closely to the prescribed formats and manner of specifying data;~~

~~(c)~~

~~(d) Insert all clock times and estimated elapsed times, in hours and minutes, as four figures, UTC, or as six digits if including the date;~~

~~(e) Shaded areas preceding Item 3 to be completed by ATS and COM~~

~~services; Items 3 to 19 to be completed only as indicated below.~~

~~(f) If it is necessary to subsequently modify an item in a filed flight plan by means of a CHG message, the data for the complete item must be re-provided and not just the modified elements, this is particularly significant for modifications to Item 18.~~

~~3. Instructions for the Completion of the Flight Plan Message~~

~~3.1 Message Envelope:~~

~~The Message Envelope is that part of the flight plan outside the open and close brackets. It should not contain any information other than the Annex 10 message header and optional extra addresses (for IFPS, see below). Any other information inserted into the message envelope will invalidate the entire message and prevent its correct processing.~~

~~Message addressing~~

~~Flight plans for flights operating to or from the IFPS zone in Europe should be filed with IFPS, not the individual NAT centres. However, with the exception of the Shanwick, Santa Maria FIR and Bodø FIR, the NAT region lies outside the IFPS zone. When submitting flight plans for trans- Atlantic flights to IFPS, operators should therefore specify the relevant NAT centre(s) using the IFPS "extra address (AD line)" feature. Note that flight plans for flights not entering the IFPS zone will not be accepted by IFPS and should therefore be sent directly to the relevant centre(s).~~

~~3.2 General Message Content~~

~~The letter "O" and the digit "0" are not interchangeable. Inappropriate use of these characters will prevent the correct processing of the flight plan.~~

~~The line length must not exceed 69 character columns. Lines exceeding the Annex 10 maximum of 69 columns are invariably broken at that position by intervening AFTN communication centres, without any regard for content, causing the creation of unintelligible fragments.~~

~~3.3 Item 3: Message Type~~

~~Enter FPL for any initial filing of a Flight Plan. For filing of subsequent flight plans use either the "modification" (CHG) or "cancellation" (CNL) format as outlined in ICAO DOC 4444.~~

~~Common Error:~~

~~It is common for CNL messages to be received without a subsequent FPL message. This is equivalent to having received no flight plan at all. If an Airline Operator still intends to operate the flight, another FPL must be sent.~~

~~Also note that there is no guarantee that messages are received in the same order they are transmitted. If a CNL (referring to a previous FPL) is sent and immediately followed by a new FPL it is quite possible that the FPL arrives first and is then immediately cancelled by the delayed CNL.~~

~~Creative use of time stamps does not help, it is the arrival sequence rather than the time stamp that determines how messages are processed. It is therefore recommended that a few minutes be allowed to elapse between the CNL and a subsequent FPL.~~

~~Another common error occurs when using CHG messages. Transmitting only those parts of an item that have changed is not acceptable because the new item will replace the entire contents of that item in the original message.~~

~~3.4 Item 7: Aircraft Identification (ACID)~~

~~The explanation of this provision has been clarified in the recent Amendment to specify that the aircraft identification cannot exceed 7 alphanumeric characters and is not to include hyphens or symbols. No other changes were made to the provision.~~

~~One of the following ACIDs must be included:~~

~~(a) The registration marking of the aircraft (e.g. EIAKO, 4XBCD, N2567GA)~~

~~(b) The ICAO designator for the aircraft operating agency followed by the flight identification (e.g. KLM511, NGA213).~~

~~(c) The call sign determined by the military authorities if this will be used to identify the aircraft during flight.~~

~~Common Errors:~~

~~The ACID must not exceed 7 characters. An ACID of more than 7 characters will invalidate the message. Furthermore it will be impossible to manually correct the data as computer systems are only designed to handle the ICAO stipulated maximum of 7 digit aircraft identification strings.~~

~~The hyphen, often used in the graphical representation of aircraft registration, is also used as the item separator in all flight related ICAO messages and so must not be used in the flight plan ACID.~~

~~All-numeric ACIDs must be avoided. Even when the registration of a military flight is all numeric it is expected to be preceded by the operating agency descriptor assigned to the military operator in question.~~

~~3.5 Item **8: Flight Rules and Type of Flight**~~

~~The explanation of the provision related to indicating flight rules has been clarified in the recent Amendment. It was further clarified that the point or points at which a change in flight rules is planned, must also be specified in Item 15 (Route). Additional text was also added to highlight that the status of the flight is to be denoted in Item 18 following the STS indicator, using one of the defined descriptors, or that other reasons for specific handling by ATS are to be denoted in Item 18 following the RMK indicator.~~

~~Flight Rules~~

~~Insert one of the following letters to denote the category of flight rules with which the pilot intends to comply:~~

~~I if IFR;~~
~~V if VFR;~~
~~Y if IFR first~~
~~Z if VFR first~~

~~Specify in item 15 the point(s) where the change of flight rules is planned.~~

~~Type of Flight~~

~~Insert one of the following letters to denote the type of~~

~~flight: S if Scheduled Air Service;~~
~~N if Non-scheduled Air Transport Operation;~~
~~G if General Aviation;~~
~~M if Military;~~
~~X if the type of flight does not match any of the predefined categories.~~

~~***Common Error:***~~

~~It is imperative that the letter 'X' is used when the type of flight does not match any of the predefined categories. Failure to do so causes the message to fail processing.~~

~~3.6 Item 9: Number and Type of Aircraft and Wake Turbulence~~

~~**category Number of Aircraft**~~

~~Insert the number of aircraft only when that number exceeds one, using two digits (e.g. 03).~~

~~**Type of Aircraft**~~

~~Insert the appropriate designator as specified in ICAO DOC 8643 "Aircraft Type~~

~~Designators", OR~~

~~If no designator has been allocated insert ZZZZ and specify in Item 18 the type of aircraft, using the "TYP/…" sub-**item** and free text.~~

~~OR~~

~~In the case of flight plans covering more than one aircraft type, insert ZZZZ and specify in Item 18 the types of aircraft using the "TYP/…" sub-item with the format used in Item 9 (e.g. TYP/02F18 KC135).~~

~~***Common Errors:***~~

~~Including the number of aircraft as 1 or 01. ICAO DOCs clearly state that the number of aircraft shall only be specified when there are more than 1.~~

~~Inserting a space between the number and type of aircraft. The correct format is to specify the number and type as a single group, any intervening blanks will cause a syntax error.~~

~~**Wake Turbulence Category**~~

~~Insert an oblique stroke followed by one of the following letters to indicate the wake turbulence category of the aircraft:~~

~~H HEAVY, to indicate an aircraft type with a maximum certificated take-off weight of 136 000 kg (300 000 lb) or more;~~

~~M MEDIUM, to indicate an aircraft type with a maximum certificated take-off weight of less than 136 000 kg (300 000 lb) but more than 7 000 kg (15 500 lb);~~

~~L LIGHT, to indicate an aircraft type with a maximum certificated take-off weight of 7 000 kg (15 500 lb) or less.~~

~~3.7 Item 10: Equipment and Capabilities~~

~~In the recent Amendment to PANS/ATM Doc.4444 numerous changes were made to this provision. It is important to note that Item 10 now also indicates "capabilities", which consists of three elements:~~

~~presence of relevant serviceable equipment on board the aircraft;~~
~~equipment and capabilities commensurate with crew qualifications;~~
~~and, where applicable, authorization from the appropriate authority.~~

~~**The following provisions are applicable to Item 10a (Radio communication, navigation and approach aid equipment and capabilities):**~~

~~INSERT one letter as follows:~~

~~N if no COM/NAV/approach aid equipment for the route to be flown is carried, the equipment is unserviceable,~~

~~OR S if standard COM/NAV/approach aid equipment for the route to be flown is carried and serviceable (see Note 1)~~

~~AND/OR~~

~~INSERT one or more of the following letters to indicate the serviceable COM/NAV/approach aid equipment and capabilities available:~~

~~A~~	~~GBAS landing system~~	~~K~~	~~MLS~~
~~B~~	~~LPV (APV with SBAS)~~	~~L~~	~~ILS~~
~~C~~	~~LORAN C~~	~~M1~~	~~ATC RTF SATCOM (INMARSAT)~~
~~D~~	~~DME~~	~~M2~~	~~ATC RTF (MTSAT)~~
~~E1~~	~~FMC WPR ACARS~~	~~M3~~	~~ATC RTF (Iridium)~~
~~E2~~	~~D-FIS ACARS~~	~~O~~	~~VOR~~
~~E3~~	~~PDC ACARS~~	~~P1~~	~~CPDLC RCP 400 (*See Note 7*)~~
~~F~~	~~ADF~~	~~P2~~	~~CPDLC RCP 240 (*See Note 7*)~~
~~G~~	~~GNSS (See Note 2)~~	~~P3~~	~~SATVOICE RCP 400 (*See Note 7*)~~
~~H~~	~~HF RTF~~	~~P1-P9~~	~~Reserved for RCP~~
~~I~~	~~Inertial Navigation~~	~~R~~	~~PBN approved (see Note 4)~~
~~J1~~	~~CPDLC ATN VDL Mode 2 (See Note 3)~~	~~T~~	~~TACAN~~
~~J2~~	~~CPDLC FANS 1/A HFDL~~	~~U~~	~~UHF RTF~~
~~J3~~	~~CPDLC FANS 1/A VDL Mode 4~~	~~V~~	~~VHF RTF~~
~~J4~~	~~CPDLC FANS 1/A VDL Mode 2~~	~~W~~	~~RVSM approved~~
~~J5~~	~~CPDLC FANS 1/A SATCOM (ARSAT)~~	~~X~~	~~NAT HLA approved~~
~~J6~~	~~CPDLC FANS 1/A SATCOM (MTSAT)~~	~~Y~~	~~VHF with 8.33 kHz channel spacing~~
~~J7~~	~~CPDLC FANS 1/A SATCOM (Iridium)~~	~~Z~~	~~Other equipment carried or other capabilities (see Note 5)~~

~~Any alphanumeric characters not indicated above are reserved.~~

~~Note 1: If the letter S is used, standard equipment is considered to be VHF RTF, VOR and ILS, unless another combination is prescribed by the appropriate ATS authority. ADF ("F") is now a represented by a separate equipage letter. It is no longer considered as included in Standard equipment ("S").~~

~~Note 2: If the letter G is used, the types of external GNSS augmentation, if any, are specified in Item 18 following the indicator NAV/ and separated by a space.~~

~~Note 3: See RTCA/EUROCAE Interoperability Requirements Standard For ATN Baseline 1 (ATN B1 INTEROP Standard - DO-280B/ED-110B) for data link services air traffic control clearance and information/air traffic control communications management/air traffic control microphone check.~~

~~Note 4:: If the letter R is used, the performance based navigation levels that can be met are specified in Item 18 following the indicator PBN/. Guidance material on the application of performance based navigation to a specific route segment, route or area is contained in the Performance-Based Navigation~~

~~*Manual (Doc 9613).*~~

~~*Note 5: If the letter Z is used, specify in Item 18 the other equipment carried or other capabilities, preceded by COM/, NAV/ and/or DAT, as appropriate.*~~

~~*Note 6: Information on navigation capability is provided to ATC for clearance and routing purposes.*~~

~~*Note 7: Guidance material on the application of performance-based communication, which prescribes RCP to an air traffic service in a specific area, is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).*~~

~~For all flights intending to operate in the NAT Region the ICAO Regional Supplementary Procedures for the North Atlantic (Doc 7030/5) specify that:~~

~~RNAV 10 (RNP 10) approved aircraft shall insert the letter R in Item 10a of the flight plan and the A1 descriptor in Item 18 of the flight plan, following the PBN/ indicator.~~

~~RNP 4 approved aircraft shall insert the letter R in Item 10a of the flight plan and the L1 descriptor in Item 18 of the flight plan, following the PBN/ indicator.~~

~~NAT HLA approved aircraft shall insert the letter X in Item 10a of the flight plan.~~

~~RVSM approved aircraft , regardless of the requested flight level, shall insert the letter W in Item 10a of the flight plan.~~

~~Aircraft planning to operate in the NAT Region and intending to use data link services shall insert the appropriate descriptor (J2, J5 or J7) in Item 10a of the flight plan to indicate FANS 1/A interoperable equipment.~~

~~**The following provisions are applicable to Item 10b (Surveillance equipment and capabilities):**~~

~~INSERT N if no surveillance equipment for the route to be flown is carried, or the equipment is unserviceable,~~

~~OR~~

~~INSERT one or more of the following descriptors, to a maximum of 20 characters, to describe the serviceable surveillance equipment and/or capabilities on board:~~

~~SSR Modes A and C~~

~~A Transponder - Mode A (4 digits - 4 096 codes)~~

~~C Transponder - Mode A (4 digits - 4096 codes) and Mode C SSR Mode S~~

~~E Transponder - Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) capability~~

