International Operations Procedures Manual

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Nimbl, LLC provides quarterly Sky Brief Summaries that describe forthcoming revisions to this manual for operators subscribed to Nimbl's manual revision services. A history of all past and current Sky Brief Summaries can be viewed online through the Nimbl portal at my.gonimbl.com.

This manual includes content updates from all Nimbl, LLC *Sky Brief Summaries* up to the end of the first quarter of 2024 (i.e., Sky Brief Summary #2024-01, March 2024), as well as content based on ICAO NAT Ops Bulletin #2023-01, Rev 2, published in April 2024.

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Procedures Statement Of Compliance (PSOC)

Section 1 | PSOC Acceptance

This manual is produced by Nimbl, LLC (formerly “AviationManuals, LLC”) for the use of Target Corporation flight crews, with an effective date stated on the Record of Revision.

Federal Aviation Administration (FAA) Acceptance		
Name / Title: Janet E. Greenwood Acting Manager, Flight Operations Group, Flight Technologies and Procedures Division	Signature: JANET E GREENWOOD Digitally signed by JANET E GREENWOOD Date: 2023.08.22 15:05:56 -04'00'	Date: August 22, 2023
This PSOC expires 24 Calendar months after the date of acceptance.		

This signature indicates that FAA policy experts have reviewed the contents of the procedure provider’s master manual and accept the information in this PSOC is accurate.

Procedure Provider Signature		
Name / Title: Clement Meersseman *VP, Strategic Partnerships*	Signature:	Date: 08/22/2023

Section 2 | Procedural Compliance

This content in this manual complies with FAA procedural requirements and recommendations for the listed LOAs.

FAA LOA	Operations
A056	Data Link Communications (FANS or ATN)
B036	Oceanic and Remote Continental Navigation Using Multiple Long-Range Navigation Systems (M-LRNS): RNP 2, 4 and 10
B039	Operations in North Atlantic High Level Airspace (NAT HLA)
B046	Operations in Reduced Vertical Separation Minimum (RVSM) Airspace
B054	Oceanic and Remote Airspace Navigation Using a Single Long-Range Navigation System

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Record of Revision

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Original	08-Jul-2016	
Reissue 1	08-Jul-2017	
Reissue 2	03-Aug-2018	
Reissue 2, Rev 1	28-Sep-2018	Added G280 (s/n 2156) to IOM; expanded CPDLC and ADS-B procedures (Appendices C and N)
Reissue 2, Rev 2	12-Mar-2019	Fleet changes
Reissue 3	18-Jul-2019	
Reissue 3, Rev 1	19-Feb-2020	Removed N686T (s/n 211), and added N686BE (s/n 2192)
Reissue 4	15-Jul-2020	
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List of Effective Sections

Section	Revision No.	Date
Preface	Reissue 8	09-Sep-2024
Section 1: Organization and Compliance	Reissue 8	09-Sep-2024
Section 2: International Operations Procedures	Reissue 8	09-Sep-2024
Section 3: Contingency Procedures	Reissue 8	09-Sep-2024
Section 4: Pacific Region	Reissue 8	09-Sep-2024
Section 5: Regional Supplementary Information	Reissue 8	09-Sep-2024
Appendix A: Preflight Planning Resources	Reissue 8	09-Sep-2024
Appendix B: Master Document	Reissue 8	09-Sep-2024
Appendix C: Data Link Communications	Reissue 8	09-Sep-2024
Appendix D: North Atlantic RCL Procedures	Reissue 8	09-Sep-2024
Appendix E: Overwater Calculations	Reissue 8	09-Sep-2024
Appendix F: Altimetry Considerations	Reissue 8	09-Sep-2024
Appendix G: Inflight Forms and Checklists	Reissue 8	09-Sep-2024
Appendix H: Postflight Forms and Checklists	Reissue 8	09-Sep-2024
Appendix I: Weather / NOTAM Procedures	Reissue 8	09-Sep-2024
Appendix J: Intercept Procedures	Reissue 8	09-Sep-2024
Appendix K: Reporting Forms	Reissue 8	09-Sep-2024
Appendix L: IATA Inflight Broadcast Procedures	Reissue 8	09-Sep-2024
Appendix M: United States Supplementary Info	Reissue 8	09-Sep-2024
Appendix N: ADS-B	Reissue 8	09-Sep-2024
Appendix O: RVSM Maintenance Policy	Reissue 8	09-Sep-2024
Appendix P: RNP Maintenance Policy	Reissue 8	09-Sep-2024
Appendix Q: RNP Approach Considerations	Reissue 8	09-Sep-2024
Appendix R: Abbreviations and Acronyms	Reissue 8	09-Sep-2024
Appendix S: Contact Information Directory	Reissue 8	09-Sep-2024
Appendix T: Quick Reference Conversion Tables	Reissue 8	09-Sep-2024
Appendix U: AIP References	Reissue 8	09-Sep-2024

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Section 1: Organization and Compliance

1.1.0 Introduction

1.1.1 Requirement

The International Civil Aviation Organization (ICAO) Annex 6, Part II - *International General Aviation – Aeroplanes* requires Target Corporation to provide an international procedures manual for use and guidance of operations personnel.

Note: Certain provisions that are applicable to United States (US) Code of Federal Regulations (CFR) Title 14 Part 135 operations may be described in this manual for general reference or educational purposes. Operations conducted under US CFR Title 14 Part 91 do not need to comply with these provisions.

1.1.2 Definitions

A. Guidance information included in this manual contains terms such as “may,” “should,” and “can.” These terms indicate actions that are permissible but not mandatory, allowing pilots flexibility during conduct of international flights.

B. “Oceanic” Operations: The terms “oceanic” and “overwater” may be used interchangeably in this manual and often indicate airspace(s) where additional crew training, aircraft capabilities, or operational authorizations may be required. Whenever possible, the specific lateral / longitudinal boundaries of such airspaces will be provided. In absence of any such definitions, the following criteria should be understood as a definition of “oceanic” operations:

- In or around US-sovereign airspace, private / non-commercial operations that take place 30 minutes or 100 Nautical Miles (NM) or more from the nearest shore.
- In or around US-sovereign airspace, commercial (charter) operations that take place 50 NM or more from the nearest shore.
- Outside US-sovereign airspace, 12 NM or more from the nearest shore (i.e., the “high seas” as defined in ICAO Doc 7030).

  Note: If there is ever any doubt as to whether a flight is an “oceanic” operation, the most restrictive of these definitions should be used.

1.1.3 Manual Organization and Updates

A. In addition to this manual, crews are encouraged to review Nimbl, LLC *Sky Briefs*, if their flight department has a subscription to an AviationManuals revision service. The *Sky Briefs* are supplementary publications provided by Nimbl, LLC that contain information about upcoming or active regulatory changes or mandates that may affect procedures contained in this manual, along with a summary of recommended revisions. Sky Briefs do not function as direct or immediate revisions, but rather as an advisory of forthcoming changes.

B. This manual has a Table of Contents for easy reference. Each page is numbered and has a date of original issue or reissue to ensure validity of the contents. This manual has a Record of Revision and a List of Effective Sections identifying section numbers and dates of entry.

C. This manual may be updated in one of two ways:

   1. *Reissues*: Periodically, the entire manual will be updated based on information provided in the Sky Briefs (paragraph A above). All pages will be notated as a “Reissue” with a progressive numbering scheme (e.g., “*Reissue 1*”). Older versions of the manual will be archived or destroyed.
   2. *Revisions*: Intermittent updates between reissues that affect only a few pages will be notated as a “Revision,” along with the corresponding reissue number (e.g., “*Reissue 1, Rev 3*”). After the entire manual is reissued, the revision numbering will start over (e.g., “*Reissue 2, Rev 1*”).

1.1.4 Purpose

A. This manual is a combination of policy and procedures for use in planning and executing international flights. It will be used in conjunction with the Target Corporation Flight Operations Manual (FOM), applicable Airplane Flight Manual (AFM), and applicable aircraft Minimum Equipment List (MEL).

B. This document is an integral part of the flight department's method of standardization and supervision of international flight operations.

C. This manual will be made available to all international flight crews and operations personnel for study and reference.

1.1.5 Deviations

A. Deviations are acceptable in the interest of safety or when it is necessary to protect the crew, passengers, or aircraft from a situation not covered in this manual.

B. When necessary, deviations from this manual must be approved by the Director of Aviation or the Director of Maintenance, as appropriate.

Note: Only the Director of Aviation and Director of Maintenance have authority to approve a deviation. If approval cannot be obtained, the deviation may not proceed.

C. Deviation approval will be transmitted to all affected flight crewmembers and/or flight department personnel via email, text, or voice along with information on the conditions under which such deviations may or must be used, if such considerations apply.

1.1.6 Responsibilities

A. The Director of Aviation will be responsible for the control of the contents of this manual and may delegate responsibility for ensuring that appropriate updates are distributed to all international flight crews and operations personnel.

B. International flight crewmembers and operations personnel are responsible for reading and understanding this International Operations Procedures Manual (IOPM) as well as all information and documentation distributed to the department as Read and Initial documents.

1.1.6.1 Pilot-In-Command Responsibilities

A. The Pilot-in-Command (PIC)'s responsibilities include the following:

- Preflight planning, delay, and release of a flight in compliance with all applicable regulations and authorizations;
- During flight time, command of the aircraft and crew; and
- Safety of the passengers, crewmembers, cargo, and airplane.

B. The PIC has full control and authority in the operation of the aircraft, without limitation, over other crewmembers and their duties during flight time.

C. The FOM should be consulted for more detail on the specific roles and responsibilities of all personnel, including flight crews.

1.2.0 Compliance

A. Although this manual has been prepared with the most current regulatory information readily available at the time of issuance, it should not be understood or used to preclude crews from applying more recent procedures that have been issued by regulatory bodies. If there is ever a discrepancy between this manual and the content of a more current regulatory document, the regulatory document will take precedence.

B. When conducting international flights, pilots must adhere to the latest revision of all applicable regulations and requirements of each state where they intend to land or which they intend to overfly, as well as the following guidance, as applicable:

Reference	Title
CFR Title 14 Part 91	General Operating and Flight Rules
AC 91-85, Latest Rev	Authorization of Aircraft and Operators for Flight in RVSM Airspace
AC 91-70, Latest Rev	Oceanic and International Operations
AC 90-96, Latest Rev	Approval of U.S. Operators and Aircraft to Operate under Instrument Flight Rules (IFR) in European Airspace Designated for Basic Area Navigation and Precision Area Navigation
AC 90-105, Latest Rev	Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System and in Oceanic and Remote Continental Airspace
AC 90-114, Latest Rev	Automatic Dependent Surveillance – Broadcast (ADS-B) Operations
AC 90-117, Latest Rev	Data Link Communications
FAA InFO Letter 12001	Flight Planning Responsibilities when Conducting RVSM Operations
FAA Notice	Operational Policy / Procedures for 30 NM Lateral, 30 NM Longitudinal and 50 NM Longitudinal Separation in the Anchorage, Oakland and New York Oceanic Control Areas
Order 8900.1	Flight Standards Information Management System
ICAO Doc 4444	Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM)
ICAO Doc 7030	Regional Supplementary Procedures
ICAO Doc 8168	Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS)
ICAO Doc 9574	Manual on the Implementation of a 300 m (1,000 ft) Vertical Separation Minimum between FL290 and FL410 Inclusive
ICAO Doc 9613	Performance Based Navigation Manual (PBN)
ICAO Doc 9869	Performance Based Communication and Surveillance (PBCS) Manual
ICAO NAT Doc 007	North Atlantic Operations and Airspace Manual
ICAO Annex 2	Rules of the Air
ICAO Annex 3	Meteorological Service for International Air Navigation
ICAO Annex 6 Part II	International General Aviation – Airplanes
MEL	Minimum Equipment List [Note 1]

Reference	Title
State's Official Publication – Aeronautical Information Publication (AIP) Note: This information is reproduced in NOTAMs and/or the Jeppesen Airway Manual under the *Air Traffic Control*, *Emergency Procedures*, and/or *Entry Requirements* sections. Hyperlinks to many AIPs can also be found in Appendix U.	

Note 1: In much of the world, use of a manufacturer's Master Minimum Equipment List (MMEL) is not acceptable (i.e., it could be a finding during a Ramp Inspection). Crews should either use an MEL specific to their aircraft, develop an MMEL Procedures Document specific to their aircraft with the same provisions and content as an MEL, or ensure there are no deferred discrepancies.

C. Crews must review safety / health travel advisories and restrictions for their destination to ensure the flight is permitted and feasible. Reference Section 2.1.5.4.

D. Compliance with International Operations Requirements: All flight crews will apply the rules of the air established by the FAA to the extent that they do not conflict with the rules published by the states in which the aircraft will overfly, land, or depart. When operating outside of any sovereign state (internationally), all operations will be in compliance with ICAO Annex 2, *Rules of the Air*.

Note: In the case of conflicting regulations, the **most restrictive** requirement between the state of registry and the state of operation will be followed.

1.3.0 International Procedures Training

1.3.1 Qualification Requirements

A. All pilots (whether contract or full-time) must meet the applicable licensing, medical, and rating requirements specified in ICAO Annex 1 before they will be assigned to any operation. The validity of all applicable licenses and certificates will be verified by the Director of Aviation.

B. All pilots (whether contract or full-time) must complete appropriate international procedures training before being assigned to any international or oceanic operation. Documentation will be verified by the Director of Aviation and entered into the pilot training records.

1.3.2 Initial Training

The Director of Aviation will assess each pilot's international training records and syllabi from completed coursework to verify that the training is acceptable for assignment to international operations. Topics to be addressed in an initial international course could include, but will not necessarily be limited to, the following sample curriculum.

Note: The following curriculum is an example only. Syllabi provided by international training vendors may vary from the examples listed below. The Director of Aviation has the responsibility to vet acceptable training vendors and verify that coursework taken by department and contract pilots meets an equivalent scope of content and training topics as required for assignment. The Director of Aviation has the authority to accept or reject any pilot's international training as being comparable and acceptable.

- Trip planning:
  - Preparation of ICAO flight plans and journey logbooks;
  - Terminology and coding for the ICAO flight plan format;
  - Route planning within RVSM / PBN / PBCS / DLC airspace;
  - Equal Time Point (ETP) planning and analysis;
  - International operations checklist.
- International flight requirements and documentation:
  - ICAO operational rules and regulations (e.g., SARPs and PANS-OPS);

  - ICAO measurement standards;
  - Air Traffic Control (ATC) / Airfield requirements;
  - Sources and content of international flight publications;
  - Policies and procedures specific to the areas of operations, including standard ATC phraseology and en route / terminal procedures;
  - International standard operating procedures, as described throughout this manual;
  - ATC clearances;
  - Structure of the special use airspace where the flights are to be conducted.
- Navigation:
  - Dead reckoning navigation;
  - Use of and proper notations on plotting charts and/or plotting software (e.g., ForeFlight, ARINC, ScottIPC, etc), as applicable;
  - Specific en route altimetry procedures and navigation procedures for each type of navigation equipment required for use in Special Areas of Operations (SAOs), to include PBN (RNP-10 / RNP-4 / RNP-2 / RNP-1), NAT HLA, B-RNAV (RNAV-5), P-RNAV (RNAV-1), ADS-B, DLC, and PBCS operations;
  - Monitoring of altimeter systems performance including familiarization with proper entries on the LRNS Performance Log, Altimeter Accuracy Log, and / or Master Document;
  - TCAS II Version 7.1, or later, including training on correct responses to *"LEVEL OFF, LEVEL OFF"* RAs and operation in RVSM airspace;
  - ADS-B systems and operating procedures, if applicable;
  - Training in the use of dual GNSSUs as the only means of long range navigation (if applicable);
  - Specialized training on operations in areas of magnetic unreliability, if applicable.
- Communications:
  - Long Range and Air to Ground Procedures;
  - European en route procedures;
  - DLC (CPDLC / ADS-C), if applicable;

    Note: Pilots will receive initial DLC training prior to performing the duties of a PIC in any aircraft capable of DLC operations.
- Oceanic procedures:
  - Operational procedures in oceanic airspace;

    Note: Flight crews will train to the most current version of the ICAO Oceanic Errors Safety Bulletin (OESB), available on the following website:

    http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx
  - Strategic Lateral Offset Procedures (SLOP) in oceanic controlled, remote landmass airspace, and published state routes / airspace;
  - Implementation of reduced lateral separation and Performance Based Communication and Surveillance (PBCS), including:
    a. Correct ICAO flight plan codes and requirement to use the CNS equipment indicated;
    b. Map and FMS displays of half- and whole-degree waypoints;
    c. Aircraft Navigation Database (NDB) waypoint identifiers;
    d. Verification of waypoint degrees and minutes inserted into navigation systems.

- Emergency procedures:
  - Required emergency equipment, search and rescue techniques, navigation, altimeter, and communication equipment failure techniques;
  - Wet ditching procedures and water survival;
  - Emergency Communications;
  - Emergency Landing Checklists.
- Meteorology:
  - International meteorology, including significant weather charts, prognostic weather charts, tropopause prognostic charts, aviation routine weather reports (METARs), Terminal Aerodrome Forecasts (TAFs), and NOTAMs;
  - Weather reports and forecasts;
  - Area weather patterns.
- Contingencies:
  - Contingency procedures in the event of equipment inoperability or failure;
  - Planning for an oxygen contingency, ETP vs oxygen;
  - Wet Footprint;
  - Point of Safe Return (PSR);
  - Weather deviation procedures.
- Background, definitions, required equipment, conditions for approval, and preflight, inflight, contingency, and postflight procedures for the following operations that require state authorization:
  - Required Navigation Performance (RNP), including RNP-10 / 4 / 2 / 1 / 0.3;
  - Advanced RNP (A-RNP);
  - North Atlantic High Level Airspace (NAT HLA);
  - Basic Area Navigation (B-RNAV);
  - Precision Area Navigation (P-RNAV); and
  - Reduced Vertical Separation Minimum (RVSM), including the following:
    a. Importance of crewmembers crosschecking each other to ensure that ATC clearances are promptly and correctly complied with;
    b. Use and limitations in terms of accuracy of standby altimeters in contingencies. Where applicable, the pilot should review the application of Static Source Correction Error / Position Correction Error (SSEC / PEC) through the use of correction cards;
    c. Characteristics of aircraft altitude capture systems that may lead to the occurrence of overshoots;
    d. Relationship between the altimetry, automatic altitude control, and transponder systems in normal and abnormal situations;
    e. Specific en route altimetry procedures for RVSM airspace to include use and limitations of standby altimeters in contingencies and problems of visual perception of other aircraft at 1,000 ft vertical separation;
    f. Problems of visual perception of other aircraft at 1,000 ft (300 m) planned separation during night conditions, when encountering local phenomena such as northern lights, for opposite and same direction traffic, and during turns;
    g. Aircraft operating restrictions (if required for the specific aircraft group) related to RVSM airworthiness approval;

h. Use of SLOP in oceanic airspace to mitigate the effect of wake turbulence and the effect of operational errors;

i. Turbulence / Wake Turbulence in RVSM airspace.

1.3.3 Recurrent Training

A. All international crews should complete a recurrent international procedures course every twenty-four (24) months, or at the discretion of the Director of Aviation. Completion certificates will be retained in the pilot training records.

B. The training curriculum content may include any or all of the topics covered by an initial international training course, as determined by the training vendor and/or the Director of Aviation.

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Section 2: International Operations Procedures

Note: *Italicized, blue font* in Section 2 indicates a record, markup, or notation that should be made on the Master Document, plotting chart (or plotting software, as applicable), and/or additional forms.

2.1.0 International Trip Planning

A. International trip preparations shall be the responsibility of the PIC. The PIC may delegate responsibilities to qualified flight department personnel and will keep all assigned flight crewmembers informed of the status of the planning process.

B. Additional preflight planning resources can be found in Appendix A.

Note: It is recommended that crews also review the FAA's North Atlantic, Pacific, and WAT resource guides prior to any overwater operations. These resources can be found online at:

https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/oceanic_remote/

2.1.1 Documents

The following documents are required, as applicable, and will be available on the aircraft in either paper or electronic format for all international operations:

- Authorizations approving the aircraft for any of the operations listed below will be kept in the aircraft, as applicable.