~~H Transponder - Mode S, including aircraft identification, pressure-altitude and enhanced surveillance capability~~

~~I Transponder - Mode S, including aircraft identification, but no pressure-altitude capability~~

~~L Transponder - Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability~~

~~P Transponder - Mode S, including pressure-altitude, but no aircraft identification capability~~

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~~S Transponder - Mode S, including both pressure altitude and aircraft identification capability X Transponder~~

~~- Mode S with neither aircraft identification nor pressure-altitude capability~~

~~*Note: Enhanced surveillance capability is the ability of the aircraft to down-link aircraft derived data via a Mode S transponder.*~~

~~ADS-B~~

~~B1 ADS-B with dedicated 1090 MHz ADS-B 'out' capability~~

~~B2 ADS-B with dedicated 1090 MHz ADS-B 'out' and 'in' capability U1 ADS-B 'out' capability using UAT~~

~~U2 ADS-B 'out' and 'in' capability using UAT~~

~~V1 ADS-B 'out' capability using VDL Mode 4~~

~~V2 ADS-B 'out' and 'in' capability using VDL Mode 4~~

~~*Note : ADS-B approved aircraft intending to operate in the NAT Region shall insert either the B1 or B2 descriptor as appropriate in Item 10b of the flight plan. Eligibility for ADS-B service in the NAT Region is detailed in* Chapter 10.~~

~~ADS-C~~

~~D1 ADS-C with FANS 1/A capabilities G1 ADS-C with ATN capabilities~~

~~*Note: Any additional surveillance application should be listed in Item 18 following the indicator SUR/.*~~

~~**Common Errors**~~

~~The filing of correct and complete NAV codes in Items10 and 18 is important. Within the NAT Region some procedures and separation standards employed by ATC depend upon ATC's knowledge of the equipage and/or the approval status of individual aircraft/crew. The following errors in completing these items have been noted. These errors create difficulties for ATC and can result in unnecessary penalties or unachieved benefits for the flights involved.~~

- ~~The filing of only a "G" or "I" rather than filing both when the aircraft is so equipped.~~

~~3.8 Item 13: Departure aerodrome and time~~

~~Insert the ICAO four-letter location indicator of the aerodrome of departure and, without a space, the estimated off-block time.~~

~~*Note: If no location indicator has been assigned, use ZZZZ and insert in Item 18 the group DEP/ followed immediately by the name of the aerodrome.*~~

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~~3.9 Item 15: Route~~

~~This item starts with the initial cruising speed and level. The basic structure of the item following this group consists of a sequence of entries, each of which contains a route (or the text "DCT" to~~

~~signal a direct routing) and a fix. In addition, a diagonal slash and a new speed/level group can be appended to a fix.~~

~~Exceptions to this simple structure are:~~

~~a) The route part may be omitted from the first entry.~~

~~b) The route part may be omitted between points encoded as geographic coordinate.~~

~~c) The fix part may be omitted from the last entry.~~

~~The following example shows a typical route broken down into such entries:~~

```
>____GELKI<                         (note a)
>UP600 GOW/N0473F360<
>UN615 STN<
>UN601 AKIVO<
>UP60 ATSIX/M081F360<
>DCT 62N020W<
>____63N030W<                       (note b)
>____63N040W<                       (note b)
>____62N050W<                       (note b)
>____62N060W<                       (note b)
>DCT TANTI/N0467F380<
>DCT FEDDY<
>SCAI 5321N09000W/N0459F390<
>SCAI YRL/N0338F160<
>V304 VBI/N0466F410<
>J538 DLH<
>J89 BAE<
>V63 JVL<
>JVL4____<                          (note c)
```

~~It will be obvious from this description that listing routes without an intervening fix is an error, so is a sequence of fixes without either a route or the text "DCT" connecting them (except as per c) above) – or indeed any text that doesn't adhere to this format.~~

~~**The following provisions are applicable to Item 15c**~~

~~An editorial change was made to clarify that it is possible to indicate, at a single point, where it is planned that a change of speed or level or both is planned to commence, or a change of ATS route and/or a change of flight rules.~~

~~The provision was also expanded to include the possibility of describing a significant point in the route as a bearing or distance from a 'reference point', rather than only from a navigational aid.~~

~~***Important Note :*** *However, in respect of this "global provision" it is important to note that a safety issue has been identified with the use of waypoints in the NAT Region when they are defined as a range and bearing from a significant point or a navigation aid. Magnetic variations, in the North Atlantic, particularly in the western portions of that airspace can be large. It has been noted that navigational data bases used on-board aircraft, by Flight planning systems and by ANSPs do not always define the same magnetic variation for the same locations. As a result, the actual position of an aircraft could be considerably different from that calculated by the ATS ground systems. The actual and expected separation between two aircraft could differ significantly. Accordingly, NAT ATS Providers have agreed that in the NAT Region airspace where ATS surveillance service is not provided, route clearances will not include waypoints defined as a range and bearing from a navigation aid or significant point. When submitting Flight Plans or re-clearance requests, Operators and Flight Planning Service providers are advised to avoid using such waypoint definitions in any*~~

~~*North Atlantic segment of the Flight route.*~~

~~Requirements for Flight Plans on Organised Track System (OTS)~~

~~Insert speed in terms of Mach number at commencement point of~~

~~OTS. Insert flight level requested at commencement point of OTS.~~

~~Insert the abbreviation "NAT" followed, without a space, by the code letter assigned to the track if, and only if, the flight is planned to operate along the whole length of one of the organised tracks as detailed in the NAT track message.~~

~~*Note: Flights wishing to join or leave an organised track, or change from one organised track to another, 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 or Track letters should not be used to abbreviate any portion of the route in these circumstances.*~~

~~Each point at which either a change in speed and/or level is requested must be specified as geographical co- ordinates in latitude and longitude, or as a named waypoint.~~

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

~~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.~~

~~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.~~

~~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. Additional significant points should be established when deemed necessary due to aircraft speed or the angle at which the meridians are crossed, e.g.:~~

a) ~~at intervals of 10 degrees of longitude (between 5°W and 65°W) for flights operating at or south of 70°N; and~~

b) ~~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**.~~

~~When the flight time between successive such significant points is less than 30 minutes, one of these points may be omitted.~~

~~For flights operating **north 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 expressed in whole degrees. The distance between significant points shall normally equate to not less than 30 and not more than 60 minutes flight time.~~

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~~Flights Planning on Routes Predominantly North/South or South/North~~

~~*Note: The ICAO Regional Supplementary Procedures for the NAT Region (Doc.7030) state 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.*~~

~~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.~~

~~For flights operating **north 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 expressed in whole degrees. The distance between significant points shall normally equate to not less than 30 and not more than 60 minutes flight time.~~

~~Requirements for Flight Plans on NAM/CAR Route Structure (WATRS Plus Airspace)~~

~~Insert speed in terms of Mach number for turbo-jet aircraft, and TAS in knots for all other aircraft. The speed is to be specified at the commencement point of the NAM/CAR route structure.~~

~~Insert the flight level for oceanic entry point specified at the commencement point of the NAM/CAR route structure.~~

~~Insert the route of flight described in terms of NAM/CAR ATS route identifier(s).~~

~~Note: Each point at which either a change in speed and/or level is requested must be specified and followed in each case by the next route segment expressed by the appropriate ATS route identifier(s), or as a named waypoint.~~

~~Flights Outside Designated ATS Routes~~

~~Insert DCT between successive points unless both points are defined by geographical co-ordinates. USE ONLY the conventions in (1) to (5) below and SEPARATE each sub-item by a SPACE.~~

~~(1) **ATS Route** (2 to 7 characters)~~

~~The coded designator assigned to the route or route segment (e.g. BCN1, B1, R14, UB10, KODAP2A)~~

~~(2) **Significant Point** (2 to 11 characters)~~

~~The coded designator (2 to 5 characters) assigned to the point (e.g. LN, MAY, HADDY)~~

~~OR~~

~~If no coded designator has been assigned, one of the following ways:~~

~~(3) Degrees only (7 characters)~~

~~Two figures describing latitude in degrees followed by "N" (North) or "S" (South), followed by three figures describing longitude in degrees followed by "E" (East) or "W" (West). Where necessary make up the correct number of figures by insertion of zeros (e.g. 46N050W).~~

~~(4) Degrees and minutes (11 characters)~~

~~Four figures describing latitude in degrees and tens and units of minutes followed by "N" (North) or "S" (South), followed by five figures describing longitude in degrees and tens and units of minutes followed by "E" (East) or "W" (West). Where necessary make up the correct number of figures by insertion of zeros (e.g. 4620N05005W).~~

~~Note: As previously advised, although Doc.4444 includes the global provision for defining waypoints in terms of "range and bearing from a navaid", use of this convention should be avoided for any North Atlantic route segment definition~~~~.~~

~~Common Error:~~

~~It is often observed that a mixture of the above is used e.g. 46N05450W, 5455N030W. This is not an acceptable format.~~

~~Change of Speed or Level (maximum 21 characters)~~

~~The point at which a change of speed (5% TAS or 0.01 Mach or more) or a change of level is planned, expressed exactly as in (2) above, followed by an oblique stroke and both the cruising speed and the cruising level, WITHOUT A SPACE BETWEEN THEM, even when only one of those quantities will be changed.~~

> ~~Examples~~
> ~~LN/N0284A045;~~
> ~~MAY/N0305F180;~~
> ~~HADDY/M084F330;~~
> ~~4620N05005W/M082F350.~~

~~Note: "N" = knots; "M" = Mach; "F" = flight level; "A" = altitude in hundreds of feet. (for other expressions of height see ICAO Doc 4444).~~

~~Cruise Climb (maximum 28 characters)~~

~~The letter C followed by an oblique stroke then the point at which cruise climb is planned to start, expressed exactly as above, followed by an oblique stroke; then the speed to be maintained during cruise climb followed by the two levels defining the layer to be occupied during cruise climb, or the level at which cruise climb is planned followed by the letters "PLUS", WITHOUT A SPACE BETWEEN THEM.~~

> ~~Examples~~
> ~~C/48N050W/M082F290F350;~~
> ~~C/48N050W/M082F290PLUS;~~

~~Note: On the basis of current NAT traffic densities, separation minima and ground system capabilities, a clearance for a cruise climb is unlikely to be given, particularly at peak times or in the busier portions of the airspace. Unless participating in a published trial and with the prior agreement of the relevant ATS Providers, operators should not plan for a cruise climb regime in the NAT Region, or to utilise LRC or ECON FMS modes.~~

~~Common Errors:~~

~~The use of spurious names for unnamed fixes (typically extracted from navigation data bases) is to be avoided. In addition to being undefined the names fail to adhere to the format specified for fixes (five alphabetical characters) and so cause a syntax error in addition to the logical error.~~ **~~ARINC 424 type position codes are not to be used.~~**

~~When specifying speeds in knots a leading zero is required if the speed is less than 1000 knots.~~

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~~No blank spaces are to be inserted between speed and level.~~

~~The ICAO convention for specifying latitude and longitude in flight plan related messages differs from that used by data base vendors in that the hemisphere indicators (N/S, E/W) should follow, not precede, the numeric component. Therefore specifying a position as "N60W010" represents an error.~~

~~The use of FIR designators as fix names is invalid, these designators should only be used in the EET sub-item of Item 18. Some flight plans contain such designators in Item 15 to indicate the transition between two FIRs at an unnamed fix. This is a syntax error. The latitude and longitude should be used.~~

~~3.10 Item 16: Destination Aerodrome and Total Estimated Elapsed Time, Destination Alternate Aerodrome(s)~~

~~In the recent Amendment to Doc.4444 the title of Item 16 was clarified to specify that the 'alternate aerodrome(s)' being referred to is(are) the destination alternate aerodrome(s). Additionally, the provision related to estimated elapsed time was clarified, along with the descriptions of how to indicate the locations, as follows:~~

~~Destination aerodrome and total estimated elapsed time (8 characters)~~

~~INSERT the ICAO four-letter location indicator of the destination aerodrome as specified in Doc 7910,~~

~~Location Indicators,~~

~~OR if no location indicator has been assigned,~~

~~INSERT ZZZZ and SPECIFY in Item 18 the name and location of the aerodrome, preceded by DEST/.~~

~~THEN WITHOUT A SPACE~~

~~INSERT the total estimated elapsed time.~~

~~Destination alternate aerodrome(s)~~

~~INSERT the ICAO four-letter location indicator(s) of not more than two destination alternate aerodromes, as specified in Doc 7910, Location Indicators, separated by a space,~~

~~OR, if no location indicator has been assigned to the destination alternate aerodrome(s),~~

~~INSERT ZZZZ and SPECIFY in Item 18 the name and location of the destination alternate aerodrome(s), preceded by ALTN/.~~