A056	Data Link Communications	ADS-C / CPDLC / PBCS
B036	Required Navigation Performance (Oceanic / Remote)	RNP-10 / 4 / 2 / A-RNP
B039	North Atlantic High Level Airspace	NAT HLA
B046	Reduced Vertical Separation Minimum	RVSM
C052	GNSS-Based RNAV Instrument Approaches[2]	RNP APCH (e.g., LPV)[2]
C063	Terminal RNP Operations	RNAV-1 / RNP-1 / A-RNP
C073	Use of MDA as a DA / Baro-VNAV Operations	
D095 or D195	Use of a Minimum Equipment List	MEL

Note: "MNPS" is an outdated term for what is now known as "NAT HLA." Authorization documents indicating "MNPS" are no longer acceptable for operations in the NAT HLA.

- Airworthiness and registration certificates;
- Airplane Flight Manual (AFM), including weight and balance information;
- Aviation Insurance Policy, Mexican Insurance Policy (original), Canadian Transportation Agency documentation, US Air Carriers Certificate of Insurance, and Civil Aircraft Certificate of Insurance, as applicable;
- Radio station license;
- Master Document (Appendix B);
- A completed Journey Log Book (Appendix B), unless the equivalent information is recorded on the Master Document, flight log, customs forms, etc.;
- Track Messages;
- NOTAMs / RAIM information – GNSS outages and duration to include loss of fault exclusion, loss of fault detection and loss of NAV function for flight on a specified route;

Note: In the event that RAIM failure is predicted, the crew will rely on other approved equipment, re-route, delay departure, or cancel the flight.

- Copy of AFIS transmittal(s), as applicable;
- Accurate passenger information submitted either by the PIC and /or the designated flight planning service;
- Applicable customs forms (e.g., 339: Annual User Decal, 7507: General Declaration, 6059-B: Items to be Transported From Abroad);
- A copy of the Visa Waiver Program approval, if participating and approved;

  Note: Refer to the US CBP website for more detail: https://www.cbp.gov/travel/international-visitors/visa-waiver-program
- If applicable, specific airport training records (e.g., Katmandu) Jeppesen Airport Qualification Charts may be referenced;
- Noise certificates;
- European import document, if applicable;
- Plotting charts, or equivalent and acceptable electronic plotting software;

  Note: If electronic plotting software will be used, the software provider's recommended instructions should be followed with respect to plotting chart notations / mark-up.
- Overflight permit / exemptions;
- Landing permits;
- International Operations Procedures Manual;
- Flight Operations Manual;
- Applicable Minimum Equipment List;
- Current and suitable charts;
- Current aircraft and/or company checklists;
- Performance data.

  Note: If there has been a significant change affecting the aircraft weight after the flight plan has been computed, flight crews should request a new flight plan.

2.1.1.1 Crew Documentation

A. Current crew licenses / medical certificates and valid passports must be carried on the aircraft.

B. Age Restrictions: ICAO has the following age restrictions that will affect pilots who conduct commercial operations:

- Pilots may not operate the aircraft on or after their 65th birthday; and
- On or after their 60th birthday, but before their 65th birthday, pilots may conduct flight operations only when flying with at least one other pilot.

  Note: The above restrictions do not apply to non-commercial flights (e.g., US Title 14 CFR Part 91) or to flights that take place wholly within countries that do not adhere to ICAO rules on age restrictions.

C. ICAO Medical Certificates

- ICAO medical class definitions do not match to FAA medical class definitions, which may create confusion when traveling internationally. It is recommended that international pilots with FAA documents maintain a first-class medical certificate to avoid potential conflicts.
- Differences in Medical Certificate Expiration Dates: Crews – particularly those who possess an FAA medical certificate – should be aware of the following differences in how various regulatory schemes apply expiration dates, which could potentially result in differing interpretation of whether or not a pilot's certificate is current when operating internationally.

- United States (FAA): For pilots under age 40 at the time of examination who hold either an ATP or a commercial pilot certificate, FAA first class medical certificates expire at the end of the last day of the twelfth month following the examination date shown on the certificate (i.e., one year, plus the remainder of the month). For pilots over age 40 at the time of examination who hold an ATP, FAA first class medical certificates expire at the end of the last day of the sixth month following examination. (No distinction is made for age for holders of a commercial pilot certificate.)
- Europe (EASA): First class medical certificates are considered valid for twelve months, with the exception that the validity immediately drops to six months if the pilot:
  a. Passes their 40^{th} birthday and is engaged in single-pilot commercial air transport operations; or
  b. Passes their 60^{th} birthday.
- ICAO (Annex 1): ICAO considers a first class medical as valid for twelve months for any pilot with an ATP or a commercial license, but then reduces that duration to six months if the pilot:
  a. Passes their 40^{th} birthday and is engaged in single-pilot commercial air transport operations; or
  b. Passes their 60^{th} birthday and is engaged in any commercial air transport operations.

2.1.2 Cabotage

A. Cabotage refers to the rules and regulations relating to carriage of passengers and goods inside the same foreign country.

B. Flight crews must be aware that cabotage regulations are not uniform or necessarily consistent from one country to another. Regardless of the country within which the crew operates, the PIC is responsible for knowing and obliging with that country's cabotage restrictions.

C. Failure to follow those restrictions can result in fines and penalties obligatory against the operator. Aircraft have been impounded by foreign governments until such violations have been resolved to the satisfaction of the governing authority.

2.1.3 Equipment

A. In addition to the requirements of ICAO Annex 6 Part II, the following equipment for international operations will be operational and on board the aircraft:

- Mode S Elementary Surveillance and Mode S Enhanced Surveillance required in participating European states;
- Radio equipment capable of 8.33 kHz channel spacing;
- Appropriate emergency medical kit;
- Flight Recorders and Cockpit Voice Recorders;

  Note: If the aircraft is fitted for DLC and is required to be equipped with a CVR, the recorder must be capable of recording all DLC messages.
- Equipment required for PBN / RVSM / DLC / ADS-B operations;
- TCAS II Version 7.1 or later, as required;

  Note: Version 7.1 is required in much of the world, including NAT HLA, Europe, and Mexico.
- Emergency Locator Transmitter (ELT) capable of transmitting on 406 MHz and 121.5 MHz (per ICAO Annex 6, Part II, and Annex 10, Vol. III, 5.1.4); and
- Any other equipment required by the state and/or airspaces where operations will be conducted, in accordance with AIPs and other published materials.

B. In addition, the aircraft must be fitted with an emergency power supply, independent of the main electrical system, that will automatically operate and illuminate an attitude-indicating instrument for a minimum period of 30 minutes after the total failure of the primary electrical system. The system must be configured so that a clear indication is given that the equipment is being operated by the emergency power supply.

C. If any pilot is required to wear corrective lenses, they must ensure that they carry a spare set of the appropriate prescription whenever acting as a crewmember on any international flights.

2.1.3.1 Radio Altimeters (5G Interference)

A. Due to the potential for interference from 5G C-Band telecommunication systems, radio altimeter functionality will be unreliable in certain areas and airports where 5G systems have been implemented. Consequently, some operations that rely upon radio altimeters will be prohibited in these areas, which could include, but is not limited to:

- ILS Instrument Approach Procedures, including CAT I, CAT II, and CAT III;
- RNP AR Instrument Approach Procedures;
- Automatic Landing operations; and
- Use of HUD / EFVS to touchdown and rollout.

B. Information about the presence of 5G systems (and associated interference) will be communicated via NOTAMs. If the aircraft has not yet been upgraded with a fix that would prevent 5G interference, crews must review all applicable airport / airspace notices for the flight to identify if any restrictions are in effect.

C. Crews should pay special attention to US NOTAMs prior to any flight with a US destination airport due to the widespread implementation of 5G in the US on a radio wavelength band (i.e., the C-Band) that has particularly high potential for interference with radio altimeters. US NOTAMs will take a form such as one of the following to describe prohibitions on the basis of 5G interference:

- Example of an airspace NOTAM: *ZHU AIRSPACE RDO ALTIMETER UNREL WI AN AREA DEFINED AS XXXNM RADIUS OF XXXXXXNXXXXXXXW (VOR/DME) SFC-5000FT AGL. HEL OPS REQUIRING RDO ALTIMETER DATA FOR OFFSHORE INSTRUMENT OPS, HOVER AUTOPILOT MODES, SAR AUTOPILOT MODES, AND CAT A/B/PERFORMANCE CLASS TKOF AND LDG NOT AUTHORIZED EXC FOR ACFT USING APPROVED ALTERNATIVE METHODS OF COMPLIANCE DUE TO 5G C-BAND INTERFERENCE PLUS SEE AIRWORTHINESS DIRECTIVE 2021-23-13*
- Example of an airport NOTAM: *BDL AD AP RDO ALTIMETER UNREL. AUTOLAND, HUD TO TOUCHDOWN, ENHANCED FLT VISION SYSTEMS TO TOUCHDOWN NOT AUTHORIZED EXC FOR ACFT USING APPROVED ALTERNATIVE METHODS OF COMPLIANCE DUE TO 5G C-BAND INTERFERENCE PLUS SEE AIRWORTHINESS DIRECTIVE 2021-23-12*

  Note 1: US NOTAMs can be searched on the following link: https://notams.aim.faa.gov/notamSearch/

  Note 2: The following link can also be referenced for an interactive display of affected airports in the US: https://www.faa.gov/5g

2.1.4 International Meteorology

A. The PIC will review and carry all applicable international meteorological information for the departure airport, en route, destination, and alternate airports, which could include:

- High Level Significant Weather Prognostic Charts;
- Winds aloft, forecast FL100 and above to maximum cruise altitude;
- Aviation Routine Weather Reports (METARs);
- Terminal Aerodrome Forecasts (TAFs);

- Selected Special Weather Report (SPECI); and
- Pilot Reports (PIREPS) and/or international NOTAMs or equivalent for potentially hazardous meteorological phenomenon including volcanic ash and solar flares.

  Note: During performance planning, consideration should be given to significant temperature inversions that can frequently occur over the Atlantic Ocean.

B. The PIC will identify weather conditions that may cause difficulty in maintaining RVSM.

Note: Air Traffic Service Providers (ATSP) will consider suspending RVSM procedures within affected areas when there are pilot reports of greater than moderate turbulence. Within oceanic areas where RVSM procedures are suspended, the vertical separation minimum between all aircraft will be a minimum of 2,000 ft.

Exception: Northern Canadian Airspace (NCA) RVSM requires pilot reports of greater than moderate turbulence and the aircraft must be within five (5) minutes of another aircraft.

C. When operating at international airports where the metric system is used and the visibility minimums are specified only in meters, pilots should use the conversion tables in Appendix T for both takeoff and landing operations.

2.1.4.1 Space Weather / Solar Activity

A. Space weather events are caused by solar flares and particles ejected from the sun, which produce electromagnetic radiation that can cause shortwave fadeout (i.e., increased absorption of HF radio waves, lasting for up an hour). These disturbances can also interfere with radio signals used for GNSS positioning and navigation. The impact is strongest at high latitudes, where HF radio loss can last for many hours and recur for days.

B. High-Frequency (HF) communications, the primary and in some cases, sole, means of communicating over the poles is affected during space weather events. For aircraft at latitudes of approximately 82° and higher, it is impossible to “see” geostationary communications satellites and to use the higher frequencies they afford.

C. The risk and dose of radiation is greatest over the poles and lessens at lower latitudes. The higher the altitude, the more radiation is present.

D. If a flight will include any high latitude operations (i.e., polar regions), the crew should obtain a space weather report to be aware of any known alerts. The following resources are available:

- The Space Weather Prediction Center at: https://www.swpc.noaa.gov/; and
- ICAO space weather advisory messages. More information about these advisories can be found at https://www.icao.int/airnavigation/METP/Pages/Public-Documents.aspx.

2.1.5 Trip Briefing and Flight Planning

A. A trip briefing conducted by the PIC with all assigned crewmembers is required prior to departure. The PIC will:

- Ensure that an appropriate number of pilots is assigned to the flight in accordance with the routes / airspace to be flown, and delegate crew duties and responsibilities.
- Ensure an appropriate risk assessment of the flight has been conducted, and that any associated mitigation strategies have been applied.
- Establish procedures that ensure the continuity of the handling of navigational procedures and information when utilizing relief crews and relief crewmembers.
- Review itinerary. Check for compatibility, reasonableness, and compliance with any applicable flight time limitations.
- Verify written confirmation of all required permits.

- Confirm that the last RVSM height monitoring date is within two (2) years or the last 1,000 flight hours, whichever is longer.
- Ensure that the aircraft is both capable of and operationally authorized for (e.g., an LOA / OpSpec has been approved) any applicable Special Areas of Operations, including RVSM, PBN, NAT HLA, and/or DLC.
- Reconfirm that all required documents are on board the aircraft.
- Review flight routing and standby flight plans.
- Confirm that the flight is planned with appropriate considerations made for terrain and driftdown procedures.
- Check the Master Document against the ICAO flight plan (check routing, fuel load, times, groundspeeds).
- Complete Plotting Chart Notations:
  - Plot the Master Document / compatibility and reasonableness check;
  - Plot Track Messages / adjacent tracks;
  - Plot the waypoints and route on the appropriate plotting chart;
  - Plot ETPs and PSRs.

  Note: Electronic plotting (e.g., ForeFlight, ARINC, ScottIPC, etc.) may be used in lieu of a plotting chart.
- Verify that sufficient / additional fuel is carried as required by ETP calculations and the flight planning service provider's procedures to avoid a wet footprint.
- Ensure that all crewmembers have reviewed and understood the ICAO Oceanic Errors Safety Bulletin (http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx).
- Review any applicable AIPs of the countries to be overflown or transited.
- Review essential data relating to the Search and Rescue (SAR) facilities in the areas in which the flight will be operated, or may be operated, in the event of a diversion, and including the ground-air signal codes.
- Review published procedures to be followed by the PIC of an intercepted aircraft and notified visual signals for use by intercepting and intercepted aircraft in the areas in which the flight will be operated, or may be operated.
- Review possible navigation aids for accuracy check prior to coast out.
- Review current ICAO departure and alternate airport Rules and Procedures (as reproduced in Jeppesen Airway Manual Services – Air Traffic Control) to include:
  - Units of Measurement (reference: Air Traffic Control): Appropriate conversion charts will be available on the flight deck and easily accessible to the flight crew;
  - Rules and Procedures for each state in which the aircraft will land or overfly;
  - Special Requirements and Regulations;
  - Airport Facility Directory: Declared runway distances, weight bearing (reference the Airplane Flight Manual Operational Information) and fire / rescue;
  - Emergency: ICAO Differences or State Special Procedures.
- Inspect required navigation charts (effective date).
- Verify NOTAMs (RAIM information and GNSS outages).
- Conduct a risk assessment, taking into account the departure airport, en route segments, destination airport, and alternate airport.
- Use caution when conducting GNSS instrument approach operations outside the US:
  - GNSS instrument approaches must be authorized by the appropriate sovereign authority (indicated by a published Approach Procedure).

- The GNSS equipment derives position information referenced to the World Geodetic System of 1984 (WGS-84). This information can be referenced in the Jeppesen Airway Manual Services – Air Traffic Control - State Pages.
- Databases produced in the contiguous US, Alaska, and Hawaii are compatible with those coordinates.
- Other ICAO states may reference other systems that are not compatible with WGS-84.

  Note 1: Flight crews should confirm the WGS-84 compliance status of all countries over which the flight will be operated.

  Note 2: International flight crews are cautioned not to rely on GNSS for primary navigation in terminal areas in those states (e.g., Russia) that do not conform to WGS-84. The GNSS sensors should be deselected from the position sources for the FMSs.

- Confirm handling arrangements.
- Comply with flight department security procedures.
- Confirm that no hazardous materials will be carried.

  Note: The flight department prohibits the carriage of these materials and all flight crews are trained in the recognition of hazardous materials.

- Review guidance for assessing health risks at out-of-country destinations and for handling passengers and crew, should they be exposed to health risks.

  Note: Information on public health issues and risk management is available from the World Health Organization, IATA, and other health authorities. Reference the links in Appendix A.

- Time permitting, check available data on bird strikes (e.g., migration density) in airspace to be flown and adjust operations as needed.

  Note: Bird avoidance databases for Europe and the US can be found in the links in Appendix A.

B. Destination Alternate Airports: For a flight to be conducted in accordance with IFR, at least one (1) destination alternate airport shall be selected and specified in the flight plan, unless the duration of the flight and the meteorological conditions prevailing are such that there is reasonable certainty that, at the estimated time of arrival at the airport of intended landing, and for a reasonable period before and after such time, the approach and landing may be made under VMC. When a destination alternate airport is required:

1. A flight to be conducted in accordance with IFR shall not be commenced unless the available information indicates that conditions at the airport of intended landing or at least one destination alternate will, at the estimated time of arrival, be at or above the airport operating minimums.
2. No pilot may designate an alternate airport unless the weather reports or forecasts, or any combination thereof, indicate that the weather conditions will be at or above authorized alternate airport landing minimums for that airport at the estimated time of arrival.

C. Extended Diversion Time Operations (EDTO) / Extended Operations (ETOPS): EDTO / ETOPS refers to a system of planning, dispatch, and flight operations that are designed to preclude a diversion. Target Corporation does not currently operate any flights on routes where the diversion time to an en route alternate airport exceeds the threshold times established by the FAA. The PIC must ensure during flight planning, using the calculation method in Appendix E, that the aircraft will not exceed 180 minutes flying time, at single-engine cruise speed in standard conditions, from an adequate airport outside the US.

2.1.5.1 Altimeter Reference Settings

A. Operations in international airspace demand that pilots be aware and understand the use of the three (3) types of altimeter reference settings:

1. QNH altimeter setting provides altitude above mean sea level based on local station pressure. This setting causes the altimeter to read field elevation while on the ground. QNH is utilized at or below the published Transition Altitude. "Transition Altitude" refers to the altitude in the vicinity of the airport at or below which the vertical position of the aircraft is controlled by reference to altitudes (MSL).

2. QFE altimeter setting provides height above airport elevation (or runway threshold elevation) based on local station pressure. This setting causes the altimeter to read zero feet while on the ground. QFE is utilized below the published Transition Height (Appendix F). "Transition Height" refers to the height within the vicinity of an airport at or below which the vertical position of an aircraft is expressed in height above the airport reference datum.

3. QNE: The standard pressure setting of 29.92 inches of mercury (1013.2 hectopascals or 1013.2 millibars) causes the altimeter to read pressure altitude. The standard pressure setting is utilized at or above the Transition Level. The Transition Level may be published or directed by ATC.

   Note: "Transition Level" refers to the lowest usable Flight Level (FL) available for use above the Transition Altitude or Transition Height. "Transition Layer" refers to the airspace between the Transition Altitude or Height and the Transition Level. While passing through the Transition Layer, pilots will report to ATC the vertical position of the aircraft expressed in terms of FL while climbing and in terms of altitude while descending.

B. In states where the metric system is utilized for altimetry, conversion charts will be accessible on the flight deck (as reproduced in Jeppesen Airway Manual Services – Tables and Codes). The conversion charts will be utilized to verify all altitudes assigned by ATC. Conversion tables published on the Instrument Approach Charts, En route Charts and metric altimeters may also be referenced.

   Note: If QNH is referenced by the flight crew in the terminal area, the conversion chart for hectopascals / millibars may be referenced in Appendix T.

C. Crews will confirm all published altimetry procedures (as reproduced in the Jeppesen Airway Manual). Procedures for operating in the terminal areas of nonstandard ICAO states are described in Appendix F.

D. Altimeter errors may be significant in extremely cold temperatures. Crews operating in such environments should reference "Values to be Added to Published Approach Altitudes" and amend their altitudes, as appropriate (Appendix F).

2.1.5.2 ICAO Flight Plan

A. Although a flight planning service may be contracted to prepare the ICAO flight plan, it is the responsibility of the flight crew to ensure the filed flight plan accurately reflects the capabilities of the aircraft as equipped and operating prior to departure.

B. Detailed information on the completion of the ICAO flight plan can be found in Appendix A.

C. The following aircraft equipment notations are required for operations into Special Areas of Operations:

Aircraft Capability	Item 10a	Item 10b	Item 18
GNSS[1]	G		
RNAV-10 / RNP-10	R		PBN/A1
RNP-4	R		PBN/L1

Aircraft Capability	Item 10a	Item 10b	Item 18
RNP-2 (Continental)	R		NAV/M1
RNP-2 (Oceanic / Remote)	R		NAV/M2
B-RNAV (RNAV-5)	R		PBN/B1[2]
P-RNAV (RNAV-1)	R		PBN/O1[2]
NAT HLA	X[3]		
RVSM	W[3]		
DLC (ADS-C / CPDLC)	Varies[2]		
ADS-B		Varies[2]	
RCP 400	P1		
RCP 240	P2		
RSP 180			SUR/RSP180
Other Nav, Comm, or Data Capabilities[4]	Z[4]		
Inoperative RNAV Equipment	Do not enter R		STS/RNAV INOP

Note 1: Although the equipment code "G" should always be entered for aircraft that are fitted with GNSS avionics, crews should be aware that "G" is a required code (in addition to "R") in order to make use of any RNP-required SIDs or STARs in US airspace.

Note 2: This entry varies depending on the aircraft equipment configuration (Appendix A).

Note 3: If the aircraft is NAT HLA or RVSM-approved, this must be indicated in Item 10a of the flight plan regardless of the airspace in which the aircraft will operate.

Note 4: Code "Z" is expected in Item 10a if any supplementary NAV/, COM/, or DAT/ codes will be entered in Item 18. The majority of aircraft with CPDLC or enhanced navigation capabilities will likely include at least one of these supplementary codes. Refer to Appendix A for more detail.

D. Operators have the ability to file more than 24 hours in advance. If it is necessary to delay a flight over midnight, send an AFTN CHG (Change) message instead of a DLA (Delay) message to modify the submitted flight plan. With the use of CHG, the flight may be delayed over midnight.

E. Item 15:

1. North Atlantic Airspace

   a. For turbojet aircraft, the speeds/Mach planned to be used for each portion of the flight in the NAT should be specified. The proposed speeds should be reflected in the following sequence:

      i. Cruising True Airspeed (TAS) prior to oceanic entry;

      ii. Oceanic entry point and cruising Mach Number; and

      iii. TAS subsequent to oceanic exit.

   b. When planning to operate at a distance of 60 NM or less from the northern or southern boundaries of Gander or Shanwick OCA, flight plans shall also be addressed to the nearest adjacent NAT center.

c. Crews must ensure flight plans are broken into the appropriate meridian intervals specified in 2.3.1.1. For flights that will utilize the NAT OTS, the route will be defined by the abbreviation “NAT” followed by the code letter assigned to the track. Flights wishing to join or leave the OTS at some intermediate point are considered random, and full route details must be specified. (The track letter is not to be used to abbreviate any portion of the flight.)

2. EUR RVSM Airspace

a. Flights intending to operate within EUR RVSM Airspace shall include the following in Item 15:

- The entry / exit points at the lateral limits of the EUR RVSM airspace and the Requested Flight Level (RFL) for that portion of the route commencing immediately after the RVSM entry / exit points.
- The co-located Standard Terminal Arrival Route (STAR).

b. Traffic intending to cross the EUR / SAM RVSM corridor should insert the entry / exit points and the respective estimated crossing of each of the fixed routes into Item 18.

3. Middle East (ME) RVSM Airspace: Entry / exit points must also be included in Item 15 of the ICAO flight plan.

F. Item 18

- Alternative FLs, and / or option route(s) and aircraft registration should be included in Item 18. For flights conducted along an Organized Track, show the accumulated Estimated Elapsed Time (EET) only to the first OEP.
- When operating wholly or partly outside of Organized Tracks, accumulated Elapsed Times to significant points en route are required.
- When planning to operate on one of the Organized Tracks, the second and third route option should be indicated at the end of Item 18 of the ICAO flight plan.
- The notation “*REG/*” should be entered in Item 18, followed by the registration of the aircraft (e.g., “*REG/N123A*”).
- The aircraft’s ICAO 24-bit address must be entered using the notation “*CODE/*,” followed by the six hexadecimal characters reflecting the aircraft address (e.g., “*CODE/A1529D*”).

G. Additional considerations for flight planning in the NAT, including both the use of the Organized Track System (OTS) and random routing, can be found in Section 2.3.1.2.

2.1.5.3 Fuel Considerations

The PIC must ensure that sufficient fuel is carried in accordance with ICAO Annex 6, any ETP / PSR calculations, applicable state regulations, and/or any unique flight department practices.

Note: A more detailed description of ICAO Annex 6 fuel requirements is included in Appendix A.

2.1.5.4 Health, Security, and Safety Evaluations

A. During the planning process, the Director of Aviation and PIC should ensure that all available health, security, and/or safety advisories for the destination of the flight have been reviewed and are current and understood. Some potential resources for finding these advisories include, but are not limited to:

- NOTAMs;
- Airport directories (e.g., Jeppesen Airway Manual Services);
- US Department of State Travel Advisories:

  https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories.html/

- WHO's *International Travel and Health* (http://www.who.int/ith/en/);
- US CDC's *Health Information for International Travel* website: http://wwwnc.cdc.gov/travel/page/yellowbook-home-2014
- Eurocontrol's EU Travel Restrictions: https://reopen.europa.eu/en
- (For US operators only) FAA's Prohibitions, Restrictions, and Notices: https://www.faa.gov/air_traffic/publications/us_restrictions/

B. Travel to the destination may be severely restricted or prohibited. If travel is permitted and any health, security, or safety advisories exist, the PIC must determine if any additional ground resources may be needed (i.e., security guards) and ensure that arrangements are made for those resources prior to departure.

C. In the event of a multi-state or global health issue, such as a pandemic, crews should take the following into consideration in addition to normal preflight planning procedures:

- Arrange for additional cleaning / disinfection of the aircraft, especially if there is reason to suspect that a passenger with an infectious disease has been on board, and as recommended by public health organizations.

  Note: In the case of SARS-CoV-2 (COVID-19), it is recommended that cleaning / disinfection occur at least once every 24 hours, as well as prior to any flight lasting six hours or longer.
- Procure and distribute any protective equipment that may be recommended to prevent the spread of infectious disease, such as face masks and/or gloves.
- Become familiar with common symptoms associated with infectious disease and, if deemed advisable by public health authorities, implement preboarding health screenings.

2.1.5.5 GNSS Jamming / Spoofing

A. In or near geographic areas where there is active conflict, operators should be aware of and on alert for the possibility of intentional disruption of GNSS sensors, i.e., "GNSS jamming." This is a situation in which actors on the ground will intentionally interfere with GNSS data, resulting in degradation or even total loss of GNSS signals. As a result of GNSS jamming, the aircraft may be unable to conduct or maintain a variety of operations, including PBN and/or ADS-B Out.

B. To the extent possible, crews should avoid planning flights into areas where a risk of GNSS jamming is known and reported. If a flight must be planned in an area of high risk, crews must ensure a thorough safety analysis of the flight is conducted, including an assessment of all available information, as well as checking on the availability of alternative (i.e., non-GNSS) procedures / approaches in the area.

C. As of February 2022, the following areas have been identified as having an increased risk of GNSS jamming:

1. Kaliningrad region, surrounding Baltic sea and neighbouring States;
2. Eastern Finland;
3. The Black Sea;
4. The Eastern Mediterranean area near Cyprus, Türkiye, Lebanon, Syria and Israel; and
5. Northern Iraq.

D. If crews notice degradation of GNSS equipment inflight, they should:

- Follow the contingency procedures described in Section 3.4.1;
- Report any observed interruption, degradation, or anomalous GNSS equipment performance to ATC;
- Verify the aircraft position by means of available conventional navigation aids; and

- Be prepared to revert to conventional (i.e., non-GNSS) arrival / approach procedures, as needed.

2.1.6 Fatigue Management and Crew Rest

A. Any international flight should be planned in accordance with existing fatigue management programs and/or flight department policies on crew rest. Consideration should be given to the fact that international travel will often induce additional fatigue due to the crossing of time zones and extended flight time, especially for transoceanic flights.

B. At the discretion of the Director of Aviation, an additional pilot may be assigned to long-duration flights or those outside of normal sleep times to help mitigate fatigue issues and promote safer flying.

2.2.0 Special Areas of Operation / Preflight Procedures

A. Special Areas of Operation (SAOs) are geographic areas having unique characteristics that require the use of special equipment, procedures, and/or techniques to safely conduct flight operations.

Note: In addition to special equipment, SAOs may also require operational approval. The crew must ensure the aircraft has been operationally approved prior to flight.

B. The following airspace definitions apply and will be used throughout this manual:

1. Reduced Vertical Separation Minimum (RVSM): RVSM airspace is airspace where aircraft are vertically separated by 1,000 ft (300 m). RVSM is implemented from FL290 to FL410 inclusive, unless otherwise specified. Aircraft and operators must receive state approval to conduct RVSM operations prior to entering this airspace.

   Note: An RVSM approval is not restricted to a specific region. It is valid globally on the understanding that any operating procedures specific to a given region will be provided to the flight crews.

2. Performance Based Navigation (PBN)

   - PBN is an umbrella term that includes Area Navigation (RNAV) and Required Navigation Performance (RNP) specifications. The PBN concept was introduced to better define the specific performance requirements of navigation equipment.
   - RNAV and RNP refer to the level of aircraft performance required for certain levels of airspace, expressed in terms of the accuracy to which a navigation system must be able to calculate its position (e.g., “RNP-10” indicates that the system must be able to calculate its position to within a circle with a radius of 10 NM).
   - Although RNAV and RNP are sometimes used interchangeably, RNP is defined as RNAV with on-board navigation monitoring and alerting. Recognized definitions of RNP and RNAV are as follows:

Terminal RNP Operations

RNP Level	Typical Application
RNP-1	Obstacle Departure Procedures (ODPs), Standard Instrument Departures (SIDs), and Standard Terminal Arrival Routes (STARs)
RNAV-1	Precision RNAV (P-RNAV) – Used for terminal airspace (arrival and departure) in the US and European (EUR) Region

En Route RNP Operations

RNP Level	Typical Application
RNP-2	Areas with little or no ground NAVAID infrastructure, limited or no ATS surveillance, and low- to medium-density traffic

RNP Level	Typical Application
RNAV-2	Used for continental en route operations in the US (high altitude / Q routes)
RNAV-5	Basic RNAV (B-RNAV) – Used for arrival and continental en route operations in some regions

Oceanic / Remote RNP Operations

RNP Level	Typical Application
A-RNP	Not currently required for oceanic operations; however, an A-RNP authorization includes authorization for RNP-2, RNP-4 and RNP-10.
RNP-2	Not currently required for oceanic operations; however, an RNP-2 authorization will include authorization for RNP-4 and RNP-10.
RNP-4	Oceanic/Remote Areas where 30 NM horizontal separation is applied
RNP-10	Oceanic/Remote Areas where 50 NM horizontal separation is applied

3. Performance Based Communication and Surveillance (PBCS): PBCS is a framework for communication and surveillance performance specifications that aircraft must be capable of meeting in order to be authorized for certain SAOs or other operations. Similar to PBN, PBCS is an umbrella term and includes the following key terms:
   - Required Communication Performance (RCP): Specifies the maximum allowed time, in seconds, of a systems communications capabilities (e.g., RCP 240 or RCP 400).
   - Required Surveillance Performance (RSP): Specifies the maximum allowed time, in seconds, of a systems surveillance capabilities (e.g., RSP 180).
4. North Atlantic High Level Airspace (NAT HLA): Airspace in the North Atlantic Region between FL285 and FL420 inclusive is designated as "NAT HLA." (Reference Section 2.2.1.1.) Operators must have an oceanic PBN authorization (RNP-10 / RNP-4) in addition to a NAT HLA authorization to operate in this airspace.

   Note: Aircraft that do not meet NAT HLA requirements may be permitted to operate in NAT HLA if they are provided with ATS surveillance services (e.g., ADS-B), maintain direct VHF voice communication with ATC, and have a certified installation of equipment allowing the aircraft to navigate on the cleared track. Aircraft that do not meet these provisions may be cleared to climb or descend through the NAT HLA, traffic permitting.
5. Data Link Communications (DLC): As used in this manual, the phrases "*Data Link Communications*" or "*Data Link*" (as opposed to "*a data link*" or "*a datalink*") refer to the use of Automatic Dependent Surveillance – Contract (ADS-C) and Controller Pilot Data Link Communications (CPDLC) capabilities for exchanges between the pilot and ATC. DLC is required in RNP-4 airspace where the separation standard is 30 NM (lateral / longitudinal).
6. Automatic Dependent Surveillance – Broadcast (ADS-B) Out / In: ADS-B Out refers to an aircraft broadcasting own-ship information and includes the automatic transmission of the aircraft position to ATC and other users. ADS-B In refers to an aircraft's ability to receive ADS-B transmissions from ATC and other ADS-B Out-equipped aircraft.

   Note: As ground infrastructure expands, crews can except more airspaces over time to support space-based (i.e., satellite-based) ADS-B. Although the general functionality and use of this technology remains the same, space-based ADS-B surveillance may be used as an alternative to VHF surveillance, and as such, reduced aircraft separation may be applied. Refer to Section 2.3.5.2 for more information.

7. Reduced Separation: Trials were introduced in the NAT region to reduce the separation of aircraft based on enhanced navigation, communication, and/or surveillance capabilities. Although those trials have since evolved and are now known under different terminology, the potential exists for other reduced separation mandates or trials to be implemented elsewhere in the future.
   a. Reduced Lateral Separation: In some airspace, aircraft are separated laterally by a half degree of latitude (23 NM). There is currently not a specific authorization (e.g., LOA) for reduced lateral separation. However, typically aircraft must hold other authorizations prior to entering airspace with reduced lateral separation.

      Note 1: In the NAT, Tracks where reduced lateral separation has been formally implemented are known as “PBCS Tracks.” Considerations for reduced lateral separation still apply even though the terminology “PBCS” is used.

      Note 2: To operate on NAT PBCS Tracks, aircraft must be authorized and equipped for DLC, PBCS, and RNP-4 (GNSS).
   b. Reduced Longitudinal Separation (RLongSM): Longitudinal separation is ordinarily ten (10) minutes between aircraft. The RLongSM trial introduced longitudinal separation of five (5) minutes between aircraft equipped with DLC. RLongSM trials have been discontinued in the NAT, but could be put into effect elsewhere.

2.2.1 Oceanic Implementation of SAOs

A. All regional graphical coverage presented in this section is for general guidance only. Flight crews will reference all current and applicable text and charts in the Jeppesen Airway Manual Services prior to operating in each region.

B. Additional regional procedures and guidance for implementation of SAOs can be found in Section 5.

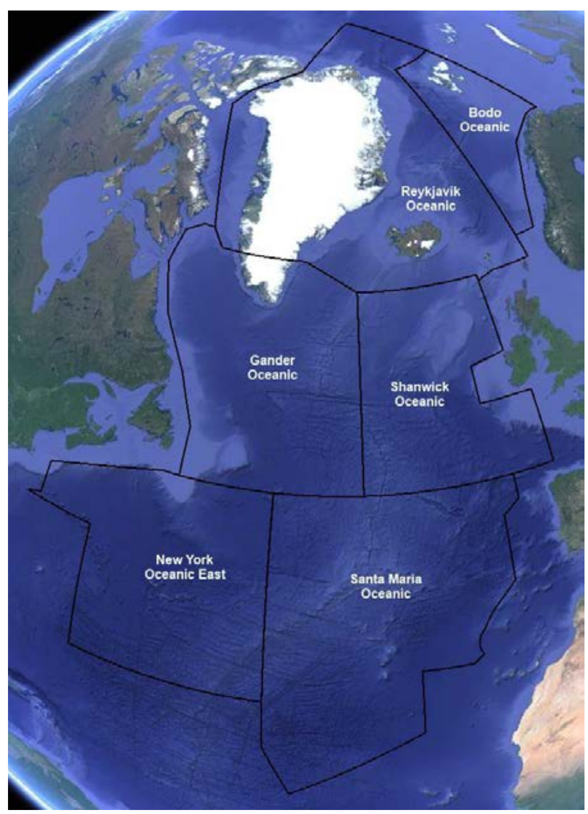
2.2.1.1 North Atlantic (NAT) Region

A. Overview of North Atlantic (NAT) Region:

The NAT is comprised of the following Oceanic Control Areas (OCAs), as depicted in the graphic to the right:

- New York East OCA;
- Santa Maria OCA;
- Gander OCA;
- Shanwick OCA;
- Reykjavik OCA; and
- Bodo Oceanic.

  Note: The boundaries of NAT HLA include the volume of airspace between FL285 and FL420 inclusive in the NAT Region, including the following OCAs: Gander Oceanic, New York Oceanic East, Reykjavik, Santa Maria, Shanwick (except for the Brest and Shannon Oceanic Transition Areas), and Bodo Oceanic.



B. A minimum crew of two pilots is required for NAT HLA operations.

C. RVSM Airspace: RVSM has been implemented throughout the entire NAT region between FL290 to FL410 inclusive.

D. DLC Airspace

- FANS 1/A capable DLC systems are required from FL290 to FL410 (inclusive) throughout the NAT region.

  Note: These DLC systems must utilize either Inmarsat or Iridium SATCOM equipment to remain fully complaint with NAT DLC requirements. DLC via HF is not sufficient and VHF coverage is not available over much of the NAT.

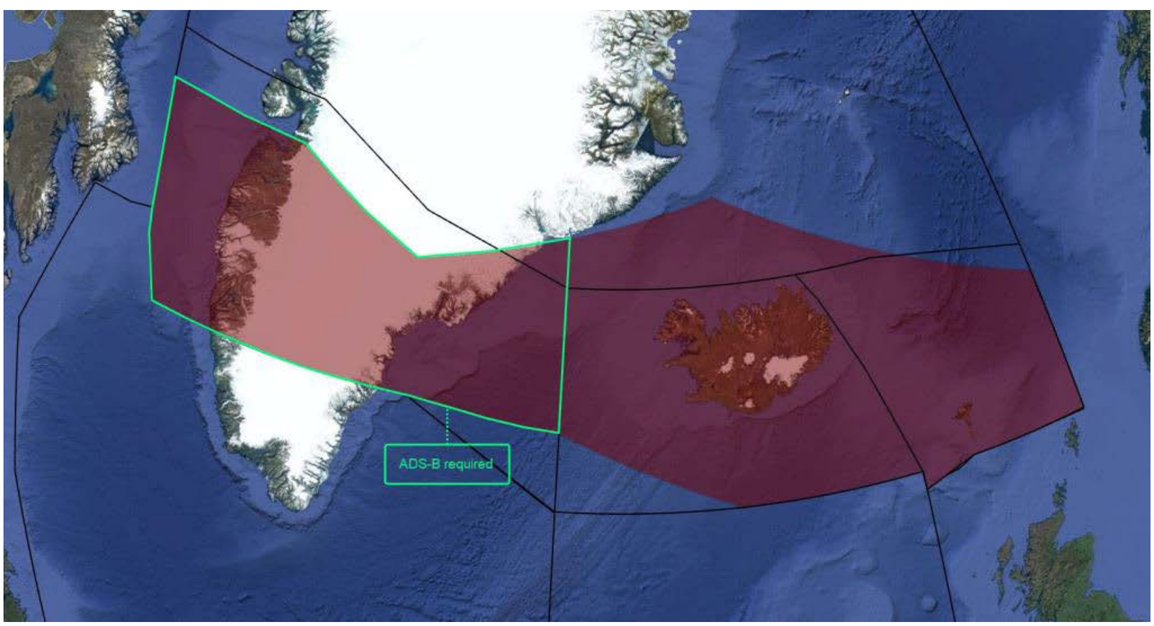
- The following airspace is not included in the DLC Mandate for the NAT region:
  - ATS surveillance airspace (i.e., airspace where surveillance is provided by radar and/or ADS-B for suitably equipped aircraft, including portions of the NAT “Blue Spruce” routes), provided that the aircraft is suitably equipped with ADS-B (Refer to paragraph E below);
  - Airspace north of 80°N; and
  - The New York East OCA.

    Note: The New York West OCA is not part of the NAT region, and is accordingly also not included in the DLC Mandate.

E. Exceptions to the Data Link Mandate (i.e., NAT HLA airspace where non-CPDLC aircraft may be flown):

Note: As noted above, such aircraft must still be fitted with ADS-B Out equipment and appropriate communications equipment, such as HF or, where permitted, VHF radios.