~~*Notes:*~~

a) ~~*Total Estimated Elapsed Time*~~
   i) ~~*For IFR flights this is the total estimated time from take-off until arriving over the designated point from which it is intended that an Instrument Approach Procedure, defined by reference to navigation aids, will commence, or, if no navigation aid is associated with the destination aerodrome, until arriving over the destination aerodrome itself.*~~
   ii) ~~*For VFR flights this is the total estimated time from take-off until arriving over the destination aerodrome.*~~
b) ~~*For a flight plan received from an aircraft in flight, total estimated elapsed time starts from the first point of the route to which the flight plan applies*~~

~~3.11 Item 18 - Other Information:~~

~~Significant changes have been made to these provisions.~~

~~The provision was clarified to indicate that hyphens '-' or oblique strokes '/' should only be used as described.~~

~~The provision was amended such that only indicators described in the provisions may be used, and they must be inserted in the order shown. The indicators defined are as follows, and are listed in the order in which they are to be inserted, if used:~~

~~STS/ Reason for special handling by ATS, e.g. a search and rescue mission, as follows:~~

~~ALTRV: for a flight operated in accordance with an altitude reservation;~~

~~ATFMX: for a flight approved for exemption from ATFM measures by the appropriate ATS authority.~~

~~FFR: fire-fighting;~~
~~FLTCK: flight check for calibration of navaids;~~

~~HAZMAT: for a flight carrying hazardous material;~~

~~HEAD: a flight with Head of State status;~~
~~HOSP: for a medical flight declared by medical authorities;~~

~~HUM: for a flight operating on a humanitarian mission;~~
~~MARSA: for a flight for which a military entity assumes responsibility for separation of military aircraft;~~

~~MEDEVAC: for a life critical medical emergency evacuation;~~
~~NONRVSM: for a non-RVSM capable flight intending to operate in RVSM airspace; SAR: for a flight engaged in a search and rescue mission; and~~
~~STATE: for a flight engaged in military, customs or police services.~~

~~Other reasons for special handling by ATS shall be denoted under the designator RMK/.~~

~~PBN/ Indication of RNAV and/or RNP capabilities. Include as many of the descriptors below, as apply to the flight, up to a maximum of 8 entries, i.e. a total of not more than 16 characters.~~

~~RNAV SPECIFICATIONS~~	
~~A1~~	~~RNAV 10 (RNP 10)~~
~~B1~~	~~RNAV 5 all permitted sensors~~
~~B2~~	~~RNAV 5 GNSS~~
~~B3~~	~~RNAV 5 DME/DME~~
~~B4~~	~~RNAV 5 VOR/DME~~
~~B5~~	~~RNAV 5 INS or IRS~~
~~B6~~	~~RNAV 5 LORANC~~
~~C1~~	~~RNAV 2 all permitted sensors~~
~~C2~~	~~RNAV 2 GNSS~~
~~C3~~	~~RNAV 2 DME/DME~~
~~C4~~	~~RNAV 2 DME/DME/IRU~~

~~RNAV SPECIFICATIONS~~	
~~D1~~	~~RNAV 1 all permitted sensors~~
~~D2~~	~~RNAV 1 GNSS~~
~~D3~~	~~RNAV 1 DME/DME~~
~~D4~~	~~RNAV 1 DME/DME/IRU~~
~~RNP SPECIFICATIONS~~	
~~L1~~	~~RNP 4~~
~~O1~~	~~Basic RNP 1 all permitted sensors~~
~~O2~~	~~Basic RNP 1 GNSS~~
~~O3~~	~~Basic RNP 1 DME/DME~~
~~O4~~	~~Basic RNP 1 DME/DME/IRU~~
~~S1~~	~~RNP APCH~~
~~S2~~	~~RNP APCH with BARO-VNAV~~
~~T1~~	~~RNP AR APCH with RF (special authorization~~
~~T2~~	~~RNP AR APCH without RF (special~~

~~*Note: For flights intending to operate through the New York Oceanic East or Santa Maria Oceanic FIRs or through the WATRS Plus Airspace, RNAV 10 (RNP 10) or RNP 4 approval is required in order to benefit from reduced horizontal separations employed here. Any NAT HLA aircraft intending to also fly in these airspaces should ensure that its RNP approval status is also included in the flight plan. Annotate as PBN/A1 (for RNAV 10 (RNP 10)) or PBN/L1 (for RNP 4). Similarly aircraft planning to fly on RLatSM OTS Tracks should annotate PBN/L1 (for RNP 4).(see* Chapter 4 – *Note following paragraph 4.1. 20 and paragraph 4.1.21).*~~

~~NAV/ Significant data related to navigation equipment, other than specified in PBN/, as required by the appropriate ATS authority. Indicate GNSS augmentation under this indicator, with a space between two or more methods of augmentation, e.g. NAV/GBAS SBAS~~

~~COM/ Indicate communications applications or capabilities not specified in Item 10a. DAT/ Indicate data applications or capabilities not specified in 10a..~~

~~SUR/ Include surveillance applications or capabilities not specified in Item 10b.~~

~~When Required Surveillance Performance (RSP) Capability has been filed in SUR/, this can be conveyed by inserting the character “Z” in Item 10 and “SUR/” in field 18 followed by the appropriate RSP performance per the following:~~

~~For RSP 180 – flight plan RSP180~~

~~For RSP 400 – flight plan RSP400~~

~~DEP/ Name and location `of departure aerodrome, if ZZZZ is inserted in Item 13, or the ATS unit from which supplementary flight plan data can be obtained, if AFIL is inserted in Item 13. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location as follows:~~

~~With 4 figures describing latitude in degrees and tens and units of minutes followed by "N" (North) or "S" (South), followed by 5 figures describing longitude in degrees and tens and units of minutes, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 4620N07805W (11 characters).~~

~~*OR*, Bearing and distance from the nearest significant point, as follows:~~

~~— The identification of the significant point followed by the bearing from the point in the form of 3 figures giving degrees magnetic, followed by the distance from the point in the form of 3 figures expressing nautical miles. In areas of high latitude where it is determined by the appropriate authority that reference to degrees magnetic is impractical, degrees true may be used. Make up the correct number of figures, where necessary, by insertion of zeros, e.g. a point of 180° magnetic at a distance of 40 nautical miles from VOR "DUB" should be expressed as DUB180040.~~

~~*OR*, The first point of the route (name or LAT/LONG) or the marker radio beacon, if the aircraft has not taken off from an aerodrome.~~

~~DEST/ Name and location of destination aerodrome, if ZZZZ is inserted in Item 16. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described under DEP/ above.~~

~~DOF/ The date of flight departure in a six figure format (YYMMDD, where YY equals the year, MM equals the month and DD equals the day).~~

~~REG/ All aircraft intending to operate in the NAT Region shall insert the aircraft registration~~

~~***Notes:***~~

- ~~*If the aircraft registration is missing, or if it is different from that contained in the AFN CONTACT message, the ground system will not establish a CPDLC connection with that aircraft.*~~
- ~~*Hyphens contained in an aircraft registration must not be entered into the ICAO flight plan form.*~~

~~EET/ Followed by waypoints or FIR Boundary designators plus accumulated estimated elapsed times from take-off to such points.~~

~~For flights conducted in the NAT Region on random routes, accumulated estimated elapsed times will be required for:~~

~~a) The last domestic reporting point prior to ocean entry.~~

~~b) The oceanic entry point.~~

~~c) Each significant point described in Item 15. (see note 2)~~

~~d) The oceanic exit point.~~

~~e) The first reporting point on the domestic track.~~

~~For flights operating along the entire length of a NAT organised track, estimated elapsed times will be required for the commencement point of the track and for FIR boundaries.~~

~~For flights operating along the fixed ATS route network between NAM/CAR, no EETs are required.~~

~~Examples: EET/CAP0745 XYZ0830~~

~~EET/EISN0204~~

~~*Notes: Elapsed times to the oceanic entry point (e.g. EGGX0105) are required by Shanwick, New York and Santa Maria OACCs only.*~~

~~SEL/ SELCAL Code, for aircraft so equipped.~~

~~*Note: As directed above, if no SELCAL code has been prescribed, this sub- item should be omitted rather than inserting such data as, e.g., SEL/NIL or SEL/NONE or SEL/ followed by no data.*~~

~~TYP/ Type(s) of aircraft, preceded if necessary without a space by number(s) of aircraft and separated by one space, if ZZZZ is inserted in Item 9.~~

~~Example: TYP/2F15 5F5 3B2~~

~~CODE/ Aircraft address (expressed in the form of an alphanumerical code of six hexadecimal characters) when required by the appropriate ATS authority. Example: 'F00001' is the lowest aircraft address contained in the specific block administered by ICAO.~~

~~DLE/ En-route delay or holding, insert the significant point(s) on the route where a delay is planned to occur, followed by the length of delay using four figure time in hours and minutes (hhmm).~~

~~Example: DLE/MDG0030~~

~~OPR/ ICAO designator or name of the aircraft operating agency, if different from the aircraft identification in item 7.~~

~~ORGN/ The originator's 8 letter AFTN address or other appropriate contact details, in cases where the originator of the flight plan may not be readily identified, as required by the appropriate ATS authority.~~

~~*Note.- In some areas, flight plan reception centres may insert the ORGN/ identifier and originator's AFTN address automatically*~~

~~PER/ Aircraft performance data, indicated by a single letter as specified in the Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS, Doc 8168), Volume I - Flight Procedures, if so prescribed by the appropriate ATS authority.~~

~~ALTN/ Name of destination alternate aerodrome(s), if ZZZZ is inserted in Item 16. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.~~

~~RALT/ ICAO four letter indicator(s) for en-route alternate(s), as specified in Doc 7910, Location Indicators, or name(s) of en-route alternate aerodrome(s), if no indicator is allocated. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.~~

~~TALT/ ICAO four letter indicator(s) for take-off alternate, as specified in Doc 7910, Location Indicators, or name of take-off alternate aerodrome, if no indicator is allocated.~~

~~RIF/ The route details to the revised destination aerodrome, following by the ICAO four-letter location indicator of the aerodrome. The revised route is subject to reclearance in flight~~
~~Examples: RIF/DTA HEC~~
~~KLAX RIF/ESP G94 CLA YPPH~~

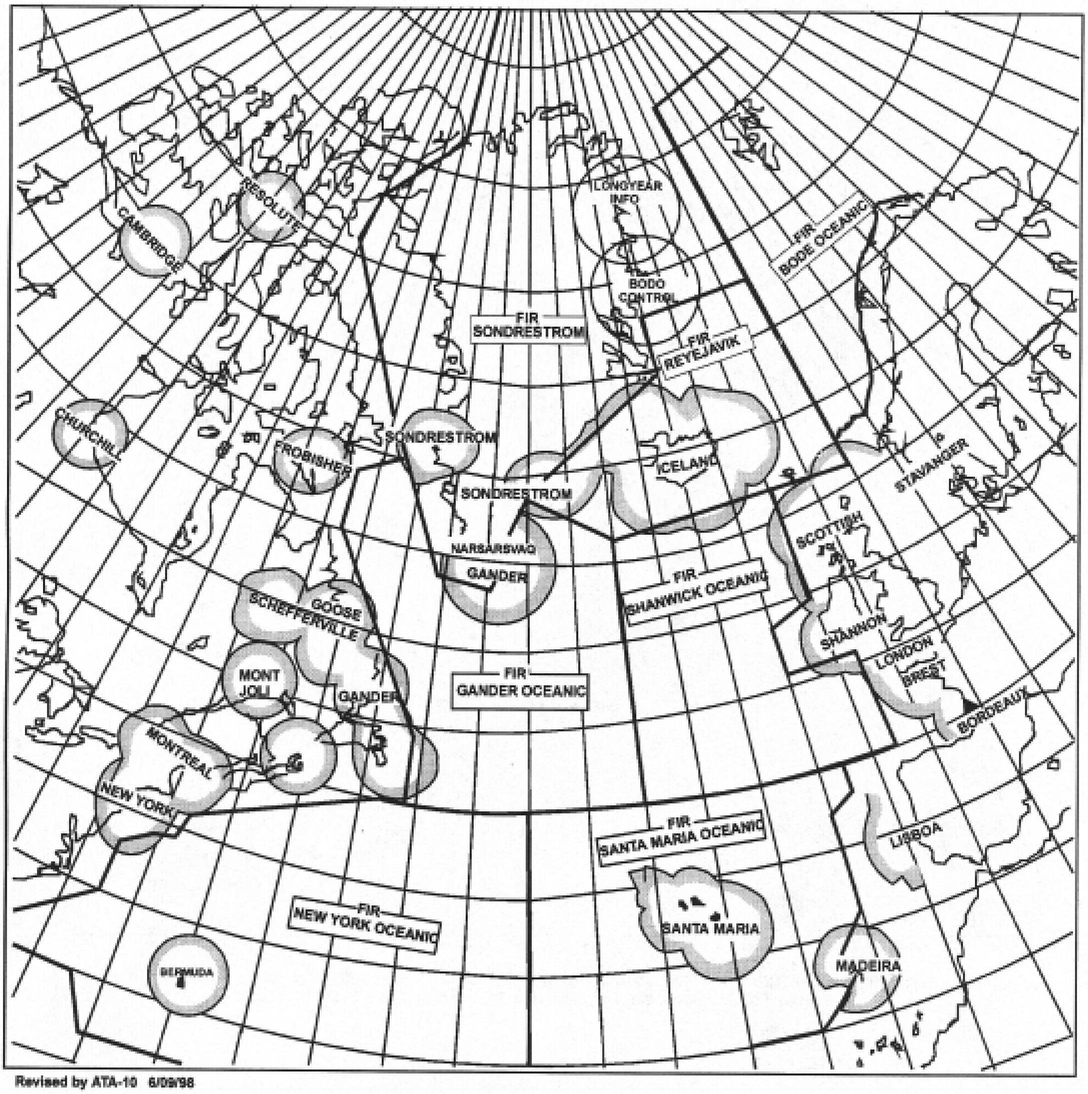
~~RMK/ Being a free text item, this is a useful sub-item for the inclusion of data only defined in particular regions (e.g. RMK/AGCS EQUIPPED RVR/800). Unrecognised sub-items embedded within the RMK/ sub-item would simply form part of the remarks and would not be processed. Hyphens must not be used in this sub-item.~~