1. The Greenland Corridor (i.e., portions of the “Blue Spruce” routes – refer to Section 2.2.2.4):



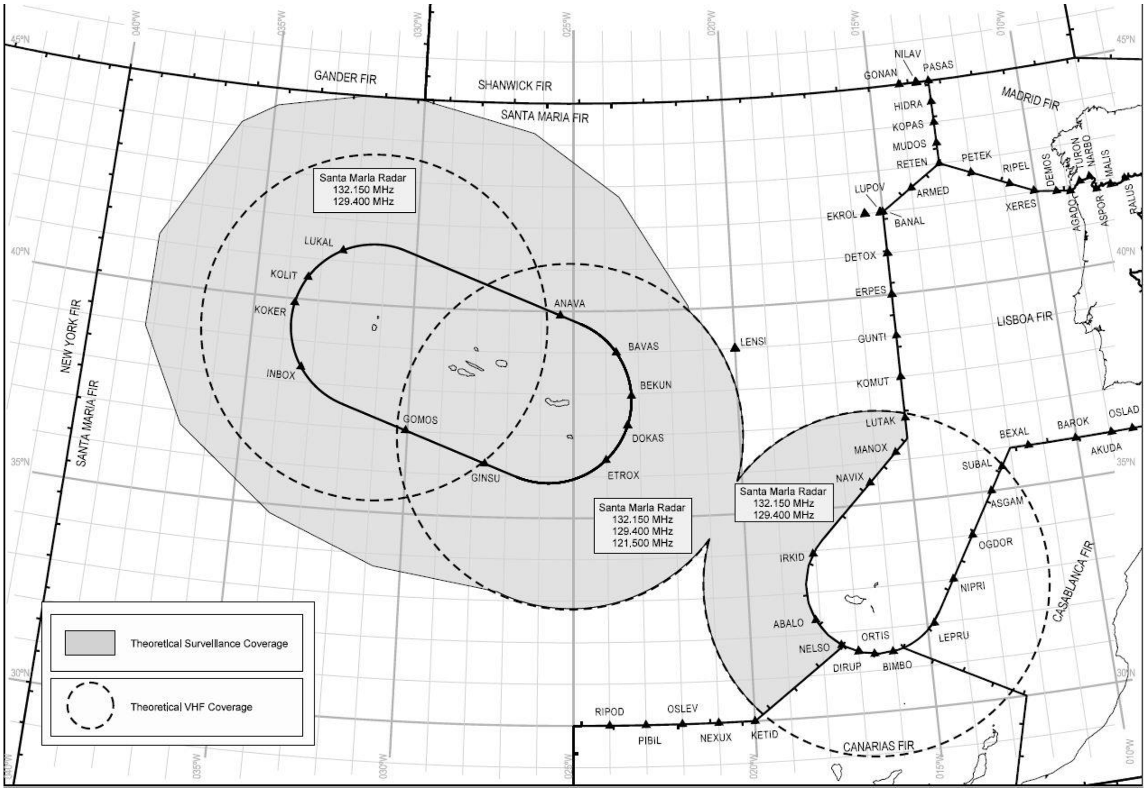
Source: ICAO NAT Doc #007, Version 2024-1

The airspace indicated on this graphic is defined by the following boundaries:

- Northern boundary: 65N000W - 67N010W - 69N020W - 68N030W - 67N040W - 69N050W - 69N060W - BOPUT
- Southern boundary: GUNPA (61N000W) - 61N007W - 6040N010W - RATSU (61N010W) - 61N020W - 63N030W - 6330N040W - 6330N050W – EMBOK

  Note: As this area is within VHF coverage, it may be used by ADS-B equipped aircraft that are fitted with either only a single or no LRCSs to cross the North Atlantic at or above FL290.

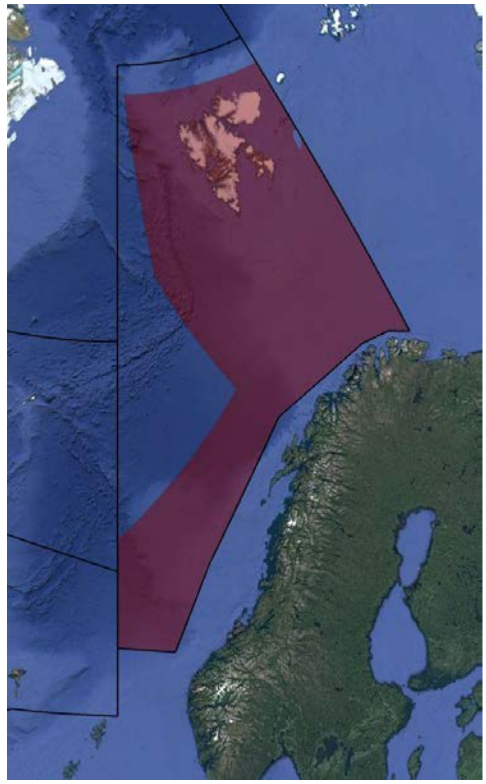
2. The Azores Corridor:



Source: ICAO NAT Doc #007

- Traffic flying to / from Azores Islands is allowed to operate in the NAT HLA, when the oceanic portion of the planned route is contained inside Santa ATC surveillance airspace and within VHF coverage.
- This will typically be achieved via MANOX, NAVIX or IRKID direct 350000N 0200000W or 360000N 0200000W direct Azores Islands.

3. The Bodo Corridor:



Source: ICAO NAT Doc #007

The airspace indicated on this graphic is defined by the following boundaries:

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

F. ADS-B Airspace: Although ADS-B coverage exists in parts of the NAT, ADS-B equipage is not mandated except as noted below:

- In airspace west of 30W;
- On routes T9 and T290; and
- In all non-DLM airspace indicated in paragraph E above.

G. PBCS Implementation

- ATC has implemented reduced separation in the North Atlantic based on PBN and PBCS (e.g., RCP240 and RSP180) as follows:
  - 55.5km (30NM) and 93km (50NM) longitudinal separation between eligible aircraft pairs within the New York East and Santa Maria OCAs, as published in AIPs;
  - Longitudinal separation as small as 14 NM between eligible aircraft pairs within the Gander, Reykjavik, Santa Maria and Shanwick OCAs, as published in AIPs;
  - Lateral separation as small as 19 NM between eligible aircraft pairs within the Gander, Reykjavik, Santa Maria, New York East (30 NM lateral applied) and Shanwick OCAs and
  - The NAT OTS, in which lateral separation will be implemented as 42.6km (23 NM) lateral spacing through whole and half degrees of latitude between tracks between FL350-FL390 inclusive, except when the OTS occurs in the New York East OCA.

- PBCS tracks will be identified in Remark 3 of the Track Message. A PBCS track will either be:
  - A whole degree PBCS track; or
  - A half-degree PBCS track (e.g. 54 degrees-30 minutes NORTH latitude 20 degrees WEST longitude).

    Note: There will be no combination of whole and half degrees of latitude within any single OTS track.
- Only eligible operators and aircraft may operate on Tracks designated as PBCS. Tracks will be established by publishing one track defined by ½ degree waypoints between two adjacent tracks defined by whole degree waypoints.
- Additional information on reduced lateral separation can be found in Section 2.2.2.6 and more information on PBCS can be found in Section 2.2.4.

H. Advanced Surveillance – Enhanced Procedural Separation (ASEPS):

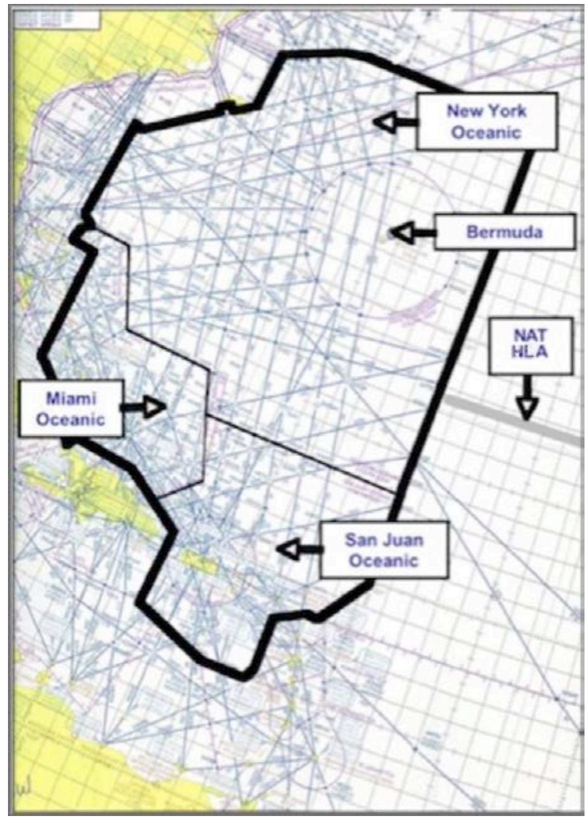
- The Shanwick, Gander, and Santa Maria OCAs have commenced a trial implementation of the following longitudinal separations:
  - 17 NM longitudinal separation of aircraft operating on same track or intersecting tracks, provided the relative angle between the tracks is less than 90 degrees;
  - 14 NM longitudinal separation of aircraft operating on same track or intersecting tracks, provided the relative angle between the tracks is less than 45 degrees; and
  - Opposite-direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft provided the aircraft have reported by ADS-B having passed each other by 5 NM.
- The Shanwick, Gander, and Santa Maria OCAs have also commenced a trial implementation of 19 NM lateral separation between parallel or non-intersecting tracks. Operators will be advised via AIC of the commencement of lateral ASEPS implementation.
- To be eligible for ASEPS, the aircraft / flight must meet the following qualifications:
  - RVSM and NAT HLA capable and authorized;
  - ADS-B Out capable (1090ES);
  - RNP-4 capable and authorized;
  - RCP 240 and RSP 180 capable and authorized; and
  - An ICAO flight plan must be correctly filed with all appropriate codes indicating the above in Items 10 and 18 (Appendix A).

2.2.1.2 West Atlantic (WAT)

A. Overview of the West Atlantic (WAT):

The WAT is comprised of the following Control Areas (CTAs), Oceanic Control Areas (OCAs), and Flight Information Regions (FIRs), as depicted in the graphic to the right:

- New York West OCA;
- San Juan FIR; and
- The Atlantic portion of the Miami Oceanic CTA.



B. RVSM has been implemented in the WAT area between FL290 - FL410 inclusive.

C. New York Oceanic airspace outside of the WAT will be transition airspace. 50 NM lateral separation may be applied in this airspace between aircraft authorized RNP-10 / RNP-4.

D. Lateral Separation Standards to be Applied

- 23 NM lateral separation will be applied in the New York West OCA between aircraft equipped with and authorized for RNP-4, CPDLC (FANS), and PBCS (RCP 240 and RSP 180). Crews must ensure the flight plan is appropriately coded for these capabilities to receive this separation standard.

  Note: Crews of such flights must ensure they are aware of special considerations for operating in a reduced lateral separation environment (Section 2.2.2.6).
- 50 NM lateral separation will be applied in the WAT between aircraft authorized RNP-10 / RNP-4 operating at any altitude above the floor of controlled airspace.
- 50 NM lateral separation may be applied in the New York Oceanic CTA/FIR outside of the WAT between aircraft authorized RNP-10 / RNP-4 operating at any altitude above the floor of controlled airspace.
- Within the WAT, the lateral separation standard applicable to Non-RNP-10 / Non-RNP-4 aircraft will be 90 NM.
- Policies for application of other lateral separation standards in airspace outside the WAT are not affected.

E. ICAO Flight Plan Requirement

- ICAO flight plans shall be filed for operation on oceanic routes and areas in the WAT.

- AFTN Addressing
  - All flights entering the New York Oceanic FIR shall address flight plans to KZWYZOZX.
  - All flights entering the New York Oceanic FIR and a U.S. ARTCC (except Boston) and/or Bermuda airspace shall address flight plans to both KZWYZOZX and the appropriate U.S. ARTCC (see table below). If operators do not address flight plans to KZWYZOZX, 50 NM lateral separation cannot be applied to them.

Airspace To Be Entered	Required AFTN Addresses
New York (NY) Oceanic CTA/FIR	KZWYZOZX
Boston ARTCC & NY Oceanic	KZWYZOZX only
NY domestic and/or Bermuda & NY Oceanic	KZNYZQZX & KZWYZOZX
Washington (KZDC) & NY Oceanic	KZDCZQZX & KZWYZOZX
Jacksonville (KZJX) & NY Oceanic	KZJXZQZX & KZWYZOZX
Miami (KZMA) & NY Oceanic	KZMAZQZX & KZWYZOZX
San Juan & NY Oceanic	TZSUZRZX & KZWYZOZX

- To inform ATC and to key Ocean21 automation that they have obtained RNP-10 / RNP-4 authorization and are eligible for 50 NM lateral separation, flight crews shall annotate the ICAO flight plan Items 10a and 18 with the appropriate terminology to indicate RNP-10 or RNP-4 capability, as defined earlier in this section and in Appendix A.

  Note: The ICAO flight plan requirements also apply to operations in the Gulf of Mexico.

F. Routes Not Requiring RNP-10 or RNP-4 Authorization Within the WAT:

- Routes that are flown by reference to ICAO standard ground-based navigation aids (VOR, VOR/DME, NDB), such as the routes in the airspace between Florida and Puerto Rico.
- Routes that are located within radar and VHF coverage. New WAT route segments M201 between BAHAA and PAEPR and L453 between PAEPR and AZEZU have replaced A761 between HANRI and ETOCA and R511 between ELTEE and AZEZU. **At and above FL310,** the new route segments are within radar and VHF coverage. Operations at and above FL310 on these route segments does not require RNP-10 or RNP-4 authorization and remains the same as those conducted on the old A761 and R511 route segments**.** Pilots shall not apply Strategic Lateral Offset Procedures (SLOP) on these route segments.

2.2.1.3 Gulf of Mexico

A. 50 NM lateral separation is applied in the following GoMex Oceanic Control Areas for RNP-10 / RNP-4 authorized aircraft:

- The Houston Oceanic CTA/FIR and the Gulf of Mexico portion of the Miami Oceanic FIR.
- The Monterrey CTA and Merida High CTA within the Mexico FIR/UTA.

  Note: The previous lateral separation minima of 100 NM in the Houston, Monterrey and Merida CTAs, and 90 NM in the Miami Oceanic CTA will continue to be applied between aircraft not authorized RNP-10 or RNP-4.

B. Q Routes: Q100, Q102, and Q105 are RNAV routes requiring a minimum of en route RNAV-5 (B-RNAV) capability and at least one operable LRNS. These routes are considered Class I airspace and are established between the surface and FL600 inclusive.

Note: Aircraft that rely on IRS navigation equipment that cannot receive automatic position updates for the length of the route are limited to 1.5 hours of un-updated operational time on these Q routes. This restriction does not apply to LRNSs operating in GNSS mode.

C. Flight crewmembers are expected to follow ICAO Document 4444 when conducting operations in GoMex oceanic airspace.

D. Application of the SLOP in Gulf of Mexico Oceanic Airspace: The offset procedure can be used as an SOP in the course of normal operations. It is intended to mitigate **both** wake vortex encounters and the heightened risk of collision when non-normal events occur.

Exception: Pilots may **not** use SLOP on the three Q routes designated as RNAV routes above (Q100, Q102, and Q105). Pilots should fly the centerline at all times on these routes and notify ATC of any loss of navigation capability to determine subsequent actions.

E. HF Communications are not required in the GoMex OCAs above FL180.

2.2.1.4 Caribbean Sea

Y-Routes: RNAV routes identified as Y585, Y586, Y587, Y588 and Y589 are available to operators of aircraft capable of oceanic RNAV-2 with operable GNSS equipment. RNAV systems relying solely on DME or IRS equipment are not suitable and not authorized for use on the Y-routes.

Note: SLOP (Section 2.3.10.2) is not to be applied on the Y-routes.

2.2.1.5 South Atlantic Oceanic Control Area (SAL)

A. RVSM has been implemented in the European / South American (EUR / SAM) corridor between FL290 - FL410.

B. RNP-10 has been implemented on ATS route structures in the EUR / SAM corridor.

C. CPDLC is supported, but is not mandated, in the Atlantico FIR.

D. Latency Timer Trials: PBCS implementation (including reduced lateral / longitudinal separation) is being considered in Atlantico FIR. Prior to implementation, ATC will be testing the CPDLC latency monitoring capability of air traffic. When aircraft log on with CPDLC, ATC will send the message "*RCP 240 TRIALS PLEASE ANSWER ROGER*." Pilots are expected to send the positive response, "*ROGER*."

2.2.1.6 Random Routing RNAV Areas

A. Certain areas of the southern Atlantic Ocean and the Indian Ocean, between FL290 and FL410 inclusive, have been designated as Random Routing RNAV Areas. These areas include:

- The Atlantic Ocean Random Routing RNAV Area (AORRA); and

  Note: The AORRA is designated as the area corresponding to oceanic sectors of the Angola, Argentina, Brazil, South Africa, and Uruguay FIRs between FL290 and FL410.

- The Indian Ocean Random Routing RNAV Area (IORRA).

  Note: The IORRA is designated as the area with vertical limits FL290 to FL410 within the Antananarivo, Beira, Johannesburg Oceanic, Mauritius, and Melbourne FIRs.

B. Operating within these areas facilitates freedom to flight plan and operate along random tracks according to operational requirements.

C. Only aircraft approved for RNP-10 are permitted to operate within the AORRA or IORRA. Flight crew must ensure that the aircraft's RNP-10 capability is indicated in the flight plan.

D. DLC services are supported in the AORRA and IORRA. In some areas of the random routing airspace, CPDLC is the primary form of communication, with HF as backup.

E. Flights operating within the AORRA shall enter and exit via particular gates. Prior to entering or after exiting at a particular gate, aircraft must comply with the fixed route structure associated with that particular entry/exit point or as instructed by ATC.

2.2.1.7 Pacific Region (PAC)

Refer to Section 4.

2.2.2 General Considerations for Flights Into SAOs

Note: Many SAOs require that the aircraft and operator be operationally approved in addition to aircraft capability / equipage. Crews must ensure that operational approval has been issued prior to conducting NAT HLA, RVSM, PBN, or DLC operations.

2.2.2.1 Required Equipment

A. The following equipment is required and must be operational in order to conduct the operations specified:

- NAT HLA
  - Two (2) fully serviceable, independent LRNSs capable of navigating to the published RNP, including two (2) Flight Management Systems (FMSs); and
  - Two (2) long range communication systems (LRCSs), at least one of which (the primary unit) must be HF.

    Note 1: Aircraft that do not have two appropriate LRCSs, and which have a VHF radio, may still fly in the NAT HLA, but will be restricted to routes within VHF coverage. Reference Sections 2.2.2.4 ("Blue Spruce Routes") and 2.2.2.5.

    Note 2: Compliant CPDLC equipment (i.e., a FANS system capable of RCP 240) may satisfy the requirement of the secondary LRCS, except for Inmarsat equipment when operating north of 80°N due to coverage limitations. If equipped with both Inmarsat and Iridium equipment, Iridium must be used north of 80°N.

    Note 3: Under some circumstances, compliant SATVOICE equipment may be permitted as a secondary LRCS. Such equipment must be allowable by the AIPs of all countries / FIRs to be overflown, installed in accordance with AC 20-150B, and allowable in accordance with the provisions of the aircraft MEL. In addition, Inmarsat equipment may not be used north of 80°N. Additional details on compliant SATVOICE equipment can be found in Section 2.3.5.1.
- RVSM
  - Two (2) independent primary altitude measurement systems;
  - One (1) automatic altitude control system*;

    * The automatic altitude control system will be capable of controlling altitude within ± 65 ft (± 20 m) about the acquired altitude when operated in straight and level flight under non-turbulent, non-gust conditions.
  - One (1) altitude alerting system;
  - One (1) Mode-C SSR transponder, with an altitude reporting system that can be connected to either of the altitude measurement systems, is required through radar-controlled RVSM transition airspace;
  - If TCAS II is installed, it must be at Version 7.1 or later.
- PBN: Refer to Section 2.2.3.3 and Appendix P.
- NAT PBCS: Specific components are not designated as NAT PBCS-critical; however, the following systems must be verified as operational prior to any flight into NAT PBCS airspace and operational approval, when required, must be obtained:
  - FANS 1/A+ CPDLC and ADS-C;
  - RNP-4 (GNSS);
  - RCP 240 and RSP 180;

- TCAS II (Version 7.1 or higher).

  Note: If the TCAS system fails after departure, the aircraft may continue on the cleared route.

B. Before takeoff, all equipment required for flight into any Special Area of Operation, including NAT HLA, RVSM, PBN, or PBCS airspace, must be operational and any malfunctions must be resolved.

C. Should any of the required equipment fail prior to aircraft entering the airspace, the pilot must request a new clearance so as to avoid flight in this airspace.

2.2.2.2 NAT HLA / RVSM Preflight Planning

A. Crews will comply with any aircraft operating restrictions related to NAT HLA / RVSM airworthiness or operational approval.

B. Exceptional Operation

1. If the RVSM status of the aircraft changes to “Not RVSM Qualified” because of equipment failure, ATC may provide an altitude reservation to fly at an RVSM level so the aircraft may return to its base.
2. The Oceanic Area Control (OAC) must be contacted by telephone not more than 12 hours (24 hours for NY) and not less than four (4) hours prior to the departure time to obtain an altitude reservation.
   a. Flight crews will notify the appropriate Oceanic Control Center after approval is received from the first affected Center and prior to departure.

      Note: Filing of the flight plan is not appropriate notification.

   b. This approval and FL are to be included along with the remarks “APVD non-RVSM” in Item 18 of the ICAO flight plan.

   c. Written justification for the request must be submitted upon completion of the flight plan to the applicable monitoring agency(ies), which may include any of the following:

      - North Atlantic Central Monitoring Agency (CMA);
      - Asia-Pacific Approvals Registry and Monitoring Organization (APARMO);
      - North American Approvals Registry and Monitoring Organization (NAARMO);
      - Middle East Regional Monitoring Agency (MIDRMA);
      - AFI Regional Monitoring Agency (ARMA);
      - Caribbean / South American Monitoring Agency (CARSAMMA); or
      - EUROCONTROL, as appropriate.

      Note: Any suspected misuse of the exceptional operations will be subject to follow up actions by the FAA.

2.2.2.3 Altimeter System Preflight Inspection Procedures

A. Prior to flight into RVSM airspace, the flight crew shall review the Aircraft Discrepancy Log for any repairs performed since the last flight into RVSM airspace. The assigned crewmember will ensure that the maintenance action has been taken to correct defects to required equipment.

B. During the exterior preflight inspection, the covers will be removed from the right and left static ports. The static sources, the condition of the fuselage skin around the static ports, and any component that affects the altimetry system will be checked for damage and / or paint chips.

C. Before takeoff, the aircraft altimeters should be set to the local altimeter atmospheric pressure at nautical height (QNH) setting and should display a known elevation (e.g., field elevation) within the limits specified in aircraft operating manuals. The difference between the known elevation and the elevation displayed on the altimeters should not exceed 75 feet. The two primary altimeters should also agree within limits specified by the aircraft operating manual. An alternative procedure using atmospheric pressure at field elevation (QFE) may also be used. *All altimeter readings will be recorded on the Altimeter Accuracy Log* (Appendix G).

2.2.2.4 Single LRNS Operations in Oceanic and Remote Airspace

A. If a crew intends to conduct operations with only a single LRNS, they must ensure all appropriate authorizations have been issued and that the planned flight route permits S-LRNS operations.

B. Areas of Operation: Authorized operators may conduct S-LRNS operations in the NAT Blue Spruce Routes (Reference paragraph E below), Gulf of Mexico, the Caribbean Sea, and the Atlantic Ocean west of a line which extends from 44°47’00” N / 67°00’00” W to 39°00’00 N / 67°00’00” W to 38°30’00” N / 60°00’00” W south along the 60°00’00” W longitude line to the point where the line intersects with the northern coast of South America.

Note: Flight conditions and the aircraft's capabilities must be such that there is no more than a 30 minute gap in two-way radio VHF communications.

C. Operational Requirements

- The airplane must be continuously navigated to the degree of accuracy required for ATC. For areas where these standards have not been formally established, the LRNS must be used to continuously navigate the airplane so that the cross-track and/or the along-track errors will not exceed 25 NM at any point along the flight plan route specified in the ATC clearance.
- Prior to entering any airspace requiring the use of a LRNS, for airplanes approved for operations using GNSSU equipage and/or DME/DME automatic updating, the systems must be confirmed to be functioning normally (no fault indications). For all other airplanes, the position shall be accurately fixed using airways navigation facilities or ATC radar.
  - After exiting this airspace, the airplane position shall be accurately fixed and the LRNS error shall be determined and logged. An arrival gate position check satisfies this requirement.
  - For airplanes approved for operations and using GNSSU equipage and/or DME/DME automatic position updating, no exit position fix is required unless there is an indication of LRNS malfunction.
- An LRNS fix may be substituted for a required en route ground facility when that facility is temporarily out of service, provided the approved navigation system has sufficient accuracy to navigate the airplane to the degree of accuracy required for ATC over that portion of the route.

D. Equipment: At dispatch, at least one of the navigation systems listed below must be installed and operational:

- One independent inertial navigation system; or
- One FMS / navigation sensor combination (or equivalent) suitable for the route; or
- One independent GNSSU navigation system approved for oceanic and remote navigation.

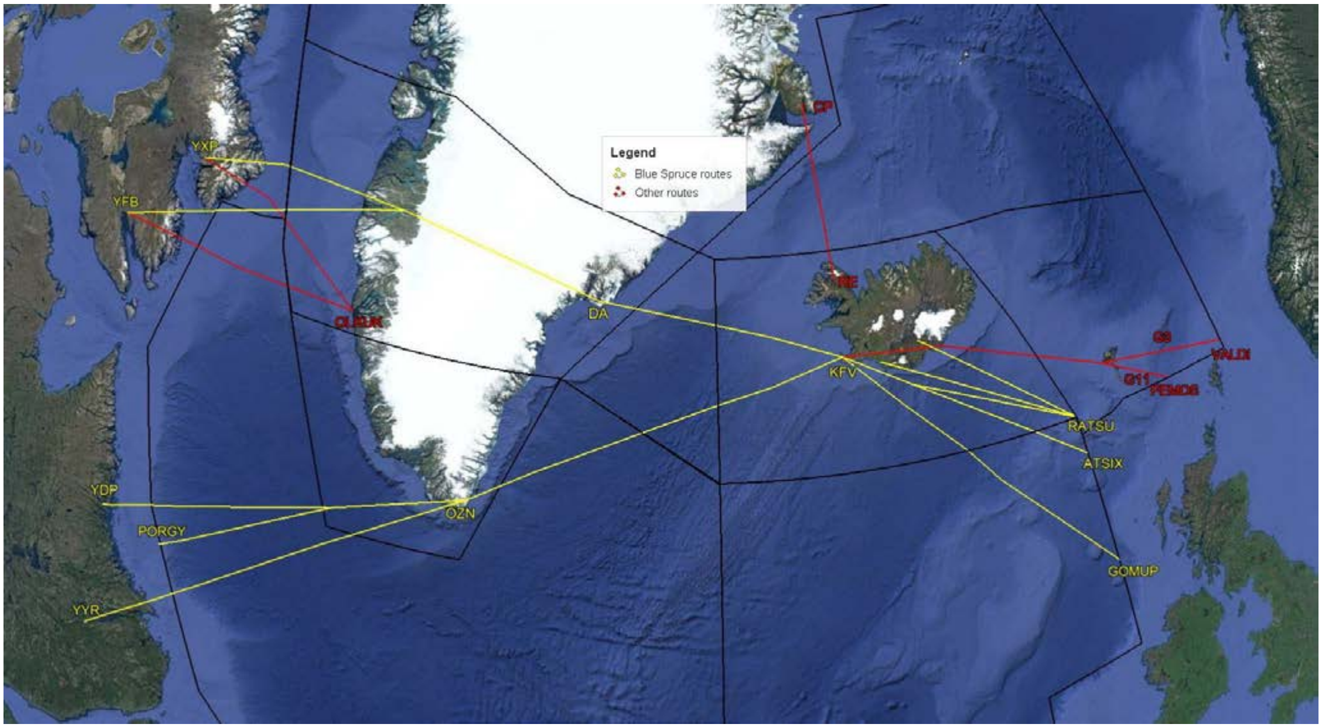
  Note: If planning to operate in RNP-10 airspace, the navigation system must be approved for RNP-10 and must provide RNP-10 performance for the planned flight time in the airspace and within any applicable RNP time limits.

E. <u>“Blue Spruce Routes” (Transatlantic Routes for Aircraft with Only One LRNS)</u>

<u>Note 1</u>: State approval for NAT HLA is still required prior to flying transatlantic S-LRNS / “Blue Spruce” routes.

<u>Note 2</u>: If the single LRNS is a GNSSU, then it must be approved in accordance with TSO-C129 (or equivalent) standards.

- The following special routes (“Blue Spruce Routes”), depicted in yellow, have been developed to allow aircraft equipped with only one LRNS and carrying normal short-range navigation equipment (VOR, DME, ADF), to cross the NAT between Europe and North America:



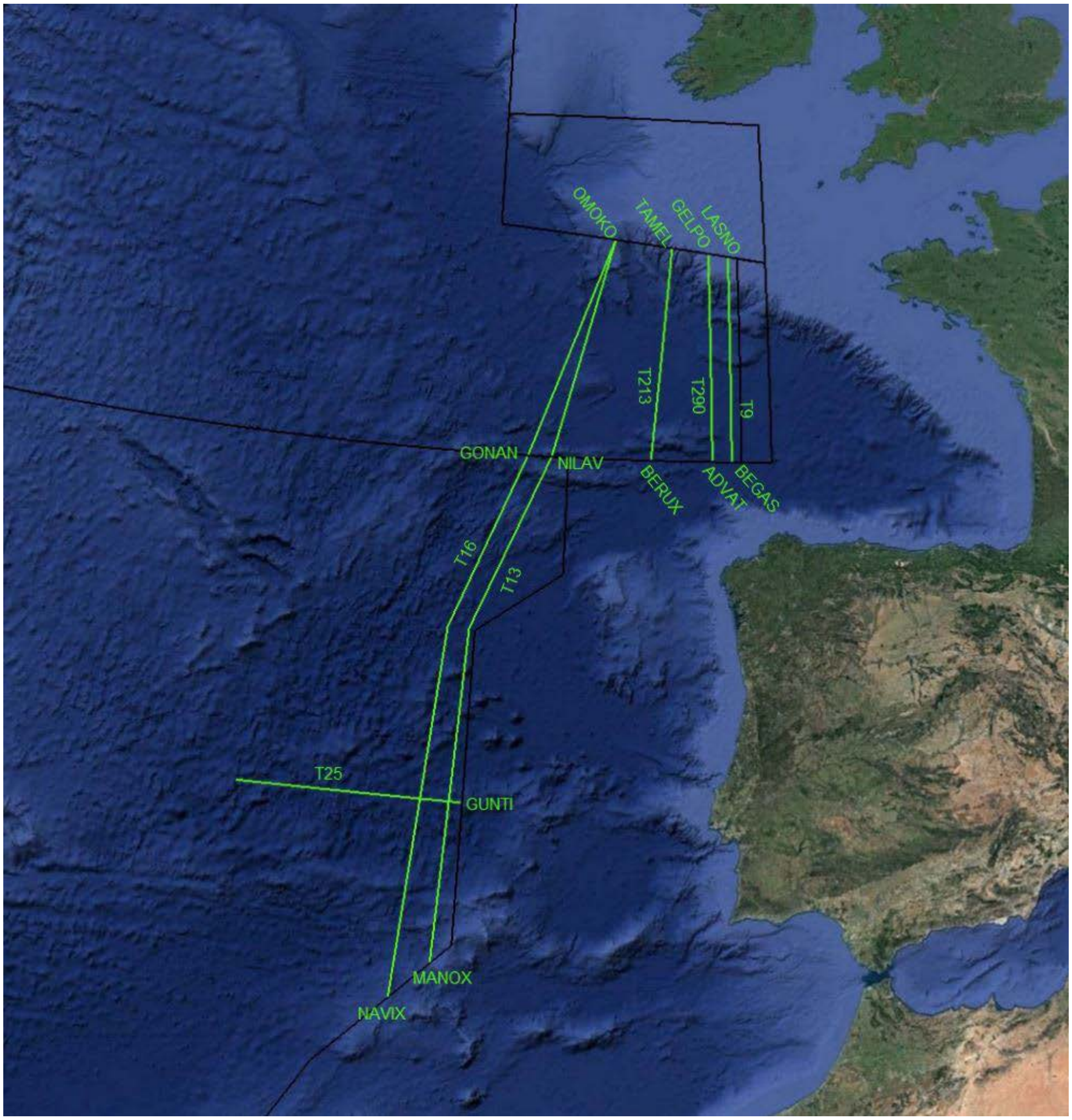
Source: ICAO NAT Doc #007

The routes depicted in this graphic are defined as follows:

1. Routes with VHF Coverage (Available to non-HF equipped aircraft):
    - MOXAL – RATSU (for flights departing Reykjavik Airport);
    - OSKUM – RATSU (for flights departing Keflavik Airport);
    - RATSU – ALDAN – KFV (Keflavik);
    - KFV – EPENI – 63°N 30°W – 61°N 40°W – OZN;
    - KFV – SOPEN – DA (Kulusuk) – SF (Kangerlussuaq) – YFB;
    - SF (Kangerlussuaq) – DARUB – YXP;
    - OZN – 59°N 50°W – AVUTI (FL290 to FL600) – PRAWN – YDP;
    - OZN – 59°N 50°W – CUDDY (FL290 to FL600)– PORGY;
    - OZN – 58°N 50°W – HOIST – YYR.
2. Routes on which HF is required:
    - ATSIX – 61°N 12°34'W – ALDAN – KFV;
    - GOMUP – 60°N 15°W – 61°N 16°30'W – BREKI – KFV.

- These routes are also available for interim use by aircraft that have suffered a partial loss of navigation and have only a single remaining functional LRNS.

- Several “T Routes” in European coastal airspace may be flown by aircraft with only a single LRNS as shown below:



Source: ICAO NAT Doc #007

The routes depicted on this graphic include:

- Routes between Northern Europe and Spain / Canaries / Lisbon FIR (T9, T290, T13, T213, and T16);

  Note: T9 and T290 require equipage for ADS-B Out (1090ES), VHF, and continental RNP-2, as well as normal short-range navigation equipment (VOR/DME/ADF).

- Routings between the Azores and the Portuguese mainland and/or the Madeira Archipelago (T25 or random);

  Note: T25 requires equipage of short-range navigation equipment (VOR/DME/ADF).

- Additional routes that may be flown by aircraft with only a single LRNS include:
  - Routes between Iceland and Constable Pynt on the east coast of Greenland and between the Kook Islands on the west coast of Greenland and Canada; and

- The following routes of short stage lengths when the aircraft is equipped with normal short-range navigation equipment that can meet the NAT HLA track-keeping criteria:
  1. G3- VALDI - MY (Myggenes) - ING – KFV; and
  2. G11 - PEMOS - MY (Myggenes).

F. 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 for aircraft operating without 2 LRNSs between Iceland and Greenland and between Greenland and Canada.

2.2.2.5 Single LRCS Operations in Oceanic and Remote Airspace

A. If a crew intends to conduct operations with only a Single Long Range Communication System (S-LRCS), they must ensure they hold appropriate authorization if required/available, and that the planned flight route permits S-LRCS operations.

Note: FAA-registered operators under Part 91 are not required to obtain a specific S-LRCS operational authorization. However, per the requirement for dual LRCSs established by ICAO NAT Doc 007, permissible operations will be limited in the event that the aircraft is fitted with only a single LRCS.

B. Requirements

1. At least one HF is required for long-range communications, even when equipped with an operational satellite voice and/or communications system (SATVOICE/SATCOM).

   Note: The use of VHF is authorized for certain extended overwater operations in the Gulf of Mexico above FL180, known as the “Gulf of Mexico Special Provision Area” (GOMEX SPA). An HF radio is not required for operations in the GOMEX SPA; however, no allowance is made for operations with a single VHF voice radio. An HF radio must be used whenever gaps in VHF coverage exist or when VHF coverage is impacted by outages. The PIC must review the appropriate NOTAM(s) to verify there are no reported or anticipated lapses in VHF coverage during the period of time in which the flight will be conducted.
2. All ANSPs currently require HF voice LRCS. In S-LRCS airspace, operators authorized for Data Link Communications may utilize CPDLC for primary communications, but at least a single HF radio is still required as a backup in case of DLC failure.
3. Operators must maintain the continuous ability to communicate with ATC.
4. Use of a single HF radio in S-LRCS airspace will provide communications with ATC through New York ARINC, a communications service provider.

2.2.2.6 Considerations for Reduced Lateral Separation

A. In some airspaces, aircraft may be laterally separated by half a degree (23 NM) or less (as small as 19 NM). Prior to operating in any reduced lateral separation environment, crews must ensure the aircraft holds any required authorizations noted as a prerequisite for lateral separation.

B. Prior to any reduced lateral operations, the crew must be familiar with half-degree waypoint naming conventions (Appendix B).

C. Currently, reduced lateral separation is implemented in the NAT region on OTS Tracks designated as “PBCS Tracks.” The following considerations apply to reduced separation operations in the NAT:

- The aircraft must be equipped and authorized for DLC, PBCS, and RNP-4 (GNSS).
- PBCS Requirements: Aircraft must be capable of RCP 240 and RSP 180, and these capabilities must be annotated on the flight plan.
- SLOP will be used and applied on the PBCS Tracks.

- TCAS II (Version 7.1 or higher) must be operational prior to departure for any flights where reduced lateral separation will be applied. However, if the TCAS system fails after departure, the aircraft may continue on the cleared route.
- <u>System Failure Prior to Departure</u>: The crew should plan the flight so as to remain clear of NAT PBCS tracks between FL 350-390 (inclusive).
- <u>System Failure After Departure But Prior to Entering NAT PBCS Airspace Between FL 350-390 (Inclusive)</u>: The crew should contact ATC and request a revised clearance that will keep it clear of PBCS airspace.
- <u>System Failure After Entering PBCS Airspace</u>: ATC must be immediately advised. Such flights may be re-cleared to exit PBCS airspace, but consideration will be given to allowing the flight to remain in the airspace based on tactical considerations.
- <u>Continuous Climb or Descent of Aircraft Not PBCS Eligible</u>: Any aircraft that is not eligible for the PBCS Tracks may request continuous climb or descent without intermediate level off through the vertical extent of the NAT PBCS airspace. Such requests will be considered on a tactical basis.
- <u>Altitude Reservation (ALTRV) Requests</u>: ALTRV requests will be considered on a case by case basis, irrespective of the PBCS eligibility status of the participating aircraft.
- <u>Contingency Situations</u>: PBCS airspace restrictions are not applicable to aircraft experiencing a contingency situation.

D. Although the NAT Tracks where reduced lateral separation has been applied are known as “PBCS Tracks,” crews must be aware that the terms “PBCS” and “reduced lateral separation” <u>are not</u> equivalent. PBCS as a general term refers only to an aircraft’s communication and surveillance performance capabilities and does not explicitly refer to reduced separation. Therefore, PBCS and reduced lateral separation can potentially be implemented independently of each other. Crews should consult relevant AIPs for further information on whether one or both have been implemented in any given airspace.

2.2.3 Performance Based Navigation (RNP / RNAV) Considerations

A. Crews must verify that the RNP / RNAV values set in the FMSs match the aircraft equipment capabilities, authorizations, and notations on the ICAO flight plan.

B. <u>Navigation Database</u>

- Crews will confirm availability of the onboard navigation equipment necessary for the route to be flown. The onboard navigation database will be appropriate for the region of intended operation and must include the NAVAIDs, waypoints, and coded terminal airspace procedures for the departure, arrival and alternate airports.
- The Director of Maintenance is responsible for ensuring navigation databases are kept current in accordance with the database provider’s schedule.
- At system initialization, the crew will check the navigation database to ensure that it is current and the crew will verify the aircraft’s present position is entered correctly.
- In the event the database cannot be made current prior to flight, or if the AIRAC cycle changes during flight, the crew will compare the database with current and applicable aeronautical charts to verify navigation information. If changes have been published, the aircraft database should not be used to conduct flight operations. Printed charts will be used and an entry will be made on the Aircraft Discrepancy Log to notify the Director of Maintenance that further action is required.
- If there is a discrepancy that would invalidate a procedure (i.e., an error in the navigation database), the database should not be used and printed charts will be used instead. The PIC will ensure that a thorough description of the issue is provided to the database supplier.

C. For multi-sensor systems, the crew will verify that the correct sensor is being used for position computation for the intended RNAV / RNP operations.

D. For areas where RNP standards have not been formally established, the LRNS must navigate the aircraft so that the cross track and/or along track errors will not exceed 25 NM anywhere along the flight plan route specified in the ATC clearance.

E. When DLC is used to uplink flight plan changes for routing that is not contained in the navigation database, the crew will confirm the RNP in effect matches the airspace requirement. If not, the crew will manually enter the RNP applicable to the route.

F. Reporting Requirements

- Flight crews are required to report significant incidents associated with PBN operations affecting the operation of the aircraft or that have affected the safety of the aircraft.
- This report must be submitted or transmitted at the first convenient opportunity to the Navigation Database Provider by the most expeditious means.
- Copies of the report are to be forwarded to the avionics manufacturer.