ATTACHMENT 5

VHF AIR/GROUND COMMUNICATIONS COVERAGE EXISTING IN THE NAT REGION

Chart #1

VHF RADIO COVERAGE IN THE NAT REGION AT FL100 ***(Map to be updated)***



NOTE-

[1] The VHF cover depicted in the transition area between the NAT and the EUR regions ~~Regions~~ *has only*

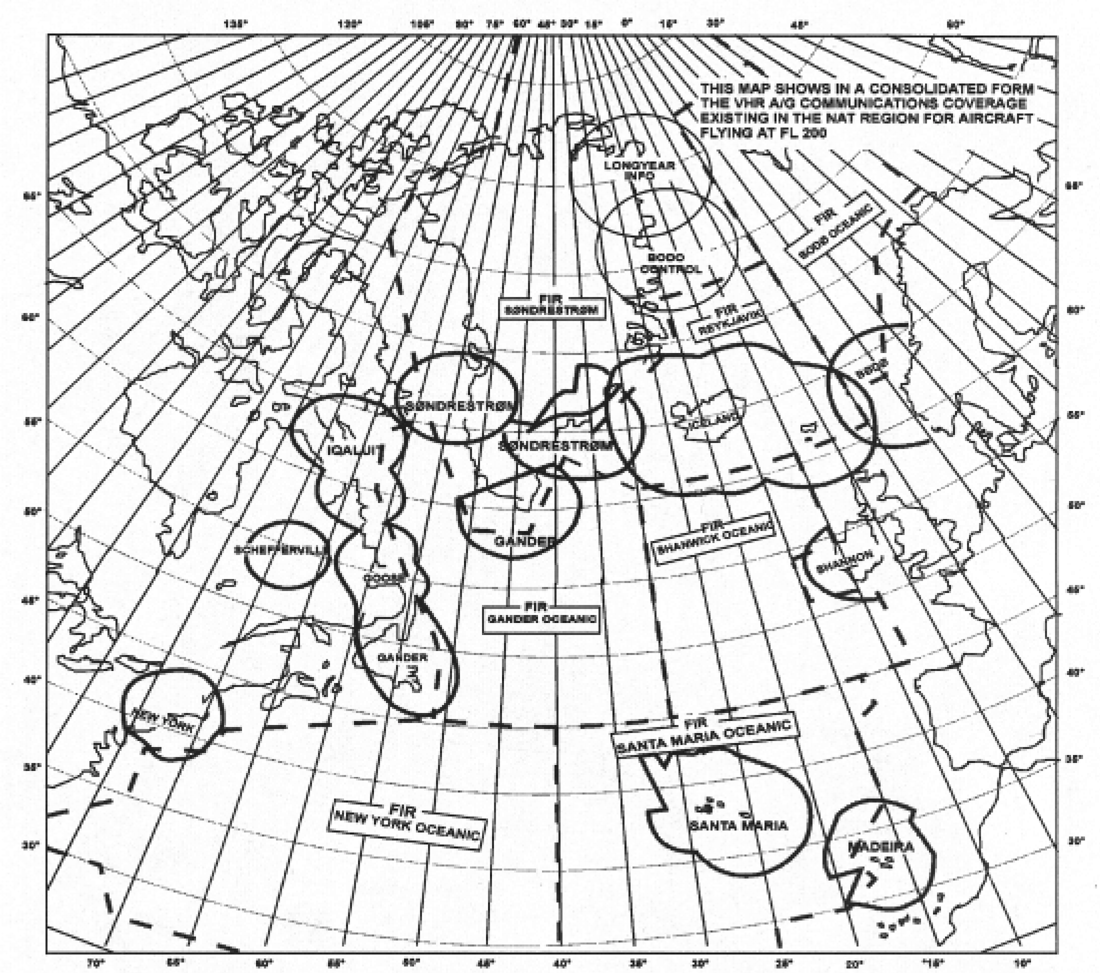
been shown to complete the picture of the communications cover. The VHF air/ground communication stations at Stavanger, Scottish, London, Brest, Bordeaux, and Lisboa do not form part of the communication system serving the NAT region ~~Region~~.

[2] The VHF cover provided by the Oaqatoqaq and Kulusuk stations in Greenland (Søndrestrøm) serves Søndrestrøm FIC only (below FL195)

[3] NARSARSVAQ information serves Søndrestrøm FIC only (below FL195).

Chart #2

VHF RADIO COVERAGE IN THE NAT REGION AT FL200 ***(Map to be updated)***

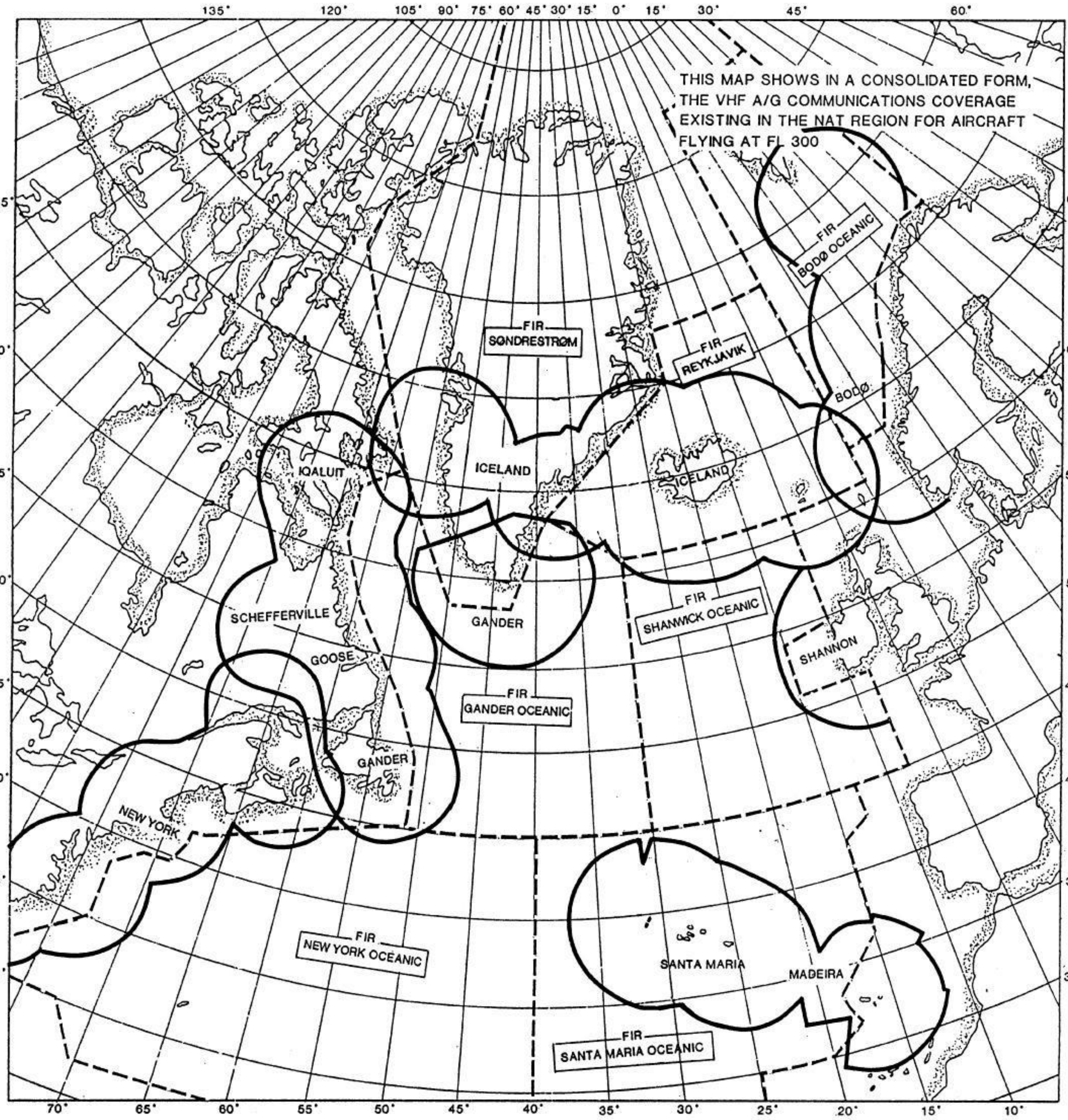


The VHF coverage provided by the QAQATOQAQ and KULUSUK stations in Greenland (Søndre Strømfjord), serves Søndre Strømfjord FIC only (below FL 195).

***NOTE** 1: The VHF cover depicted in the transition area between the NAT and the EUR regions ~~Regions~~ has only been shown to complete the picture of the communication cover. The VHF air/ground communication stations at Stavanger, Scottish, London, Brest, Bordeaux, and Lisboa do not form part of the communication system serving the NAT region ~~Region~~.*

Chart #3

VHF RADIO COVERAGE IN THE NAT REGION AT FL300 ***(Map to be updated)***



ATTACHMENT 6

NORTH ATLANTIC FLIGHT LEVEL ALLOCATION SCHEME

Flight Level Availability

1. *Introduction*

Following statistical analysis and discussions ~~between the~~ NAT ~~ATSUs, the North Atlantic~~ ~~Flight Level Allocation System~~ FLAS was developed ~~has been agreed~~ 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/ Santa Maria 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 OACC.

The procedures entail the establishment of a Night Datum Line, south of which is reserved principally for traffic originating in New York/ Santa Maria.

The procedures entail the establishment of a North Datum Line, on or north of which is reserved for late running westbound traffic from Reykjavik to Gander.

Aircraft ~~O~~operators are advised that the altitude scheme described herein should primarily be used for flight planning ~~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 signal is ~~will be~~ published by Shanwick using FL310 to FL390. Gander ~~will~~ publishes the eastbound OTS signal using FL310 to FL400. However, FL310 will only be used for “New York Tracks” which are eastbound OTS tracks that originate in the New York area and are separated from the main OTS by more than one degree at 030°W ~~as described in “*Eastbound Traffic originating in New York/Santa Maria, during the eastbound OTS*”, especially its 4th paragraph~~.

The activation times of the westbound OTS shall be published as 1130z to 1900z at 30W.

The activation times of the eastbound OTS shall be published as 0100z to 0800z at 30W.

3. *Delegated Opposite Direction Levels (ODLs)*

Gander will accept FL310 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, FL330 is delegated to Shanwick for westbound traffic.