2.2.3.1 Terminal PBN (RNP-1 / RNAV-1 / P-RNAV / SIDs / STARs)

A. RNAV DPs and STARs

1. RNAV DPs and STAR procedures must be retrieved by procedure name from the onboard navigation database and conform to the charted procedure.
2. RNAV DP Engagement Altitudes: For DPs, the pilot must be able to engage RNAV equipment to follow flight guidance for lateral RNAV no later than 500 feet above airport elevation.
3. Pilots must use a lateral deviation indicator (or equivalent navigation map display), flight director, and/or autopilot in lateral navigation mode on RNAV-1 routes. The full-scale CDI deflection value of ±1 NM is acceptable.
4. If GNSSU is not being used (e.g., inoperable) and DME/DME/IRU is being used, crews must ensure the aircraft navigation system position is confirmed within 1,000 feet at the start point of the takeoff roll. The use of an automatic or manual runway update is an acceptable means of compliance with this requirement. A navigation map may also be used to confirm aircraft position, if pilot procedures and display resolution allow for compliance with the 1,000-foot tolerance requirement.
5. When using GNSSU, the signal must be acquired before the takeoff roll commences.
6. For aircraft with RNP Selection Capability, pilots shall select RNP-1 or lower when operating on RNP-1 SIDs and STARs.

B. Preflight Procedures

1. During preflight planning, flight crews will confirm the availability of the navigation infrastructure for the period of intended operation including any non-RNAV contingencies.
2. For systems with RAIM-based integrity, RAIM prediction must be performed prior to departure. This capability can be a ground service and need not be resident in the aircraft's avionics equipment.
3. If RNP-1 approval based on DME/DME, the availability of critical DME for ODPs, SIDs, and STARs must be confirmed.

   Note: Procedures with (GPS) in the title and with a GNSSU required are not evaluated for critical DMEs.
4. If the aircraft will be dispatched in accordance with the MEL with inoperable GNSSU equipment, the aircraft must be capable of navigation system updating using DME/DME/IRU for RNAV-2 or RNAV-1 routes, as well as RNAV-1 DPs and STARs.

5. The flight crew shall check the active flight plan by comparing the charts, Standard Instrument Departure (SID), or other documents with the map display, if applicable, and the Control Display Unit (CDU) / Multi-Function Display (MFD). This includes confirmation of the waypoint sequence, reasonableness of track angles and distances, any altitude or speed constraints, and, where possible, which waypoints are fly-by and which are fly-over.

   Note: At a minimum, the departure checks could be a simple inspection of a suitable map display that achieves the objectives of the above paragraph.

6. The creation of new waypoints by manual entry into the aircraft system is not permitted and invalidates any affected RNAV procedure (e.g., manual entry or modification by the flight crew of the loaded procedure, using temporary waypoints or fixes not provided in the database, is not permitted).

   Note: Route modifications in the terminal area may take the form of radar headings or “direct to” clearances and the flight crew must react in a timely fashion. This may include the insertion of waypoints into the flight plan loaded from the database.

7. Prior to takeoff, the flight crew will verify that the aircraft RNAV system is operational and that the correct airport and runway data are loaded.

8. The crew will ensure initialization on the runway by means of a manual runway threshold or intersection update, as applicable, unless automatic updating of the actual departure point is provided. Where GNSSU is used, the signal must be acquired before the takeoff roll.

9. During the procedure, flight progress should be monitored for navigational reasonableness by crosschecks with conventional navigation aids using the primary flight displays and the MCDU. Where applicable and when used, the flight crew procedures shall include flight crew monitoring to verify automatic updating of the inertial systems and the ability to ensure the time period without updating does not exceed the permitted limit.

   Note: If the initialization is not achieved, the departure should be flown by conventional navigation means. A transition to the RNAV structure should be made at a point where the aircraft’s RNAV system has had sufficient time to provide a position update.

C. *CLIMB/DESCEND* Phraseology: ICAO introduced the following phraseology for SIDs/STARs in PANS-ATM Amendment 7. It is expected that this phraseology will be adopted progressively worldwide. Crews should consult applicable AIPs and/or informational notices to determine if the phraseology has been implemented at destination airports.

ATC Clearance	Pilot Actions
“CLIMB VIA SID [TO] (altitude)” or *“DESCEND VIA STAR [TO]* (altitude)”	1. Climb/descend to the cleared altitude in accordance with published level restrictions. 2. Follow the lateral profile of the procedure. 3. Comply with published speed restrictions or ATC-issued speed control instructions.

ATC Clearance	Pilot Actions
"*CLIMB VIA SID [TO]* (altitude), *CANCEL SPEED RESTRICTION(S)*" or "*DESCEND VIA STAR [TO]* (altitude), *CANCEL ALTITUDE RESTRICTION(S) AT* (point(s))"	1. The lateral profile of the procedure continues to apply. 2. Speed or level restrictions that have not been referred to will continue to apply.
"*PROCEED DIRECT* (waypoint)" or "*VECTORING*"	Speed and level restrictions associated with the bypassed waypoints are cancelled.
"*PROCEED DIRECT* (waypoint) *ON COURSE*" or "*REJOIN SID/STAR*"	Speed and level restrictions associated with the waypoint where the rejoin occurs, as well as those associated with all subsequent waypoints, must be complied with.

Note: Use of "*CANCEL SPEED RESTRICTION*" applies only to the speed restrictions associated with the SID/STAR. It does not cancel any other speed restrictions.

D. Arrival

1. Prior to arrival, the flight crew should verify that the correct terminal procedure has been loaded, and check the active flight plan by comparing the charts with the map display, if applicable, and the CDU.
2. Flight crews will confirm the waypoint sequence, reasonableness of track angles and distances, any altitude or speed constraints, and, where possible, which waypoints are fly-by and which are fly-over.

   Note: At a minimum, the arrival checks could be a simple inspection of a suitable map display that achieves the objectives of the above paragraph.
3. Manual entry creation of new waypoints into the aircraft's system invalidates the RNAV procedure and is not permitted.
4. The flight crew will make the necessary preparation to revert to a conventional arrival procedure, where required, as a contingency.
5. During the procedure and where feasible, the flight crew should monitor flight progress for navigational reasonableness by crosschecks with conventional navigation aids using the primary displays in conjunction with the CDU.
6. A navigation reasonableness check must be accomplished during the descent phase before reaching the Initial Approach Fix (IAF). If the check fails or a GNSSU integrity alarm / warning is received, a conventional procedure must be flown.
7. Route modifications in the terminal area may take the form of radar headings or "direct to" clearances and the flight crew must be capable of reacting in a timely fashion. This may include the insertion of tactical waypoints loaded from the database. Manual entry or modification by the flight crew of the loaded procedure, using temporary waypoints or fixes not provided in the database, is not permitted.

   Note: All published altitude and speed constraints must be observed even though a particular method is not mandated.
8. For aircraft equipped with TSO-C129a GNSS-Based RNP Systems: If the RNP-1 STAR begins 30 NM from the ARP and a lateral deviation indicator is used, full scale sensitivity should be manually selected to a value of 1 NM or less prior to commencement of the STAR.

9. For aircraft utilizing a lateral deviation display**:** The navigation map scale must be set for the STAR, and the autopilot or flight director will be utilized.

E. Contingency Procedures: The flight crew:

1. Must notify ATC of any loss of RNP / RNAV capability, along with the proposed course of action.

   Note: ATC will also be notified if there is a loss of redundancy of required RNP / RNAV equipment or a multiple systems failure, including failure of the navigation sensors. In addition, ATC will be notified of pending time limits while coasting on inertial sensors. Radar vectors will be requested.

2. Should continue with the RNP / RNAV procedure in accordance with the published lost communication procedure in the event of communications failure.

3. Should navigate using an alternative means of navigation, which may include the use of an inertial system in the event of loss of RNAV capability. The alternative does not need to be RNAV.

2.2.3.2 En Route PBN (RNP-2 / RNAV-2 / RNAV-5 / B-RNAV)

A. Whenever possible, RNAV routes should be extracted from the database in their entirety, rather than loading RNAV route waypoints from the database into the flight plan individually. Selecting and inserting individual, named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted.

B. A continuous indication of the aircraft position relative to track must be displayed in the primary field of view of the PF and the PM.

C. Pilots must use a lateral deviation indicator (or equivalent navigation map display), flight director, and/or autopilot in lateral navigation mode. If the aircraft has a lateral deviation display and RNP-2 will be applied, crews must ensure lateral deviation scaling is suitable.

D. Other NAVAIDs (e.g., VOR, DME, and ADF) should be selected to allow immediate crosschecking or reversion in the event of loss of RNAV capability.

E. If ATC issues a heading assignment taking the aircraft off a procedure, the crew should not modify the route in the RNAV system until a clearance is received to rejoin the procedure or the controller confirms a new route clearance. When the aircraft is not on the published procedure, the specified accuracy requirement does not apply.

F. RNP-2

- RNP-2 is based upon GNSS. RNP-2 will not be used in areas of known GNSS signal interference.
- If the navigation system does not automatically retrieve and set RNP-2 from the onboard navigation database for the entirety of the operation, the crew must manually set RNP-2. This ensures proper system monitoring and alerting is available.
- When conducting RNP-2 operations, pilots must ensure the aircraft maintains centerline, as depicted by lateral deviation indicators and/or flight guidance computers. Crosstrack error or deviation should be limited to 1 NM for RNP-2 operations.

  Note: Deviation from centerline may only occur in the event of emergency conditions or when otherwise authorized by ATC. In the event of emergency, reference the contingency procedures below.
- Use of aircraft default bank limiting functions may cause a reduction in the ability for the aircraft to maintain the desired track, thus reducing the ability to satisfy ATC path expectations, particularly when performing large angle turns. Bank limiting functions should **not** be utilized, whenever possible.
- When transitioning to oceanic or remote airspace, crews must ensure compliance with the procedures described in Section 2.2.3.3.

G. Fixed Radius Transitions (FRTs): FRTs are waypoint transitions between en route legs using a defined radius. The intent is to define waypoint transitions along airways where separation between parallel routes is required and flyby transitions are not compatible with the separation criteria.

Note: The crew must not select any procedure or route that incorporates an FRT unless the aircraft is capable of and authorized for FRT operations.

H. Parallel Offsets: Parallel offsets provide a capability to fly offset from the parent track, as defined by the series of waypoints. Parallel offset capability is required for an A-RNP qualification and mandatory for oceanic and remote RNP-2 and RNP-4 operations. The turn defined for the parent track (flyby or FRT) must be applied in the offset track. Parallel offsets are applicable only for en route segments and are not foreseen to be applied on SIDs, STARs, or approach procedures. The activation of an offset must be clearly displayed to the flight crew with the cross-track deviation indication to the offset track.

- Parallel offsets can be used on route segments in en route and terminal areas, and are intended to replicate all of the centerline route characteristics at the desired offset to the left or right of the centerline route. Parallel offsets are not intended for approach segments, arrivals, or departures.
- The system should be capable of flying tracks offset by up to 20 NM from the parent track. The presence of an offset should be continuously indicated. Tracks offset from the parent track must be continued for all ATS route segments and turns until either removed by the crew or automatically cancelled by:
  1. Amendment of the active flight plan by executing a “Direct-To”;
  2. Commencement of an approach procedure; or
  3. Where a course change exceeds 90 degrees.

     Note: The navigation system can be expected to terminate the offset no later than the fix where the course change occurs. The offset may also be terminated if the route segment ends at a hold fix.
- Lateral Offset Activation: When a lateral offset is activated in the RNAV or RNP system, the aircraft will leave the defined route and typically intercept the offset at an angle of 45 degrees or less. When the offset is cancelled, the aircraft returns to the defined route in a similar manner.
- The cross track offset distance should be manually entered into the RNP system to a resolution of 1 NM or better.
  - The lateral track-keeping requirement of RNP must be maintained referenced to the offset track where parallel offsets are applied.
  - Where FRTs are applied, the offset track must be parallel to the parent track (i.e., a smaller turn radius for offsets to the inside of the turn, and a larger turn radius for offsets to the outside of the turn).

I. Contingency Procedures

- Pilots should notify ATC of conditions (e.g., equipment failures and weather conditions) that may affect the ability of the aircraft to maintain position.
- In this case, flight crews should state their intentions, coordinate a plan of action, and obtain a revised ATC clearance.
- If unable to obtain an ATC clearance prior to deviating from the airspace, the flight crew should follow established contingency procedures and obtain an ATC clearance as soon as possible.

2.2.3.3 Oceanic / Remote PBN (A-RNP / RNP-2 / RNP-4 / RNP-10)

A. Equipment Requirements

- *RNP-10*: At least two (2) independent LRNSs based on GNSS and/or IRS sensor information.

  Exception: Single LRNS RNP-10 is authorized in the WAT, Houston OCA, Gulf of Mexico, Monterrey CTA and Merida CTA within the Mexico FIR, and NAT special routes (i.e., Blue Spruce routes), as defined in ICAO NAT Document 007.
- *RNP-4*: At least two (2) independent Long Range Navigation Systems (LRNSs) and GNSS must be used as either a stand-alone navigation system, as one of the sensors in a multi-sensor system, or as part of an integrated GNSS/inertial system.

  Note: RNP-4 operations are based on GNSS positioning. Positioning data from other types of navigation sensors (e.g., IRS) may be integrated with the GNSS data only if it does not cause position errors exceeding the Total System Error (TSE) budget.
- *RNP-2*: At least two (2) independent Long Range Navigation Systems (LRNSs) based on GNSS. The area of RNP-2 application will determine the applicable RNP continuity requirement (e.g., dual or single LRNSs).
- *A-RNP:* In addition to the requirements for RNP-2, the aircraft must be capable of scalability, Radius to Fix (RF), and parallel offset. Navigation systems must also have foundational RNP capability as a prerequisite to implementing any A-RNP functions.
  - Scalability: The ability of the RNP system to automatically retrieve and set the RNP value for each leg segment of a route or procedures from the onboard navigation database. When a change occurs to a smaller RNP value (e.g., from RNP 10 to RNP 4), the change must be completed by the first fix defining the leg with the smaller RNP value requirement. The timing of this change must also consider any latency in alerting from the RNP system.
  - Radius to Fix (RF): An RF leg is a constant radius circular path around a defined turn center that starts and terminates at a fix. An RF leg may be published as part of a procedure.
  - Parallel Offset: The capability to fly offset from the parent track, as defined by the series of waypoints. Maneuvers (such as turns) defined for the parent track must be applied in the offset track. The activation of an offset must be clearly displayed to the flight crew with the cross-track (XTK) deviation indication to the offset track.

B. When conducting flights into RNP airspace or on an RNP route, crews will verify that the aircraft is approved for the applicable RNP level (RNP-10/4/2).

   Note: RNAV installations with AFM-RNP certification based on GNSSU or systems integrating GNSSU are considered to meet standard RNP levels for all phases of flight.

C. A Fault Detection and Exclusion (FDE) function must be available and flight crews must have the means to predict the availability of GNSS fault detection (e.g., ABAS RAIM), as appropriate to the route to be flown and means of navigation.

   Note: For systems with RAIM-based integrity, RAIM prediction must be performed prior to departure.

D. Crews will confirm that the RNP approval is for a time limit that will allow RNP capability to exist for the total length of the flight. Crews will comply with any operating restriction related to RNP approval.

E. The Aircraft Discrepancy Log and any other applicable maintenance forms will be reviewed to ascertain the condition of equipment required for flight in RNP airspace or on an RNP route.

   Note: Crews will ensure maintenance action has been taken to correct defects to required equipment.

F. During the external inspection of aircraft, particular attention should be paid to the condition of navigation antennae and the condition of the fuselage skin in the vicinity of each of these antennae. This check may be accomplished by a qualified and authorized person other than the PIC (e.g., maintenance personnel).

G. RNP-2 will not be used in areas of known GNSS signal interference.

H. Emergency procedures in RNP airspace are no different than normal oceanic emergency procedures except that crews must be able to recognize if the aircraft is no longer able to navigate to its approved RNP capability and must advise ATC of any non-RNP status.

I. Inflight Operating Drills: Crews must ensure they crosscheck navigation sensors throughout any flights in oceanic RNP airspace to identify navigation errors in sufficient time to prevent deviation from the ATC-cleared route. Refer to Section 2.3.5 for acceptable tolerances during these crosschecks.

J. A-RNP Considerations: Pilots must not fly an RNP procedure unless it is retrievable by name from the onboard navigation database and conforms to applicable charts. An RNP route should not be used if doubt exists as to the validity of the procedure in the navigation database.

- Navigation Database Entry and Procedure Selection: The pilot must confirm the navigation database is current and the correct procedure is selected. This process includes confirmation of the waypoint sequence, reasonableness of track angles and distances, and any other parameters that can be altered by the pilot, such as altitude or speed constraints. A navigation system textual display or navigation map display must be used.
  - For flexible route structures, manual entry of waypoints may be permitted provided the potential for entry error by pilots is mitigated by adequate procedures. The manual entry or creation of new waypoints, by manual entry of latitude and longitude or rho/theta values for fixed, published routes is **not** permitted.

    Note: Whenever possible, RNP routes should be extracted from the database in their entirety, rather than loading RNP route waypoints from the database into the flight plan individually. Selecting and inserting individual, named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted. Expanded coordinates of named fixes extracted from the database will be verified prior to use.
  - The pilot may modify the route through the insertion or deletion of specific waypoints in response to ATC clearances. Pilots must not change any database waypoint type from a flyby to a flyover or vice versa.
  - Flight crewmembers may notice a slight difference between the navigation information portrayed on the chart and their primary navigation display. Differences of 3 degrees or less may result from equipment manufacturer's application of magnetic variation and are acceptable.
  - For aircraft utilizing multiple navigation sensors, crew must verify that the correct sensor is being used for position computation.
- Cross Track Error: Cross track error/deviation shall be calculated and compared to the maximum deviations permissible. Under no circumstance shall the RNP route be utilized when deviations exceed limitations.
- Inflight Considerations
  - Pilots of aircraft with RNP input selection capability should select the smallest RNP value for the route or procedure that ensures the RNP system offers appropriate lateral deviation scaling permitting the pilot to monitor lateral deviation and meet the requirements of the A-RNP operation.

Note**:** If the navigation system does not automatically retrieve and set the RNP value from the onboard navigation database for each leg segment of a route or procedure, flight crewmembers' will confirm that the appropriate RNP value for the route or procedure is manually entered into the RNP system.

- Maintain the published path and maximum airspeeds while performing A-RNP operations with RF legs or FRTs.
- Pilots must use a lateral deviation indicator, Flight Director (FD), or Autopilot (AP) in LNAV mode. Lateral deviation scaling must be appropriate for the RNP value associated with the procedure.

  Note: Lateral and, if installed, vertical deviations on the PFD will be monitored to ensure the aircraft remains within the bounds defined by the procedure. The deviation must be monitored, and action taken to minimize errors during all RNP operations.
- Some aircraft do not display or compute a path during flyby turns. As such, pilots of these aircraft may not be able to adhere to half the lateral navigation accuracy during turns but are still expected to satisfy the standard during intercepts following turns and on straight segments. This does not apply to the execution of either FRT or RF procedures.
- If ATC issues a heading assignment taking the aircraft off a procedure, the pilot should not modify the primary flight plan in the RNP system until a clearance is received to rejoin the route or the controller confirms a new route clearance. The specified accuracy requirement does not apply when the aircraft is not on the published A-RNP procedure.

• Contingency Procedures

- The pilot must notify ATC of any loss of the RNP capability (integrity alerts or loss of navigation), together with the proposed course of action. If unable to comply with the requirements of an RNP procedure, pilots must advise ATC as soon as possible.
- The loss of RNP capability includes any failure or event causing the aircraft to no longer satisfy the RNP requirements of the route.

2.2.3.4 Provisions for Accommodation of Non-RNP-10 Aircraft

A. If the aircraft becomes Non-RNP-10, flight crews will annotate Item 18 of the ICAO flight plan with: "RMK/NONRNP10"

B. Flight crews of Non-RNP-10 aircraft that are flight planned or are operating on WAT "L" and "M" routes shall report the lack of authorization by stating "Negative RNP-10" in the:

- Atlantic portion of the Miami Oceanic CTA;
- New York Oceanic CTA/FIR;
- New York Atlantic High Offshore Airspace;
- San Juan CTA/FIR.

  Note: This will be done on the initial call to ATC, in the readback of a clearance to descend to FL410 and below, and if approval status is requested by the controller.

C. Flight crews of Non-RNP-10 aircraft that operate in the GoMex CTAs shall report the lack of authorization by stating "Negative RNP-10":

- On initial call to ATC in a GoMex CTA;
- In readback of a clearance to climb or to descend from cruise altitude; and
- When approval status is requested by the controller.