~~During the eastbound OTS, a static Datum Line, known as the~~ Night Datum Line, is established with the following coordinates ~~co-ordinates~~:

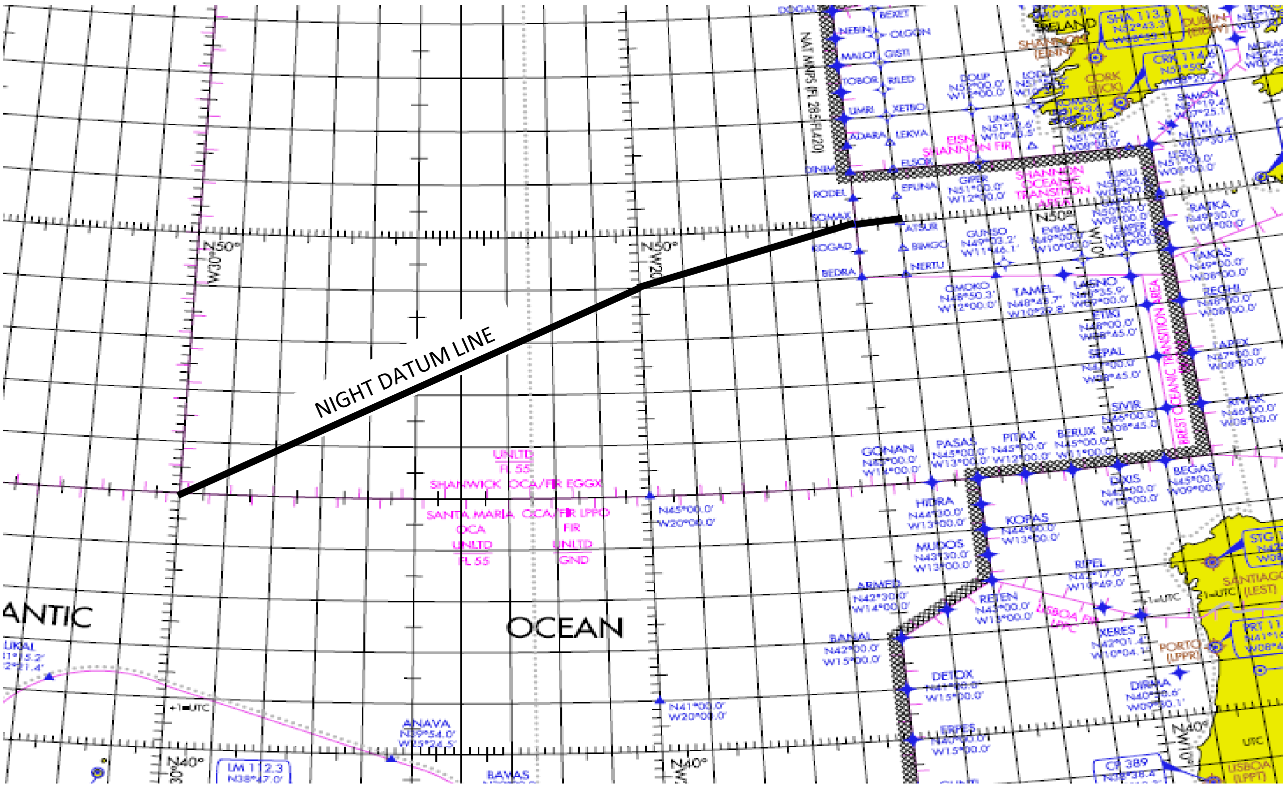
45N030W 49N020W SOMAX ATSUR.

~~On and to the n~~North of the Night Datum Line FL340 and FL380 are delegated to Gander for ~~use by E~~eastbound traffic.

~~To the s~~South of the Night Datum Line FL340 will not be used for Gander eastbound traffic.

To the south of the Night Datum Line or the eastbound OTS, whichever is further ~~S~~south, FL340 and FL380 will not be used for Gander eastbound traffic.

~~During the westbound OTS, FL330 is delegated by Gander to Shanwick for use by westbound traffic.~~

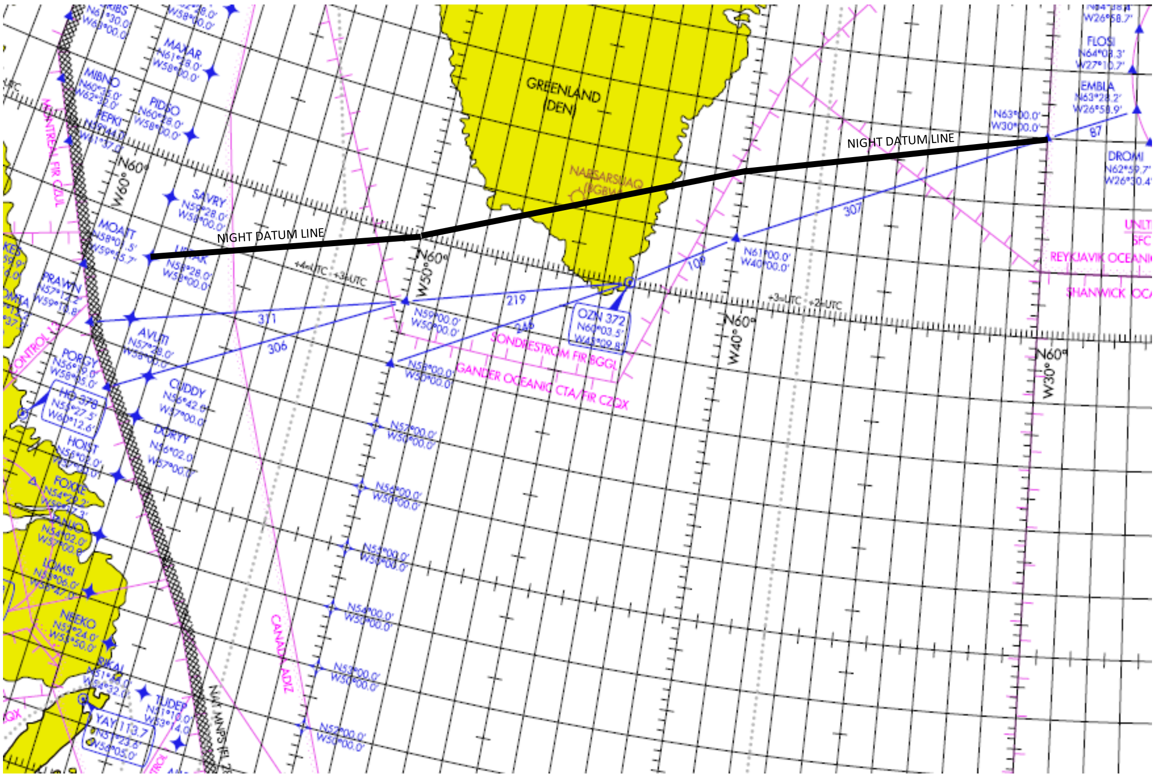


~~Between 0300Z and 0700Z, a static Datum Line, known as the~~ North Datum Line, is established between 0300Z and 0700Z with the following coordinates:

URTAK 60N050W 62N040W 63N030W

On and ~~to the~~ north of the North Datum Line FL380 is delegated to Reykjavik for ~~use by W~~westbound traffic.

In the event of a high volume of North Random Flights and/or OTS tracks ~~Tracks~~ the North Datum Line may be suspended to accommodate the dominant ~~E~~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 FL310, FL340, FL360 or FL380.

Eastbound traffic remaining south of the Night Datum Line should flight plan using FL310, FL340 FL380 or FL400.

The levels allocated to New York tracks ~~Tracks~~ entering Shanwick which cross, or route south of, the Night Datum Line, may be any combination of FL310, FL340, FL360, FL380, or as otherwise agreed between Santa Maria and New York. Additional levels will be allocated to New York tracks ~~Tracks~~ if the core OTS is located in that area.

For this procedure, "New York Tracks" are any eastbound OTS tracks ~~Tracks~~ which originate in the New York area and enter Gander or Shanwick OACC.

~~**5. *Iberian Tracks***~~

~~Iberian Tracks are eastbound or westbound organised Tracks, routing between New York and Santa Maria, and lying south of the core OTS, which do not enter Gander or Shanwick airspace.~~

~~The Flight Levels allocated to Iberian Tracks will normally be limited to FL350 and FL370, and can be adjusted to accommodate traffic if necessary as agreed between Santa Maria and New York.~~

OTS Design & Use

For all westbound tracks ~~Tracks~~ which landfall at or north of AVUTI, Reykjavik require FL340 to be omitted from that track ~~Track~~ to allow profiles for aircraft originating in the Reykjavik OCA.

During the westbound OTS validity times, Shanwick 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.

Note: The effect of this particular ATS co-ordination restriction on ~~O~~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 0600z at 30W.

Note that Shanwick may tactically release FL320 back to Gander should there be insufficient demand on the TANGO routes, or that the demand on the eastbound tracks is sufficiently greater.

6. *Summary*[v35]

The availability of RVSM levels, between 0100z and 0800z (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 ~~Tracks~~ in the vicinity.

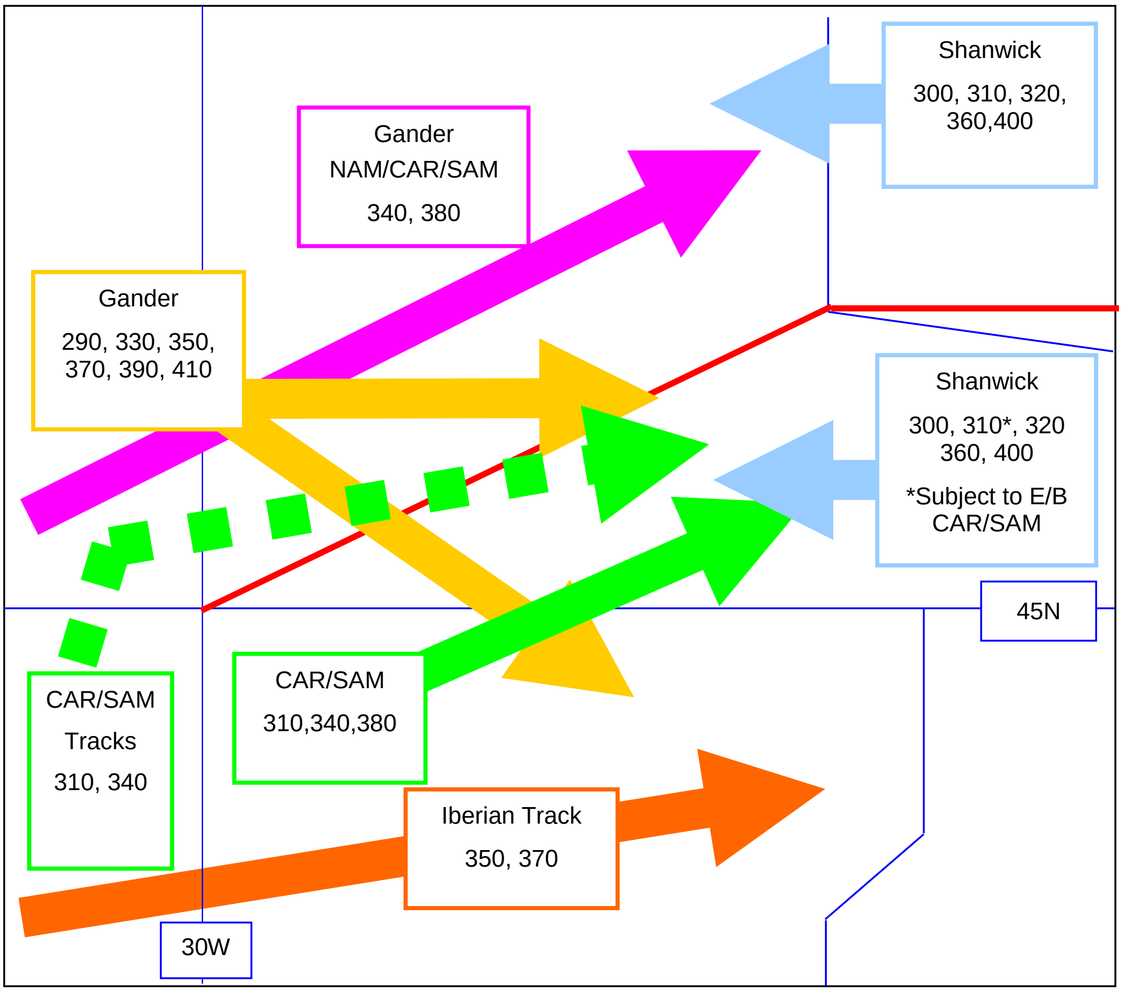
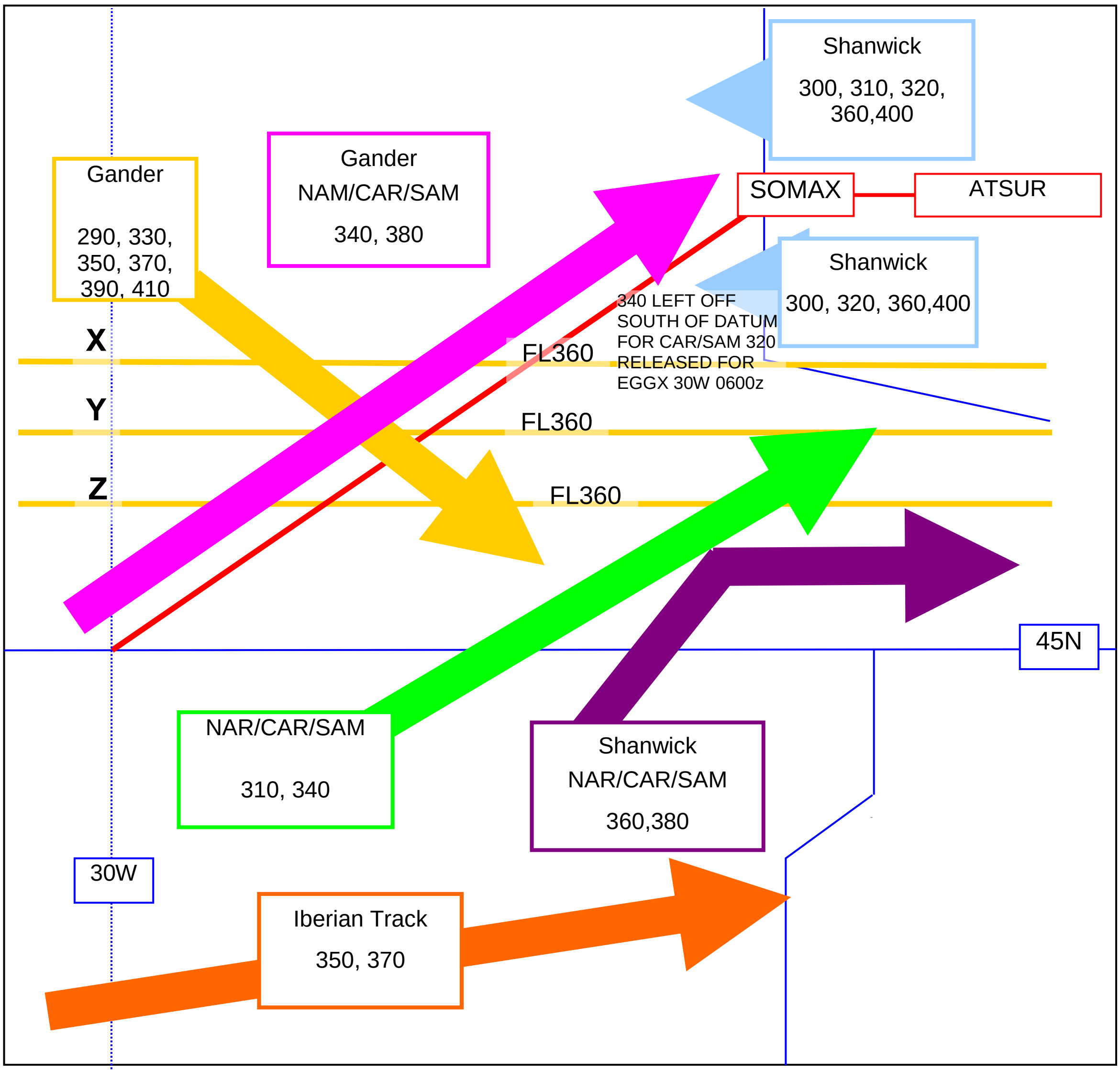