D. If the aircraft is not approved for RNP-10 / RNP-4, flight crews shall **not** annotate Item 18 of the ICAO flight plan to indicate RNP-10 or RNP-4 capability if they have not obtained authorization.

E. If the aircraft is not approved for RNP-10, flight crews will be able to fly most WAT routes at any altitude. Some routes may require special routing. Non-RNP-10 aircraft will be cleared to operate on preferred routes and altitudes as traffic permits. 50 NM lateral separation is not applied to Non-RNP-10 aircraft.

Note: Non-RNP-10 aircraft may file any route at any altitude in a GoMex CTA. They will be cleared to operate on their preferred routes and altitudes as traffic permits.

F. If the aircraft is not approved for RNP-10, flight crews will retain the option of climbing to and operating at altitudes above those where traffic is most dense (i.e., at/above FL410). To minimize the chance of conflict with aircraft on adjacent routes, the aircraft should plan on completing their climb to or descent from higher FLs within radar coverage.

G. If the aircraft is not approved for RNP-10, the flight crews can enhance their opportunity to be cleared on their preferred route and altitude if they operate at non-peak hours, approximately 01:00 to 11:00 UTC.

2.2.4 PBCS (RCP / RSP) Considerations

A. The PBCS concept at present primarily affects Data Link Communications and SATVOICE operations. However, crews must be aware that new PBCS standards could potentially be applied to emerging communication / surveillance technologies.

B. The aircraft equipment must be capable of meeting and maintaining any prescribed RCP and RSP specifications for the airspaces in which the aircraft will be flown. The applicable AIPs should be consulted for RCP/RSP specifications, and the AFM can be consulted for more information on the aircraft's RCP/RSP capabilities.

C. The appropriate equipment codes indicating the aircraft's RCP and RSP capabilities must be entered on the ICAO flight plan in Items 10 and/or 18, as applicable. (Reference Section 2.1.5.2 and Appendix A for more information.)

D. The crew should ensure that contracts with any Communication Service Providers (CSPs) that will be used stipulate RCP/RSP allocations, including any monitoring / recording requirements, and that those contractual arrangements include a provision for the CSP to notify ATC if a CSP system failure will impact the crew's PBCS operations.

E. Monitoring and Reporting Programs: The crew will participate in regional PBCS monitoring and reporting programs (e.g., Data Link Monitoring Agencies, www.fans-cra.com, etc.), as applicable. The operating name, contact information, and other coordinating information for the flight will be submitted to those monitoring programs when possible. Problems with PBCS operations will be reported to the applicable monitoring agency as soon as possible.

F. Authorization of the specified RCP and RSP values is required to operate into airspace in which PBCS has been implemented (e.g., RCP 240 and RSP 180 in NAT PBCS airspace).

G. Non-PBCS Operations in the NAT: Operators or aircraft without an appropriate PBCS authorization may be permitted to:

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

  Note: Such clearances will only be permitted on a tactical basis.

2.2.5 LRNS Procedures for Oceanic or Extended Operations

A. All installed and required long range navigation and communication system equipment will be operational, per the MEL, prior to oceanic operations. Refer to Appendix P for additional LRNS and RNP considerations.

Note 1: LRNS programming will be accomplished prior to all oceanic or extended flight operations.

Note 2: For multi-sensor systems (e.g., GNSSU and IRS), crews must verify that the correct sensor is being used for position computation.

Note 3: Crews must ensure the correct RNP value for the aircraft is entered in the FMS, either manually or by default, to enable monitoring and alerting to the most stringent oceanic RNP capability filed in the flight plan.

B. Each crewmember shall ensure that NAV databases are current. If equipped, IRSs will be selected to Align or NAV and the IRS battery lights will be extinguished prior to position initialization.

C. UTC Time Check

1. A UTC time check of all clocks on the flight deck must be accomplished. One clock will be designated as the master and the crew will ensure that all clocks on the flight deck are accurate and synchronized to the master clock within ten (10) seconds.
2. The following are acceptable international time sources: GNSS, WWV, CHU, BBC, HF operational control service providers, and any ATC facility.

   Note: All times are given in UTC and every minute within specified periods.

D. Restrictions and Requirements for GNSSU (If GNSSU is sole means of LRNS)

1. Crews should check the availability of VOR, DME, or ADF for intended route of flight and ensure availability of a suitable alternative means of navigation in the event of GNSS / RNAV system failure.
2. GNSS as Primary Means of LRNS
   a. FDE Availability Prediction Program: When conducting GNSS as primary means of oceanic and remote navigation, crews will utilize an approved FDE prediction program for the installed GNSS equipment that is capable of predicting, prior to departure, the maximum outage duration of the loss of fault exclusion, the loss of fault detection, and the loss of navigation function for flight on a specified route.
   b. Operational Control Restrictions
      1) Any predicted satellite outages that affect the capability of GNSS equipment to provide the navigation function on the specified route of flight requires that the flight be canceled, delayed, or re-routed.
      2) If the fault exclusion capability outage (exclusion of a malfunctioning satellite) exceeds the acceptable duration on the specific route of flight, the flight will be canceled, delayed, or re-routed.
   c. Determination of the Capability to Navigate: Prior to departure, flight crews will use the FDE prediction program to demonstrate that there are no outages in the capability to navigate on the specified route of flight (the FDE prediction program determines whether the GNSS constellation is robust enough to provide a navigation solution for the specified route of flight).
   d. Determination of Availability of Exclusion
      1) Once navigation function is ensured (the equipment can navigate on the specified route of flight), flight crews will use the FDE prediction program to demonstrate that the maximum outage of the capability of the equipment to provide fault exclusion for the specified route of flight does not exceed the acceptable duration (fault exclusion is the ability to exclude a failed satellite from the navigation solution).

2) If the fault exclusion outage exceeds the acceptable duration, the flight must be canceled, delayed, or re-routed.

E. Each crewmember shall ensure that FMSs are operated in accordance with the AFM. Identical flight plans must be present in all FMSs.

F. The aircraft ramp reference waypoint will be inserted and verified. Actual aircraft ramp position via database may be inserted and / or verified. Comparing GNSSU and IRS positions on the Position Sensor page will alert crew to any initial gross insertion errors. The last GNSSU position may be considered the most accurate.

Exception: The last position may not be accurate if the aircraft has been towed with the power off.

G. Waypoint Insertion and Verification

1. One flight plan labeled “MASTER” (Master Document) shall be used on the flight deck.
2. The PM will be responsible for programming, and the PF will be responsible for crosschecking during the preflight procedures.
   a. Prior to loading the LRNSs, each pilot will check the clearances against the Master Document, track messages, plotting charts, and/or electronic plotting software, as applicable.
   b. Entry of waypoint data must be a coordinated operation by both pilots who will work independently, but in the sequence stated herein.
   c. Designated pilot will insert data and the other pilot will read and confirm the data (from the FMS / LRNS) against the Master Document. (It is not sufficient for one pilot to simply observe the other pilot entering the data.)
   d. Consideration should be given to inputting oceanic waypoint designators to minimize the risk of errors. These waypoints are named according to ARINC 424 navigation database specification (Appendix B).

      Note: Special attention should be paid to the display and input of half-degree waypoints, as many FMS pages will not display full waypoint degrees and minutes. A full latitude/longitude (13-character) input should be used when possible.
   e. Both the PF and PM will check expanded coordinates of the waypoints.

H. Flight Plan Check

1. As each oceanic / remote waypoint is confirmed for accuracy, *the latitude and longitude data will be circled on the Master Document* to indicate its correctness.

   Note: When uploading a computerized flight plan via AFIS or disk, flight crews will use the same crew procedures for crosschecking the route and sequential listing of waypoints of the selected AFIS flight plan on the CDU. The crew will ensure that the waypoint naming convention is the same as that entered on the Master Document.
2. When a reroute is necessary, *the old waypoints will be clearly crossed out and new ones entered in their place on the Master Document and/or plotting chart*. The procedures used to copy the ATC clearance, load and check the waypoints, verify the flight plan information, and update the plotting chart / software will be the same procedures as beginning a flight.

   Note: Since reclearances are the leading cause of GNEs, flight crews will carefully check for accuracy of each waypoint.

3. Each crewmember shall check the reasonableness of the flight plan on the navigational computer against the Master Document.
    a. The total distance to destination and fuel remaining displayed on the FMS should be reasonably close to the Master Document, the plotting chart / software, and the track message. *The circled number (lat / long) is ticked to signify that the relevant track and distance information has been double-checked.*
    b. Distance and desired track between waypoints displayed on the FMS should agree with the Master Document, plotting chart / software and track message (±2NM / ±2°).
4. *All pertinent operational information will be recorded on the Master Document*. This includes all clearances and assigned VHF and HF frequency assignments.
5. If CPDLC is used to uplink flight plan changes for a routing that is not contained in the navigation database, the flight crew should confirm the RNP value in effect matches the airspace requirement. If not, the flight crew should manually enter the RNP value applicable to the route.
6. Crews should be careful not to load additional waypoints to the active route (e.g., to depict ETPs), even if they are along the route. These can produce unnecessary non-conformance alerts on ground-based monitoring systems and may cause misunderstandings that could lead to deviations from the ATC-cleared route.

I. Before Leaving the Ramp
1. *Before leaving the ramp, crews will record the fuel on board on the Master Document*.
2. Fuel quantity of aircraft: FMS fuel management data is advisory information. The primary indication of fuel quantity and fuel flow is the aircraft indicating gauges.

J. Runway Position: The FMS normally uses GNSSU updating when on the ground. A position error for each IRS, if fitted, is continuously calculated and stored within the FMS. It is not recommended that the IRSs be updated at the end of the runway under normal circumstances.

K. If the aircraft is capable, ADS-B Out must be enabled during airport surface movement operations and ADS-B Out equipment should be operated in the transmit mode at all times during flight.

Note: Transponders should also be in the altitude reporting mode whenever the aircraft is on an airport movement area.

2.2.6 LRCS Procedures for Oceanic or Extended Operations

A. HF Check: Either maintenance personnel or flight crewmembers will ensure an operational check of all HF radios prior to takeoff. In performing an HF radio check, the flight crew will:
1. Refer to appropriate Jeppesen en route chart for an ARINC frequency.
2. Contact ARINC for a radio check and establish two-way radio communication to ensure that the HF radios can transmit and receive.

    Note: An operational check of the satellite phone (if equipped) should also be performed.
3. Carriage of HF communications equipment is mandatory for flight in the Shanwick OCA.

    Note: Oceanic HF radio station telephone numbers can be found in Appendix S.

B. Flights without operable HF equipment planning to operate outside VHF coverage in the NAT may request that ATC waive the HF requirement if they fall into one of the following categories:
- Air carriers returning to home base for repairs to HF equipment;

- Ferry or delivery flights; or
- Special event flights.

  Note: ATC may grant HF equipage relief if the aircraft has at least two other LRCSs appropriate for the route of flight. State-specific AIPs should be referenced for more detail.

C. Selective Calling (SELCAL) Codes: SELCAL is a means by which a ground station transmitting via HF or VHF can use a variety of audio tones to uniquely identify an individual aircraft.

- Prior to flight, crews should confirm which SELCAL code is assigned to their aircraft (e.g., via ASRI) and verify that this code is included in the flight plan.
- SELCAL systems may make use of either 16 tones only (the original system) or 32 tones (the newer system). Crews should be aware of the difference in these systems and should take note of the capabilities of the HF / VHF equipment installed in the aircraft.
- Due to the mathematical limitations of the number of codes and combinations, the number of available SELCAL identifiers on a SELCAL 16 system is less than the number of aircraft that have SELCAL 16 capability. Accordingly, it is possible for multiple aircraft to be assigned a SELCAL 16 code.
- As of November 2022, SELCAL 32 has been implemented globally and is now supported. The additional tones available permit an exponentially greater number of combinations, and so there should not be a risk of duplicate assignments of a SELCAL 32 code.
- Regardless, as a best practice, all crews should confirm that ATC is using the appropriate call sign for their aircraft when responding to a SELCAL to avoid the possibility of duplicate code assignments.

2.2.6.1 SELCAL Checks

A. Prior to entering any oceanic airspace (e.g., Atlantic or Pacific), crews should complete an HF SELCAL check. This check should be completed regardless of whether or not CPDLC is working properly and/or being used.

B. Crews should establish communications with the appropriate oceanic radio station upon entering the OCA and request that the controller transmit their SELCAL code, such as the following exchange:

Crew (HF)	*"New York Radio, N123A, request SELCAL Check."*
ATC	*"N123A, New York Radio, roger."* [SELCAL tones transmitted]
Crew (HF)	[If successful] *"SELCAL check good, thank you!"*

C. This check must be completed prior to commencing SELCAL watch and is usually conducted using the primary frequency.

D. After the SELCAL check is completed, if a primary and a secondary HF frequency have been assigned, set one HF radio to the primary and the other to the secondary.

E. If the SELCAL unit is working at the time of the initial contact, the aircraft may maintain a SELCAL watch on the appropriate frequency(ies).

F. If the SELCAL unit is inoperative or if the radio station has a malfunctioning SELCAL transmitter, the aircraft shall maintain a continuous air / ground communication watch on the appropriate frequency(ies).

2.3.0 Inflight Procedures

A. Before entering any airspace requiring the use of an LRNS, the aircraft position must be accurately fixed using airways navigation facilities or ATC radar. If the initial part of the flight is conducted along airways, the airways facilities should be monitored using the RMI and compared with the aircraft navigation system to ascertain which system is giving the most accurate performance. A navigation system error is cause to consider aborting the flight.

B. If the aircraft is fitted with IRSs, flight crews will check that the IRS drift rate does not exceed one (1) NM per hour, or a total distance of ten (10) NM. If an IRS exceeds this tolerance, the flight crew will reconsider entering oceanic airspace.

C. All required equipment will be operating normally prior to entering oceanic airspace. Should any of the required equipment fail prior to aircraft entering NAT HLA / RVSM / RNP-10 / RNP-4 / DLC airspace, the pilot should request a new clearance to avoid flight in this airspace.

D. If the FL becomes unsustainable due to degrading performance, it is imperative that ATC be notified immediately in order to coordinate an FL change as soon as possible.

E. Crews will calculate waypoint ETAs by adding zone times to the departure time and comparing destination time to the total elapsed time.

F. *Fuel should be checked (and recorded on the Master Document) at all waypoints noted on the flight plan and/or any required reporting points along the route*. Further information regarding these checks in oceanic / remote airspace is described in Section 2.3.6.

Note: This procedure generally assumes that the period of time between waypoints (and the corresponding fuel checks) will be no longer than 45 minutes. If the length of the flight will be less than 60 minutes, the crew should conduct a fuel and navigation check and record the results at the midpoint of the flight.

2.3.1 General

2.3.1.1 RVSM Phraseology

Circumstance	Phraseology
ATC wishes to know RVSM approval status of an aircraft	"*CONFIRM RVSM APPROVED*"
Pilot indication that aircraft is RVSM approved	"*AFFIRM RVSM*"
Pilot indication that aircraft is not RVSM approved[1]	"*NEGATIVE RVSM*, (Supplementary information, e.g., "*CERTIFICATION FLIGHT*")[1]
Pilot reporting RVSM equipment failure (all primary altimeters, automatic altitude control systems, or altitude alerters) (This phraseology must be used both for initial indication of RVSM system failure and on initial contact on all frequencies in RVSM airspace until the problem ceases or the aircraft has exited RVSM airspace)	"*UNABLE RVSM DUE EQUIPMENT*"
ATC denial of clearance into RVSM Airspace	"*UNABLE ISSUE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN FL*"
Pilot reporting inability to maintain CFL due to weather encounter	"*UNABLE RVSM DUE* (Reason, e.g., *TURBULENCE* or *MOUNTAIN WAVE*)"

Circumstance	Phraseology
ATC requesting confirmation that an aircraft has regained RVSM-approved status or a pilot is ready to resume RVSM operations	*“CONFIRM ABLE TO RESUME RVSM”*
Pilot ready to resume RVSM after equipment / weather contingency	*“READY TO RESUME RVSM”*

Note 1: During operations in or vertical transit through RVSM airspace with aircraft not approved for RVSM operations, pilots shall report non-approved status as follows:

- At initial call on any channel within RVSM airspace;
- In all requests for level changes; and
- In all read-backs of level clearances.

Note 2: Controllers shall explicitly acknowledge receipt of messages from aircraft reporting RVSM non-approved status.

2.3.1.2 North Atlantic Operations

A. The NAT HLA effectively constitutes free route airspace. However, ICAO Doc 7030 details some routing constraints which must be adhered to unless otherwise authorized:

- 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.
- 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. However, where appropriate *all* oceanic ten-degree meridians should be included as waypoints in the flight plan, 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.

  Note: If permitted by a state AIPs, operators that meet any AIP-specified requirements can flight plan their user-preferred trajectories without the need to cross ten degrees of longitude at a whole or half degree of latitude.

B. Where permitted by the appropriate authority, in areas where surveillance (SSR and/or ADS-B) and VHF voice coverage are available, crews 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 route network. If intending to benefit from these routing freedoms, operators should carefully consult the relevant state AIPs.

C. All flights should plan to operate on great circle tracks joining successive significant waypoints.

D. Much of the air traffic in the NAT region is concentrated in either a westbound flow departing Europe in the morning or an eastbound flow departing North America in the evening. Accordingly, the NAT Organized Track System (OTS) is constructed each day to accommodate as many flights as possible within the major flows on or close to their minimum time tracks and altitude profiles. Separate organized track structures are published each day for eastbound and westbound flows.

E. Use of OTS tracks is recommended, but not mandatory. Aircraft may fly on random routes that remain clear of the OTS or may fly on any route that joins or leaves an outer track of the OTS. Routes may also be planned that cross the OTS. However, ATC re-routes or significant changes in flight level from those planned are very likely.

F. The OTS is announced by means of a NAT Track Message via the AFTN according to the timeframes in the table below:

	Publication Time	Normal Hours of OTS Validity
Daytime OTS	22:00 UTC	11:30 UTC to 19:00 UTC at 30°W
Nighttime OTS	14:00 UTC	01:00 UTC to 08:00 UTC at 30°W

Note: Changes to these validity times may be negotiated between the Gander and Shanwick OCAs. Flight crews must check the Track Message for full details.

G. Split Westbound Structure: When a strong westerly Jetstream follows the dominant NAT traffic flow, 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.

Note: When 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.

H. Random Flight Planning

1. Flights that are planned to remain entirely clear of the OTS or which join or leave an OTS Track are all referred to as random flights and flight plans must adhere to the following guidance:
   - Full route details must be specified in the flight plan and a NAT track letter must not be used to abbreviate any portion of the route;
   - The planned Mach number and flight level should be specified at either the last domestic reporting point prior to oceanic airspace or the OTS point;
   - Each point at which a change of Mach or flight level is planned must be specified by lat / long coordinates or as a named waypoint and followed by the next significant point; and
   - The accumulated estimated elapsed time to each oceanic FIR boundary must be specified in Item 18 with the EET/ indicator.
2. Flights against Peak Traffic Flow: Eastbound traffic crossing 30°W at 10:30 UTC or later and Westbound traffic crossing 30°W at 00:00 UTC or later should avoid the OTS.
3. Random Route Segments in a Predominantly East - West Direction
   - For flights operating at or south of 70°N, the planned tracks will 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 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 should not exceed one (1) hour 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:
     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.

- For flights operating north of 80°N, the planned tracks shall normally be defined by points of intersection of parallels of latitude expressed in degrees and minutes with meridians expressed in whole degrees. The distance between significant points shall equate to no less than 30 minutes and no more than 60 minutes of flying time.

  Note: The flight planning requirements described above are not applicable in the Bodo, Shanwick, or Santa Maria OCAs.

4. Random Routes in a Predominantly North - South Direction

- Flights operating between North America and Europe 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 equate to no less than 30 minutes and no more than 60 minutes of flying time.

  Note: The flight planning requirements described above are not applicable in the Bodo, Shanwick, or Santa Maria OCAs.

I. Track Messages: Crews of all NAT flights at or above FL290, even those that will fly above the NAT HLA or who do not plan to use the OTS, must carry both the Track Message and any relevant amendments. If more than one version has been issued, then crews must carry the entire revised version along with an appropriate explanation of differences between versions. Each successive version will be identified by the TMI and a suffix (e.g., 243A, 243B, etc.).

2.3.1.3 Pacific Operations

Refer to Section 4, *Pacific Region*, of this manual for detailed information on operations over the Pacific Ocean.