Diagram 1

Diagram 2 illustrates the situation when there are Gander eastbound NAT tracks ~~Tracks~~ in the vicinity.



7.

Diagram 2

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:

8. ***Basic Principles:***

All times relate to 30W.

OTS Transition rules apply between 0801z to 1129z and 1901z to 0059z. During these times flight levels shall be applied in accordance with direction of flight other than as stated below.

9. ***General principles:***

Westbound traffic crossing 30W, 2230z to 0059z, shall remain clear of the incoming OTS and shall not use delegated ODLs (FL340 and FL380). After 2230z, the OTS and ODLs (F340 and FL380) are released to Gander, who may clear eastbound aircraft, taking cognisance of, and giving priority to, already cleared westbound aircraft.

Eastbound traffic crossing 30W 1000z to 1129z, shall remain clear of the incoming OTS at FL350 and shall not use delegated ODL (FL330). After 1000z, the OTS (at FL330 and FL350) and ODL (FL330) are released to Shanwick, who may clear westbound aircraft, taking cognisance of, and giving priority to, already cleared eastbound aircraft.

Eastbound traffic, at FL370 and FL390, crossing 30W 1030z to 1129z, shall remain clear of the incoming OTS. After 1030z, the OTS (at FL370 and FL390) are released to Shanwick, 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 1900z, at ODL~~s~~ (FL330) 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 0800z, at ODLs (F340, FL380) 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	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	Eastbound. Westbound (subject to eastbounds).

Level	Time	Direction
	1130 – 1900	Westbound (OTS and ODL).
FL320	0801 – 2229 2230 – 0059 0100 – 0800	Westbound. Westbound (avoiding OTS). Eastbound OTS (subject to westbounds). Westbound (avoiding OTS). Eastbound (OTS).
FL310	H24	Westbound. (ODL).
FL300	H24	Westbound.
FL290	H24	Eastbound.

ATTACHMENT 7

OCEANIC CLEARANCES DELIVERY/FORMAT/CONTENT

OCEANIC CLEARANCE

~~There are three elements to an Oceanic Clearance: Route, Speed and level. These elements serve to provide for the three basic elements of separation: lateral, longitudinal and vertical~~ 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 ~~Oceanic Clearances~~ include:

a) use of published VHF clearance delivery frequencies;

b) by HF communications to the OACC through the appropriate ~~ae~~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 ~~AIS~~ AIPs and also as NAT OPS Bulletins which are available for download from the ICAO Paris website (see http://www.paris.icao.int/documents_open/subcategory.php?id=106). 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 ~~Region~~ will normally have the

following format: "OCEANIC CLEARANCE [WITH A <list of ATC info>]. <atc 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 ~~O~~oceanic ~~C~~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) DLH458””

2. *Controller/radio operator:*

~~“REYKJAVIK OACC CLEARS DLH458 TO CYVR, VIA GUNPA 65/10 69/20 71/30 72/40 73/60 MEDPA, FROM GUNPA MAINTAIN F340 M083”~~ “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 clearanceswhich 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 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 ~~Region~~ oceanic airspace. These examples have been chosen with a view to explaining certain elements that are unique to the ICAO NAT region ~~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 (~~a~~eradio 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 FL330. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CARPE at FL330. If the flight is unable to cross CARPE at FL330 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 FL330. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CARPE at FL330. If the flight is unable to cross CARPE at FL330 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	**Meaning**
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	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. 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 FL330. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CARPE at FL330. If the flight is unable to cross CARPE at FL330 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 (aeradio or clearance delivery) for a flight cleared on a random route.	**Meaning**
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.	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 FL350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL350. If the flight is unable to cross CRONO at FL350 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 FL350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL350. If the flight is unable to cross CRONO at FL350 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. 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 FL350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL350. If the flight is unable to cross CRONO at FL350 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	**Meaning**
ATC CLEARS ABC123 CLEARED DESTINATION AIRPORT UUDD DIRECT BALOO 36N060W 38N050W 43N045W 47N040W 52N030W 56N020W BALIX UP59 NINEX. MAINTAIN FLIGHT LEVEL 330. MAINTAIN MACH POINT EIGHT TWO.	ABC123 is cleared to Moscow via the route specified. The altitude, route and speed elements of the ~~O~~oceanic ~~C~~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 FL290, 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 FL290. 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 (~~a~~eradio or clearance delivery), where the route differs from the flight plan route	**Meaning**
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.	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 FL350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL350. If the flight is unable to cross CRONO at FL350 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.

Example3b –Oceanic clearance delivered via voice (DCPC), where the route differs from the flight plan route	Meaning
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.	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 FL350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL350. If the flight is unable to cross CRONO at FL350 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	**Meaning**
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	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 FL350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL350. If the flight is unable to cross CRONO at FL350 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	**Meaning**
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	Data link clearance number 135 sent from the Gander OceanicArea 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. 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 FL340. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL340. If the flight is unable to cross CRONO at FL340 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	**Meaning**
ATC CLEARS ABC123 CLEARED DESTINATION AIRPORT UUDD DIRECT BALOO 36N060W 38N050W 43N045W 47N040W 52N030W 54N020W DOGAL BEXET. MAINTAIN FLIGHT LEVEL 330. MAINTAIN MACH POINT EIGHT TWO, ROUTE HAS BEEN CHANGED.	ABC123 is cleared to Moscow via the route specified. The altitude and speed elements of the ~~O~~oceanic ~~C~~clearance are derived from the aircrafts 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 ~~O~~oceanic ~~C~~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 4 – Re-route clearances

Example 4a –Revised route clearance delivered via voice (~~ae~~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 4b –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 4c – 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 4d – 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 5 – level clearances – no restrictions

Example 5a –Revised level clearance delivered via voice ~~(ae~~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 FL340. If the instruction to "report leaving" is included, flight is to report leaving its current level. The flight is to report reaching FL340.
Example 5b –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 FL340. If the instruction to "report leaving" is included, flight is to report leaving its current level. The flight is to report reaching FL340.

Example 5c – 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 FL320, is cleared to climb to and maintain FL340. The flight is to send a CPDLC downlink message to report leaving FL320 and to send another CPDLC downlink message to report when the flight has levelled at FL340.

Example 6 – level clearances – with geographic restrictions/conditions

Example 6a –Revised level clearance delivered via voice (a~~e~~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 FL320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W already level at FL320. The flight is to report leaving its current level and also to report reaching FL320.
Example 6b – 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 FL320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W level at FL320. The flight is to report leaving its current level and also to report reaching FL320.
Example 6c –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 FL320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W already level at FL320. The flight is to report leaving its current level and also to report reaching FL320.
Example 6d - 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 FL310, is cleared to climb to and maintain FL320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W already level at FL320. The flight is to send a CPDLC downlink message to report leaving FL310 and to send another CPDLC downlink message to report when the flight has levelled at FL320.

Example 6e – Revised level clearance delivered via voice (~~ae~~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 FL300, is cleared to climb to and maintain FL320; 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 FL320. 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 6f – 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 FL300, is cleared to climb to and maintain FL320; 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 FL320. 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 6g – 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 FL300, is cleared to climb to FL320; however, climb must not commence until the flight reaches 41N020W. The flight is to send a CPDLC downlink message to report leaving FL300 and to send another CPDLC downlink message to report when the flight has levelled at FL320. 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 7 – level clearances – with time restrictions/conditions

Example 7a – Revised level clearance delivered via voice ~~(a~~eradio) –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 FL320. Climb must be arranged so that the flight is level at FL320 no later than 1337 UTC. The flight is to report leaving its current level and also to report reaching FL320.
Example 7b –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 FL320. Climb must be arranged so that the flight is level at FL320 no later than 1337 UTC. The flight is to report leaving its current level and also to report reaching FL320.
Example 7c – the same clearance delivered via CPDLC CLIMB TO REACH F320 BY 1337 REPORT LEAVING F310 REPORT LEVEL F320	**Meaning** ABC123, which is currently at FL310, is cleared to climb to and maintain FL320. Climb must be arranged so that the flight is level at FL320 no later than 1337 UTC. The flight is to send a CPDLC downlink message to report leaving FL310 and to send another CPDLC downlink message to report when the flight has levelled at FL320.
Example 7d – Revised level clearance delivered via voice (~~a~~eradio) –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 FL300, is cleared to climb to and maintain FL320; however, climb cannot be commenced until 1337 UTC, or later. The flight is to report leaving its current level and also to report reaching FL320. 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 7e – Revised level clearance delivered via voice (DCPC) –restriction to maintain current level until TIME ABC456 MAINTAIN FLIGHT LEVEL300. 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 FL300, is cleared to climb to and maintain FL320; however, climb cannot be commenced until 1337 UTC, or later. The flight is to report leaving its current level and also to report reaching FL320. 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 7f – 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 FL300, is cleared to climb to FL320; however, climb must not commence until 1337 UTC. The flight is to send a CPDLC downlink message to report leaving FL300 and to send another CPDLC downlink message to report when the flight has levelled at FL320. 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 8 – time restrictions/conditions – reach a point no later than a specified time

Example 8a – time restriction delivered via voice (~~a~~eradio), speed amended – AT OR BEFORE ABC123 AMENDED SPEED CLEARANCE. REYKJAVIK OACC 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 8b – 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 8c – 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 8d – time restriction delivered by ~~a~~eradio 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 8e – 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 9 – time restrictions/conditions – cross a point no earlier than a specified time

Example 9a–. time restriction delivered via voice (~~a~~eradio) – AT OR AFTER ABC456 AMENDED SPEED CLEARANCE. REYKJAVIK OACC 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 9b–. 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 9c – 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 9d – time restriction delivered by ~~a~~eradio 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 9e – 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 8

WEATHER CONDITIONS & CONSIDERATIONS

1. GENERAL

1.1 The following text is concerned primarily with the North Atlantic region ~~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 ~~problems in this area are produced mainly by frontal depressions. H~~hurricanes and tropical storms, ~~affect the southern regions of the North Atlantic~~ 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 ~~in the winter~~. 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 Canaries 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 FL235 in the area near the highest terrain, and FL190 over the icecap. On the route between Søndrestrøm and Kulusuk the lowest usable flight level in general is about FL130. 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 FL130. On the route from Nuuk/Godthaab towards Iceland either direct or via Kulusuk NDB, the lowest usable flight level will often be FL150. 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 center of the sun's disc is 6 degrees below the horizon, and begins in the morning when the center 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 F 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 FL120.

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 FL075.

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°
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 movementsare 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 centers 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.

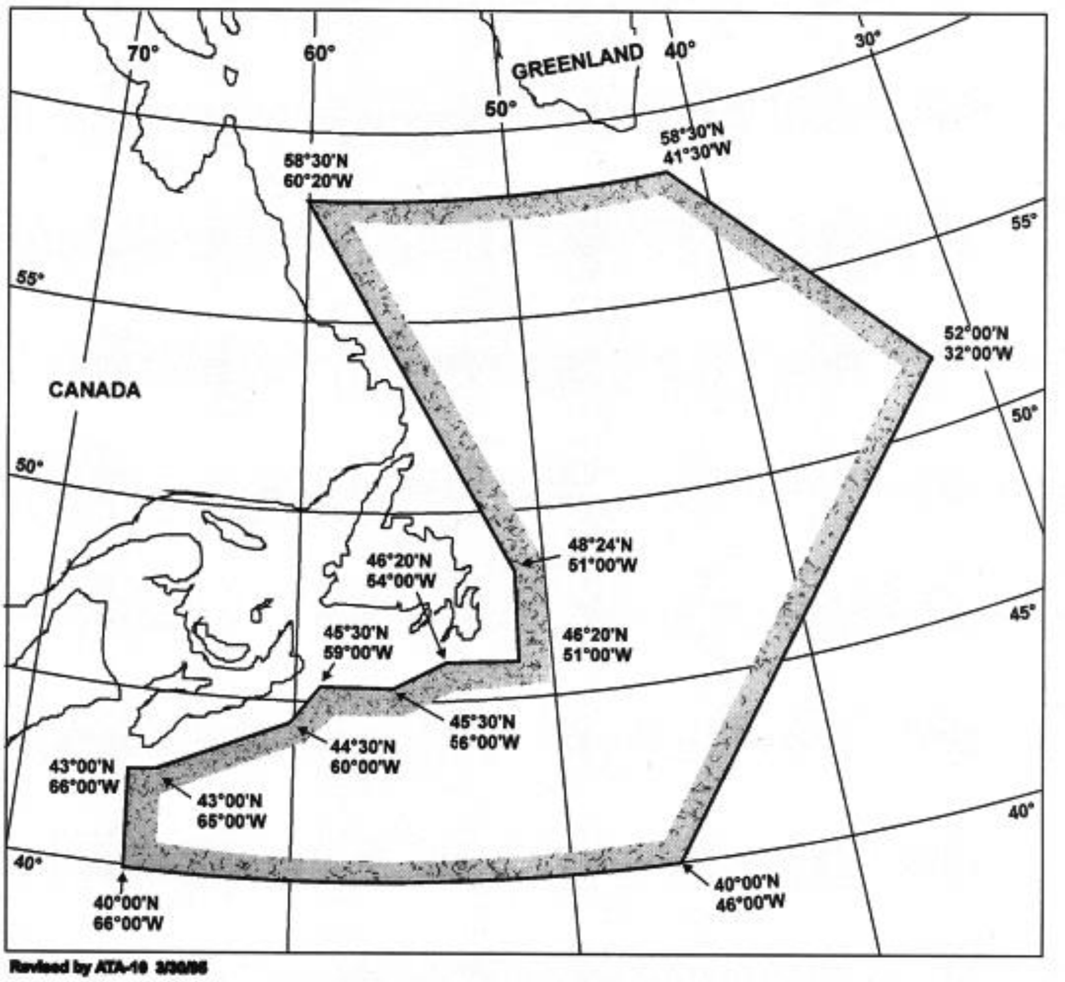
7. Distribute candies or other nibble food.

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.

8. PERMANENT MILITARY OPERATIONS

8.1 AREA ELK FL 50 AND BELOW



8.2 Maritime surveillance aircraft conduct daily all-weather operational flights in Area ELK. These aircraft are required to operate on various headings and altitudes up to and including FL50 and to make rapid climbs and descents without prior warning. Because of operational considerations they operate without navigation or identification lights during the hours of darkness and often without SIF/IFF.

8.3 The Canadian Maritime Command ~~COmmand~~ (CANMARCOM) provides advisory information between maritime aircraft and other aircraft in Area ELK based on known air traffic.

8.4 Standard pressure setting 29.92 inches is used for transit and separation within the entire area.

8.5 In the interest of flight safety it is essential that CANMARCOM be informed in advance of all flights or proposed flight in or through Area ELK. Aircraft flight level(s), track and approximate times of ELK penetration and exit are required. Military aircraft are encouraged to communicate directly with CANMARCOM. On prior request, frequencies will be assigned on which to report position and obtain ELK clearance. ASW aircraft will be routed clear of all known military and civil traffic.

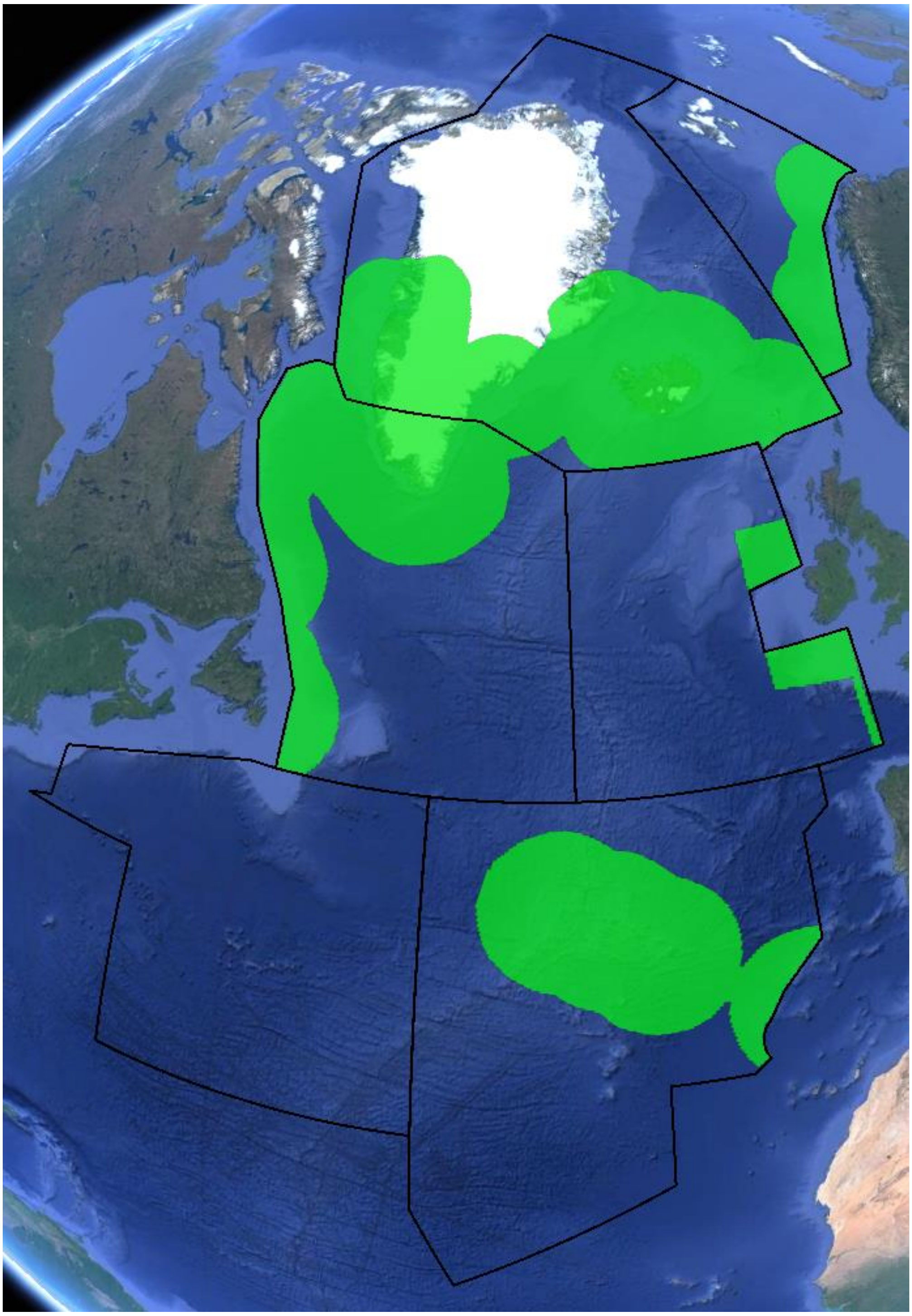
8.6 CANMARCOM may be contacted by the following means:

a) Letter to Commander maritime Command, Halifax, N.S., Canada.
b) Message to MOC HALIFAX.
c) Telephone Maritime Operations Centre 902-427-2501, 902 427 2502, Autovon 447-2502.
d) On request of the pilot when filing flight plans at departure points in North America, aircraft flight plans may be relayed through ATC channels to Moncton ACC for Maritime Command Operations.
e) In-flight position reports or advisories when not transmitted directly as in paragraph 4 above may

be relayed through Gander or Moncton ACC. These messages should specify "Pass to Maritime Operations Centre."

ATTACHMENT 9

NORTH ATLANTIC ATS SURVEILLANCE COVERAGE CHARTS



ATTACHMENT 10

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 18)
2. An instrument rating (Chapter 18)
3. Long range NAVAIDS (Chapter 8)
4. Available daylight on your route (Chapter 18)
5. Aircraft inspected by a licensed mechanic for suitability for a long, over water crossing. The necessary aircraft documents (Chapter 18)
6. If transiting Canadian airspace, the required Sea/Polar Survival equipment necessary to adhere to Canadian Air Regulation 540 (Chapter 18)
7. Format to be used when filing an oceanic flight plan (Chapter 4)
8. The proper procedures to be used in obtaining an oceanic clearance (Chapter 5 & Attachment 7)
9. How to prevent hypothermia (Chapter 18)
10. VHF radio coverage in the NAT Region (Chapter 6 & Attachment 5)
11. A position report and a revised estimate (Chapter 6)
12. SELCAL Code (Chapter 6)
13. Flight planned for FL285 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 18)
16. The relevant meteorological information (Chapter 18)
17. Current NOTAMs with special regard to the status of radio-navigation aids and airport restrictions. (Chapter 18)

Pre-Flight Inspection

Pull the cowling 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 121.5 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 11

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 will 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 (**P1, P2 and/or P3**) in Item 10a **PBS**: Insert relevant required surveillance performance (RSP) specification(s) (e.g **RSP180**) in Item 18 of the flight plan following the SUR/ indicator. **CPDLC**: Insert the appropriate descriptor (**J2, 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.	
PBCS Compliance - III	Do I meet RCP 240?	29 March 2018	Support a means within the airline for receiving in-flight reports of observed performance and the ability of taking corrective actions for aircraft identified as not complying with RCP specifications; and, carry authorizations in the AOC/Ops. Specs from the State of the Operator or the State of Registry, as appropriate, in order to qualify for the separation minima shown in the Separation Requirements Table in Item 8 below. As fitted, carry authorizations in the AOC/OpSpecs from the State of the Operator or the State of Registry to utilize CPDLC. This includes a statement of compliance with RTCA DO-258/EUROCAE ED-100 or equivalent and that it is capable of operating outside VHF data link coverage (availability of Satcom data)	
Mandatory ADS-B Carriage	Northern boundary: 64N000W - 68N010W - 69N020W -		Aircraft not equipped with FANS 1/A (or equivalent) systems will be allowed to operate	

	68N030W - 67N040W - 69N050W - 69N060W - BOPUT. Southern boundary: GUNPA (61N000W) - 61N007W - 6040N010W - RATSU (61N010W) - 61N020W - 63N030W - 62N040W - 61N050W – SAVRY		within this area at DLM designated flight levels, provided the aircraft is suitably equipped (transponder/ADS-B extended squitter transmitter).	
Datalink Mandate Compliance	» Phase **2A**, commenced 5 February 2015: FL 350 to FL 390 (inclusive) all tracks within the NAT OTS. This phase applies to all aircraft operating on or at any point along the tracks; » Phase **2B**, commencing 7 December 2017: FL 350 to FL 390 (inclusive) throughout the ICAO NAT region; » Phase **2C**, commencing 30 January 2020: FL 290 and above throughout the ICAO NAT Region.			
ICAO FPL Requirements	Multiple requirements for PBCS, HLA, Data Link Mandate, Equipage and 3rd Part Contracts	Ongoing	• Item 10a of the ICAO flight plan will be annotated with the letter **“X”** to indicate that the aircraft meets the requirements for HLA operations. • The letter **“R”** is required in Item 10a of the flight plan along with the performance-based navigation levels	

			that can be met specified in Item 18 following the indicator **PBN/**. • The RNP4 designator, **“L1”** is required for 30NM lateral and 30NM longitudinal. • Either **“L1”** or the RNP10 designator, **“A1”** is required for 50NM longitudinal. • The equipment qualifier J-code must be found within Item 10a of the flight plan. The presence of at least one of the following J- codes is required: ○ **“J 5”** (INMARSAT), ○ **“J6”** (MTSAT), and ○ **“J7”** (Iridium) for performance-based separation. • The equipment qualifier P-code **“P2”** must be found within Item 10a of the flight plan. • The **“P2”** equipment qualifier indicates the aircraft is certified **CPDLC** RCP-240 • The text string **“RSP180”** must appear in Item 18 of the flight plan, following the indicator for surveillance equipment and capabilities **(SUR/)**, which indicates the airframe is certified and compliant.	

- Lateral & Vertical
- Datalink Requirements
- 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/MNPS. See: Chapter 1
- ✓ RVSM. See: Chapter 1 and Chapter 17
- ✓ 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 17.
- ✓ 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 See: Chapter 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 Item10.
  - 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.

5. Flight Monitoring

- ✓ Oceanic clearances. See: Chapter 5
- ✓ Transponder Use. See: Chapter 17
- ✓ Re-Routes. See: Chapter 17
- ✓ En-route Contingencies. Chapter 17
- ✓ Loss of communications and HF failure. See Chapter 17 and Chapter 6.
- ✓ Normal Flight Tracking. See ICAO Annex 6 Part 1 Chapter 3.5.1
  - o 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 17

✓ After entering NAT RVSM Airspace. See: State AIPs.

7. Document References

Reference	Check
PBCS Manual	
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	
Canada AIC XXX	
ICAO Circular 347 Normal Flight Tracking	

8. Separation Requirements

<table>
<tr><th>Oceanic Area FIR</th><th>Separation Standard</th><th>ATC Application</th><th>COM</th><th>NAV</th><th>SUR</th><th>Flight Planning Guide</th></tr>
<tr><td rowspan="3">Gander Oceanic FIR CZQX
Shanwick Oceanic FIR EGGX
Reykjavik Oceanic FIR BIRD</td><td>LATERAL SEPARATION (pairs of aircraft on Tracks or Random Route)</td><td>23 NM</td><td>RCP240</td><td>RNP 4</td><td>RSP 180 with ADS-C</td><td>Whole or Half Degrees of Latitude</td></tr>
<tr><td rowspan="2">LONGITUDINAL SEPARATION (pairs of aircraft in trail)</td><td colspan="4">30 minutes for non-turbo-jet aircraft</td><td>ATC sets <u>Periodic</u> ADS-C Contracts- usually to 14 minutes</td></tr>
<tr><td>5 Mins.</td><td>RCP 240</td><td>RNP 10 or RNP 4</td><td>RSP 180</td><td>ATC sets <u>Event Contracts</u>
- 5nm Lateral Deviations (LDE)
- 300ft Level Range Deviation (LRDE)
- Waypoint Change Event at CRP (WCE)</td></tr>
<tr><td rowspan="4">New York Oceanic East KZWY
Santa Maria Oceanic FIR
LPPO</td><td>LATERAL SEPARATION (pairs of aircraft on Tracks or Random Route)</td><td>30 NM</td><td>RCP 240</td><td>RNP 4</td><td>RSP 180 with ADS-C</td><td>Whole or Half Degrees of Latitude</td></tr>
<tr><td rowspan="3">LONGITUDINAL SEPARATION (pairs of aircraft in trail)</td><td colspan="5">30 minutes for non-turbo-jet aircraft</td></tr>
<tr><td>50 NM</td><td>RCP 240</td><td>RNP 10 or RNP 4</td><td>RSP 180 with ADS-C</td><td>ADS-C Contract set to 14 minutes</td></tr>
<tr><td>30 NM</td><td>RCP 240</td><td>RNP 4</td><td>RSP 180 with ADS-C</td><td>ADS-C Contract set to 14 minutes</td></tr>
</table>

ATTACHMENT 12

BIBLIOGRAPHY AND OTHER REFERENCE MATERIAL

~~**Australian Civil Aviation Order 20.18 Appendix XI**~~

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* ~~(PBN)~~ Performance-Based Navigation Manual (PBN)

www.icao.int

ICAO Doc 10037* Global Operational Data Link (GOLD) Manual

www.icao.int

ICAO NAT HF Guidance Material (NAT Doc 003)

www.icao.int/EURNAT/ > EUR & NAT Documents > NAT Documents > NAT Doc 003

* ICAO saleable documents - Please contact ICAO Headquarters, Montreal sales@icao.int

~~ICAO~~ Sample Oceanic Checklist

www.icao.int/EURNAT/ > EUR & NAT Documents > NAT Documents > NAT OES Bulletins

~~ICAO~~ Sample Oceanic Expanded Checklist

www.icao.int/EURNAT/ > EUR & NAT Documents > NAT Documents > NAT OES Bulletins

~~ICAO~~ Oceanic Errors Safety Bulletin

www.icao.int/EURNAT/ > EUR & NAT Documents > NAT Documents > NAT OES Bulletins

~~ICAO~~ NAT OPS Bulletins

www.icao.int/EURNAT/ > EUR & NAT Documents > NAT Documents > NAT OPS Bulletins

~~ICAO Global Operational Data Link Document (GOLD)~~

~~www.icao.int/EURNAT/ > EUR & NAT Documents > NAT Documents > GOLD~~

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 Traffic Density Analyser** (TDA)~~

~~https://extranetapps.navcanada.ca/NATTDA/TDAListing.aspx?reqDirection=East~~

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

http://www.eurocontrol.int/articles/library

EASA AMC 20-24

easa.europa.eu/system/files/dfu/Annex%20II%20-%20AMC%2020-24.pdf

ETSO- CS-ETSO ~~C129a~~

www.easa.europa.eu/ws_prod/g/doc/Agency_Mesures/Certification%20Spec/CS-ETSO.pdf

Iceland AIP

~~www.isavia.is~~ http://eaip.samgongustofa.is/

Ireland AIP

~~www.iaa.ie/safe_reg/iaip/~~ http://iaip.iaa.ie/iaip/IAIP_Frame_CD.htm

RTCA DO 260/A/B

~~www.rtca.org/Files/ListofAvailableDocsMarch2013.pdf~~ https://standards.globalspec.com/std/1994503/rtca-do-260

UK AIP

~~www.ais.org.uk~~ http://www.nats-uk.ead-it.com/public/index.php.html

UK "TrackWise" video

https://www.youtube.com/watch?v=EJTjwW5ZYas

USA FAA TSO-C129 or later standard (GPS Certification)

www.airweb.faa.gov

USA FAA AC 20-138D (Airworthiness Approval of GPS)

www.airweb.faa.gov

USA FAA AC 20-165B (Airworthiness Approval of ADS-B)

www.airweb.faa.gov

USA FAA AC91-85A (RVSM MASPSs)

www.faa.gov/air_traffic/separation_standards/rvsm/

USA FAA NAT Resource Guide for U.S. Operators

~~www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/afs470/media/NAT.pdf~~
https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs470/media/NAT.pdf

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 ~~(WATRS)~~

~~http://www.faa.gov/pilots/intl/oceanic_ops/~~ https://www.faa.gov/air_traffic/publications/

USA US Coastguard GPS NOTAMs

www.navcen.uscg.gov

— **END** —

LIST OF ACRONYMS

ACG Atlantic Coordination Group
ACP Actual Communication Technical Performance , Actual Communication Performance
ADS Automatic Dependent Surveillance
ADS-B Automatic Dependent Surveillance – Broadcast
ADS-C Automatic Dependent Surveillance – Contract
AIRAC Aeronautical Information Regulation and Control
ANC Air Navigation Commission
AN-Conf Air Navigation Conference
ANSP Air Navigation Service Provider
ASBU Aviation System Block Upgrades
ASECNA Agence pour la sécurité de la navigation aérienne en Afrique et à Madagascar
ASEPS Advanced Surveillance Enhanced Procedural Separation
ATM Air Traffic Management
ATMOPS ICAO Air Traffic Management Operations Panel
BCA Business Case Assessment
CDA Current Data Authority
COG *see* EANPG COG
CONOPS Concept of Operations
CPDLC Controller Pilot Data Link Communications
CSP Communications Service Provider
CTA Control Area
DEMA Deviations and Error Monitoring Application
Doc 10037 *Global Operational Data Link Document* (GOLD)
Doc 4444 *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM)
Doc 7030 *Regional Supplementary Procedures* (SUPPs)
Doc 9634 *Regional Air Navigation Plan – North Atlantic* (NAT eANP)
Doc 9750 *Global Air Navigation Plan* (GANP)
EANPG European Air Navigation Planning Group
EANPG COG EANPG Programme Coordinating Group
EUR (ICAO) European (Region)
EUR (EAST) VOLCEX/SG Volcanic Ash Exercises Steering Group for the (far) Eastern part of the EUR Region
EUR/NAT European and North Atlantic
EUR/NAT VOLCEX SG European and North Atlantic Volcanic Ash Exercises Steering Group
FANS Future Air Navigation System
fapfh Fatal Accidents Per Flight Hour
FIR Flight Information Region
GANP *ICAO Global Air Navigation Plan* (Doc 9750)
GASeP *ICAO Global Aviation Security Plan*
GDP Gross Domestic Product
GNE Gross Navigation Error
GOLD *Global Operational Data Link Document* (Doc 10037)
GRF Global Reporting Format
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 Association
MWO	Meteorological Watch Office
NAMEUR	North American/European Air Traffic Flow Management Task Force
NAT	(ICAO) North Atlantic (Region)
NAT CMA	North Atlantic Central Monitoring Agency
NAT Doc	
NAT Doc 001	*North Atlantic Systems Planning Group Handbook*
NAT Doc 006, Part I	*Air Traffic Management Operational Contingency Plan – North Atlantic Region*
NAT Doc 006, Part II	*Volcanic Ash Contingency Plan* (VACP)
NAT Doc 007	*North Atlantic Operations and Airspace Manual*
NAT EFFG	North Atlantic Economic, Financial and Forecast Group
NAT IMG	North Atlantic Implementation Management Group
NAT MWG	North Atlantic Mathematicians' Working Group
NAT OTS	North Atlantic Organized Track System
NAT POG	North Atlantic Procedures and Operations Group
NAT Project Team	
NAT DEMA RPT	NAT Deviations and Error Monitoring Application (DEMA) Replacement Project Team
NAT Doc 007 PT	*North Atlantic Operations and Airspace Manual* (NAT Doc 007) Revision Project Team
NAT FDPEOCR PT	NAT Flight Deck Procedures and Ergonomics for Oceanic Clearances and Re-Clearances Project Team
NAT SB ADS-B PT	Reduced separation standards and flight efficiency through the implementation of Space Based/Low Earth Orbits (LEO) ADS-Project Team
NAT SCMR PT	NAT Severity Classification Matrix Review Project Team
NAT SCR PT	NAT Southeast Corner Routes Project Team
NAT ULT PT	North Atlantic Uplink Latency Timer Project Team
NODAR PT	Network Outage Detection And Reporting Project Team
OWAFS PT	NAT Operations Without Assigned Fixed Speed Project Team
NAT SG	North Atlantic Scrutiny Group
NAT SOG	North Atlantic Safety Oversight Group
NAT SPG	North Atlantic Systems Planning Group
NAT ASR	North Atlantic Annual Safety Report
NAT eANP	*Regional Air Navigation Plan – North Atlantic* (Doc 9634)
NAT SPR	North Atlantic Safety Performance Report
NOTAM	Notification for Airmen
PANS	Procedures for Air Navigation Services
PANS-ATM	*Procedures for Air Navigation Services – Air Traffic Management* (Doc 4444)
PBCS	Performance-Based Communication and Surveillance
PfA	Proposal for Amendment
PIRG	Planning and Implementation Regional Group
RASG	European Regional Aviation Safety Group
RASG-EUR	
RCOG	RASG-EUR Coordination Group
RCF	Radio Communication Failure
RCP	Required Communication Performance

RMA	Regional Monitoring Agency
RSP	Required Surveillance Performance
RVSM	Reduced Vertical Separation Minimum
SASP	ICAO Separation and Airspace Safety Panel
SB ADS-B	Space-Based ADS-B
SID	Standard Instrument Departure
SIGMET	SIGnificant METeorological Information
SKPI	Safety Key Performance Indicator
SLOP	Strategic Lateral Offset Procedure
SSP	Satellite Service Provider
STAR	Standard Terminal Arrival Route
SUPPs	*Regional Supplementary Procedures* (Doc 7030)
TLS	Target Level of Safety
ToRs	Terms of Reference
VACP	*Volcanic Ash Contingency Plan* (NAT Doc 006, Part II)
VOLCEX SG	*see* EUR/NAT VOLCEX SG, *or* EUR (EAST) VOLCEX SG

— END —