2.3.2 Clearances

A. All clearances will be fully understood and followed.

B. The use of the terms "*EXPECT*" or "*WHEN CAN YOU ACCEPT*" by ATC is NOT a clearance. Typical phraseology is "*ATC CLEARS*."

C. Two (2) qualified crewmembers will utilize headsets and monitor all clearances.

2.3.2.1a Oceanic Clearance to Enter Oceanic Airspace (Temporary)

A. The OCAs in the NAT region have implemented a piecemeal schedule regarding the use / removal of an Oceanic Clearance procedure. Accordingly, the procedures in this section should be followed in the OCAs below until the dates specified. Thereafter – or in an OCA not specified in the list below – crews should follow the procedures described in Section 2.3.2.1b.

- Bodo OCA: June 10, 2024;
- Shanwick OCA: December 4, 2024;
- Gander OCA: December 4, 2024; and
- New York OCA East: No date specified; however, procedures in Section 2.3.2.1b should generally be followed.

Note: US AIP ENR 7.6 describes a process by which crews departing the US and entering New York East OCA obtain the components of an Oceanic Clearance without receiving a formal "Oceanic Clearance." Crews can expect their route to be cleared during departure and should receive an altitude and speed assignment prior to oceanic entry.

B. Until the dates specified above, flight crews entering the NAT in these OCAs must ensure they obtain an Oceanic Clearance prior to oceanic entry, enter the ocean at the cleared FL, and establish a post entry point altitude check.

Note: Crews must be proactive to ensure that they are maintaining their cleared oceanic FL and Mach number prior to the OEP.

C. There are three (3) elements to an Oceanic Clearance: Route, Speed (Mach) and Altitude (Flight Level). These elements serve to provide for the three basic elements of separation: lateral, longitudinal and vertical.

- The three elements of an Oceanic Clearance may not 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.
- If the pilot has not received all three clearance elements, then a full Oceanic Clearance should be obtained prior to entering the NAT HLA. 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 as needed.

  Exception: Westbound flights entering Shanwick OCA require the Oceanic Clearance prior to entry.

D. Specific information on how to obtain the Oceanic Clearance from each NAT OAC is published in state AIPs. Various methods of obtaining Oceanic Clearances include:

1. Use of published VHF clearance delivery frequencies;
2. By HF communications to the OAC through the appropriate aeradio station (if possible at least 40 minutes before the boundary / entry estimate);
3. A request via domestic or other ATC agencies; or
4. By a data link, when arrangements have been made by operators to request and receive clearances using onboard equipment (e.g., ACARS). Detailed procedures for these operations may vary.
   - Gander, Shanwick, Santa Maria and Reykjavik OACs provide a data link facility and the relevant operational procedures can be found in Appendix D.
   - New York East OCA uses the CPDLC function to uplink oceanic clearances to all aircraft utilizing CPDLC.

E. Format of Oceanic Clearance Messages Delivered Via Voice

- Oceanic clearances delivered via voice in the NAT Region will normally have the following format: "*OCEANIC CLEARANCE* [with a <list of ATC info>]. <atc unit> *CLEARS* <Aircraft ID> *TO* <clearance limit>, *VIA* <route>, *FROM* <entry point> *MAINTAIN* <level> [<speed>] [<free text>]"

  Note: Fields in [brackets] 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 element, "<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 element, "<list of ATC info>" will normally be separated with the word "*AND*."

F. <u>Delivery Method for Oceanic Clearance Messages Delivered Via Voice</u>

- In the first contact the Controller will alert the Pilot to the intention to deliver an oceanic clearance, so that the Pilot can be prepared to accept and copy the detail.
- When the clearance to be delivered (CPL) differs in any way from the filed/requested flight plan (RCL), the Controller 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 will provide the details of the clearance in the format described above.
- Example exchange:
  1. Controller: "*DLH458- OCEANIC CLEARANCE WITH A LEVEL CHANGE AND SPEED CHANGE*."
  2. Pilot: "*DLH458*."
  3. Controller: "*REYKJAVIK OAC CLEARS DLH458 TO CYVR, VIA GUNPA 65/10 69/20 71/30 72/40 73/60 MEDPA, FROM GUNPA MAINTAIN F340 M083*."

G. <u>Revisions to Oceanic Clearances</u>

- When delivering any subsequent revisions or amendments to previous delivered clearances which include changes to the level, route, and/or speed, ATC will use the following format and will provide a "heads-up" to the pilot upon first contact as to which elements are being revised: "*AMENDED* <change> *CLEARANCE*. <ATC unit> *CLEARS* <Aircraft ID>, <clearance>"

  <u>Note</u>: The element "<change>" can be one or more of the following: *LEVEL, ROUTE, SPEED*. Multiple <change> elements will normally be separated with the word "*AND*."
- Example exchange:
  1. Controller: "*DLH458- AMENDED LEVEL AND SPEED CLEARANCE*."
  2. Pilot: "*DLH458*."
  3. Controller: "*REYKJAVIK OAC CLEARS DLH458, CLIMB TO F350, MAINTAIN M082, REPORT LEAVING, REPORT REACHING*."

H. Oceanic Clearance Delivery Procedures

1. Crews will request oceanic clearances as early as possible from the responsible ATC unit. Content and data sequence of request is as follows:
   - Callsign;
   - OCA entry point and ETA;
   - Requested Mach number and FL;
   - Any change to flight plan affecting OCA;
   - The highest acceptable FL that can be maintained at the OCA entry point.
2. Pilots are encouraged on initial contact with ATC at each OCA boundary to indicate, at the end of the position report, the highest level they can accept, and the time or position at which such FL would be acceptable.
   a. Should the original FL in the oceanic clearance differ from the current FL, a domestic reclearance must be obtained to ensure that the flight is in compliance with the oceanic clearance prior to entering Oceanic Airspace.
   b. Except for Shanwick OCA, flights may enter other NAT OCAs while pilots are awaiting receipt of a delayed oceanic clearance. Pilots should always endeavor to obtain oceanic clearance prior to entering other NAT OCAs; however, if any difficulty is encountered, the pilot **should not hold** while awaiting clearance unless so directed by ATC.

   Note: Any estimate found to be in error in excess of two (2) minutes for the Oceanic Boundary originally given at the time of initial contact with ATC / OCA must be passed on to ATC when using voice.
3. Methods include:
   a. Use of VHF clearance delivery frequencies when in coverage.
   b. Use of HF to the OAC (Oceanic Area Control) through the appropriate radio station, if possible, at least 40 minutes before boundary / entry estimates.
   c. Request via domestic or other ATC agencies.
   d. Prior departures from airports close to oceanic boundaries.
4. Aircraft en route to the Oceanic Airspace encountering a critical inflight equipment failure must advise ATC upon initial contact when requesting oceanic clearance.

I. Gander OCA may issue an oceanic clearance for random routings which specify "*VIA FLIGHT PLAN ROUTE*." Pilots are required to read back **the full track coordinates** of the flight plan route, from the oceanic entry point to the exit point.

Note: The pilot shall, if in doubt, request a detailed description of the route from ATS.

2.3.2.1b Clearances After Entering Oceanic Airspace (Long-Term)

A. Prior to March 21, 2024, crews were required to obtain an Oceanic Clearance prior to oceanic entry in the NAT in the Reykjavik and Santa Maria OCAs. That requirement is no longer in effect. Instead, pilots should proceed according to their flight plan or, if alternate instructions have been issued by ATC, in accordance with ATC's instructions.

B. If a flight is expected to be level critical, the initial OCA should be contacted prior to filing the flight plan to determine the availability of specific Flight Levels.

C. Assigned Mach / Speed Considerations:
   - The planned Mach number must be included in the ICAO flight plan for aircraft capable of maintaining an assigned Mach.
   - Fly cost index (ECON). ATC will assign a fixed Mach number if required due to traffic and will rarely assign a fixed Mach number more than 0.01 faster or 0.02 slower than filed in the flight plan.

- ATC uses speed information, along with position information to calculate estimated times along the cleared route. These times are used as the basis for aircraft separation and coordination between ATC units. Accordingly, an assigned Mach number must be maintained.
- If an immediate temporary change in an assigned Mach number is essential (due to turbulence for example), ATC must be informed.

D. The removal of the Oceanic Clearance requirement does not remove the requirement to monitor and comply with en route ATC instructions or clearances (e.g., reroutes).

E. Although an Oceanic Clearance will not be required after March 2024, crews are still required to submit an RCL message to ATC prior to the Oceanic Entry Point (OEP) to confirm their ETA and intended altitude and speed. The RCL message can be sent either by voice or ACARS in accordance with the procedures in Appendix D.

F. Crews should maintain a continuous air / ground communication watch (listening watch).

1. If a successful SELCAL check has been completed with the appropriate aeradio station, a SELCAL watch should be maintained.
2. Unless advised otherwise, use the following frequencies:

VHF	
123.95 Mhz	Aircraft registered in states West of 030º West
127.65 Mhz	Aircraft registered in states East of 030º West

HF	
Family A	Aircraft transiting Gander, New York, Santa Maria, and Shanwick, especially those with reporting coordinates between 43N and 47N
Family B, C	Aircraft on eastbound or westbound tracks within Gander, Reykjavik, and Shanwick, especially those with reporting coordinates between 47N and 64N. (Primary assignment for aircraft flying central routes.)
Family D	Aircraft transiting Bodo, Gander, Reykjavik, and Shanwick, especially those with reporting coordinates north of 62N.
Family E	Aircraft transiting New York and Santa Maria, especially those with reporting coordinates south of 43N.
Family F	Aircraft flying routes entirely within Gander and Shanwick.
Family H	Aircraft flying routes entirely within Santa Maria.

3. If so instructed, *use any frequencies assigned by ATC and record them on the Master Document*.
4. *All clearances will be recorded by the PM on the Master Document*. Should a difference exist between the clearance and the route originally requested and / or the oceanic FL differs from the current FL, the PM will obtain the necessary reclearance to ensure compliance with the clearance. *The difference and resolution will be noted on the Master Document*.
5. *The PM shall place a diagonal line through the distance check mark on the Master Document after the readback is verified. Any revised waypoints will be clearly crossed out and the new waypoint entered on the Master Document*. The plotting chart / software will be corrected for the revised clearance.

   Note: In the event of a reclearance that involves a direct routing, information relevant to the original route should be retained in case the aircraft is required to return to its original route.

6. After obtaining and reading back the clearance in detail using strict ICAO phraseology (except where approved local procedures make this unnecessary), the pilot should then monitor forward estimates. If ETA for any programmed waypoints changes in excess of two (2) minutes and the crew is reporting via voice (HF), then the pilot will pass a revised estimate to ATC using the content and sequence as follows:
   - "*REVISED ESTIMATE*"
   - Flight Identification (state frequency when using HF);
   - Next position on route;
   - Revised estimate for next position (hours and minutes);
   - Further information.

G. Revised Clearances / Clearances Different from Flight Plan

- Crews must always adhere to the clearances provided by ATC – not the flight plan.
- If any element of a clearance differs from that which is flight planned, requested, or previously cleared (whether by voice or by CPDLC), attention should be given to such changes. The programmed route in the FMS should be updated and any necessary notations or changes should be made to the Master Document and plotting chart (or equivalent plotting software).

  Note: **A significant proportion of navigation errors investigated in the NAT involve an aircraft that has followed its flight plan rather than its differing clearance**.
- Pilots should note that an FL request on a filed flight plan does not constitute authority to change FL en route without specific clearance, even though the ATC clearance originally issued may specify *"CLEARED AS FILED"* OR *"CLEARED VIA FLIGHT PLAN ROUTE."* These terms refer to routing requested, and not to altitude requests in the flight plan.
- For route amendments that change the oceanic exit point, crews must obtain domestic routing from ATC. ATC normally expects flights to rejoin the originally filed ATC flight plan route at the significant point which immediately follows the original oceanic exit point.
- Revised clearances or reroutes may include half-degree waypoints. Crews must pay special attention to half-degree waypoints to avoid FMS insertion errors. Refer to Appendix B for more detail.

  Note: If needed, crews can respond "UNABLE" to such reroutes and should coordinate accordingly with ATC.

H. With the implementation of OWAFS (Section 2.3.10.5), crews can expect ATC to issue the clearance "*RESUME NORMAL SPEED*" when traffic permits. This clearance allows the crew to select a cost index (ECON) speed instead of a fixed Mach with the condition that ATC must be advised if the speed changes by plus or minus Mach .02 or more from the last assigned Mach number.

2.3.2.2 Abbreviated Clearances

A. Abbreviated route clearances may be issued by ATC prior to the oceanic entry point when re-clearing an aircraft to fly along the whole length of a NAT Track. In any other circumstances, full details of the cleared track shall be specified in the clearance message.

B. The crew should confirm the current NAT Track Message by using the Track Message Indicator (TMI) number (including any appropriate alpha suffix) in the read back. There is no requirement for the flight crew to read back the NAT Track coordinates.

Note: If any doubt exists as to the TMI or the NAT Track coordinates, the crew should request the complete track coordinates.

C. If the crew cannot correctly state the TMI, confirmation will include NAT track coordinates in full and a full read back of those coordinates will be required.

2.3.2.3 Conditional Clearances / Restrictions

A. A conditional clearance is an ATC clearance given to an aircraft with certain conditions or restrictions such as changing an FL based on a UTC time or a specific geographic position. The following is an example of a conditional clearance given to a crew:

“*MAINTAIN FL330. AFTER PASSING 20W CLIMB TO FL350. CROSS 25W LEVEL. REPORT REACHING*.”

Note: In this example, FL330 is the present FL. The “conditional” parts of this clearance are that after 20W, the aircraft starts the climb and should reach FL350 prior to 25W.

B. In oceanic, non-surveillance airspace, crews must advise ATC when vacating any previously assigned altitude or FL and when reaching the newly assigned altitude or FL.

Note: This applies for ADS-C / CPDLC aircraft only when ATC specifically requests it.

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

D. The phrases “*EXPECT FL###*” or “*ARE YOU ABLE FL###*” are not clearances.

E. Crews must know when a climb or descent should be initiated or completed. Conditional clearances usually use the terms “BY” or “AT.” This applies whether the clearance is given via voice or DLC.

- “*BY*” means:
  1. “Before passing” when referring to a position; or
  2. “Not later than” when referring to a time.
- “*AT*” means:
  1. “After passing” when referring to a position; or
  2. “Not before” when referring to a time.

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

Examples	What Is Expected
CPDLC: CLIMB TO REACH FL390 BY 1325. REPORT LEVEL FL390. **VOICE:** CLIMB TO REACH FLIGHT LEVEL 390 AT OR BEFORE 1325. REPORT LEAVING / REACHING.	*Arrange the climb so that the aircraft is at FL390 no later than 13:25 UTC.* If it will not be possible to be level at FL390 at or before 13:25 UTC, then: **CPDLC:** Select “REJECT/ UNABLE” and do not climb. **VOICE:** Advise ATC “UNABLE” with a short explanation and do not commence climb.
CPDLC: DESCEND TO REACH FL320 BY 63N030W. REPORT LEVEL FL320. **VOICE**: DESCEND TO REACH FLIGHT LEVEL 320 BEFORE PASSING 63 NORTH 030 WEST. REPORT LEAVING / REACHING.	*Arrange the descent so that the aircraft is at FL320 before it crosses 63N030W.* If it will not be possible to be level before crossing 63N030W, then: **CPDLC**: Select “REJECT/ UNABLE” and do not descend. **VOICE**: Advise ATC “UNABLE” with a short explanation and do not commence descent.

Examples	What Is Expected
(Aircraft is initially at FL350) **CPDLC**: MAINTAIN FL350. AT 1403 DESCEND TO AND MAINTAIN FL330. REPORT LEVEL FL330 **VOICE**: AT OR AFTER TIME 1403 DESCEND TO AND MAINTAIN FLIGHT LEVEL 330. REPORT LEAVING / REACHING.	*The aircraft shall maintain FL350 until 14:03 UTC. At or after 14:03 UTC, a descent to FL330 is to commence and once reached, FL330 is to be maintained.* If it will not be possible to meet this restriction, then: **CPDLC**: Select "REJECT/ UNABLE" and do not descend. **VOICE**: Advise ATC "UNABLE" with a short explanation and do not commence descent.
(Aircraft is initially at FL350) **CPDLC**: MAINTAIN FL350. AT 58N040W CLIMB TO AND MAINTAIN FL360. REPORT LEVEL FL360 **VOICE**: AFTER PASSING 58 NORTH 040 WEST CLIMB TO AND MAINTAIN FLIGHT LEVEL 360. REPORT LEAVING / REACHING.	*The aircraft shall maintain FL350 until passing 58N040W. After passing 58N040W a climb to FL360 is to commence and once reached, FL360 is to be maintained.* If it will not be possible to meet this restriction, then: **CPDLC**: Select "REJECT/ UNABLE" and do not climb. **VOICE:** Advise ATC "UNABLE" with a short explanation and do not commence climb.

2.3.2.4 Clearances Including Variable Flight Level

A. Clearances that include variable FL may be requested and granted, traffic permitting. Such requests may be made by voice or using CPDLC.

B. Within the NAT, aircraft will either be cleared for a cruise climb or to operate within a block of FLs.

- *Cruise climb* is a cruising technique resulting in a net increase in altitude as the airplane mass decreases. No current aircraft have the capability to automatically conduct a cruise climb, but it can be approximated by climbing in small incremental steps (e.g., 100 or 200 feet at a time).

  Note: A cruise climbing aircraft may only climb or maintain a Level. Aircraft cleared to cruise climb must not descend under any circumstances, as ATC will release airspace below to another aircraft.

- When an aircraft is cleared into a *block of FLs*, 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.

C. When a pilot desires to operate with a flexible vertical profile, the following should be kept in mind when making the request to ATC:

- If the desire is to gradually climb to a more optimal FL as the aircraft weight decreases, request a cruise climb **and do not descend**.
- If there is a requirement to vary the aircraft altitude due to turbulence, icing, or other factors, request a block of FLs.

2.3.3 Use of Data Link Communications (DLC) in Oceanic Airspace

The following information is provided for general reference only. Prior to conducting DLC (e.g., CPDLC), flight crews should consult the Global Operational dataLink Document (GOLD), applicable manufacturer's AFM supplements, Flight Crew Operating Manuals, ICAO Oceanic Errors Safety Bulletin, and/or the procedures in Appendix C, as applicable.

2.3.3.1 Controller Pilot Data Link Communications (CPDLC)

A. Crews should confirm that HF SELCAL is working even when CPDLC is functioning properly. Crews should complete a SELCAL check prior to oceanic entry and at each OCA boundary.

B. Crews should understand proper responses for CPDLC messages, especially ones being used more frequently in the NAT, such as:

- "*CLEARED TO* [position] *VIA ROUTE CLEARANCE*" or "*CLEARED ROUTE CLEARANCE*." Some installations display the uplinked points only when "*LOAD*" is selected. Once LOAD is selected and the crew confirms it loads properly and is acceptable, they then need to select "*ACCEPT/ WILCO*" and, if applicable, "*EXECUTE / INSERT*" to activate the amended route in the FMS. It is vital to understand the menu hierarchy and how to load CPDLC clearances.
- "*CONFIRM ASSIGNED ROUTE*." Ensure the entire oceanic route is loaded before responding to this message. Use the automated response, not free text.
- Conditional clearances sent via CPDLC (for example, those using the terms "BY" or "AT") require special attention and are subject to the same requirements as equivalent clearances issued by voice. Refer to the procedures for conditional clearances in Section 2.3.2.3.

C. Upon receipt of a CPDLC uplink message, both pilots will independently and silently read and verify the clearance.

D. The uplink message may be more than one (1) page in length and may require "paging" through the display to see it in its entirety. The entire message must be read carefully and in the correct order before taking action. Flight crews may consider printing the message, if possible, but the displayed message on the flight deck display is the controlling document.

Note 1: Corruptions of the CPDLC message are possible when printed. Crews should confirm printouts are consistent with displayed CPDLC messages.

Note 2: Page acknowledgements may be unique to the aircraft's avionics. For example, on some installations, crews cannot select "*ACCEPT/WILCO*" until the last page of a message is reviewed, while in other installations, "*ACCEPT/WILCO*" may be allowed on the first page.

E. Both pilots should resolve any questions that they may have regarding the clearance with each other and, if necessary, with ATC prior to initiating any action. If unable to fully understand the CPDLC clearance, or if the clearance is unexpected (such as a FL change without having requested one), pilots should revert to backup voice communication.

F. Crews should be cautious with CPDLC messages that appear to be old (delayed).

G. Dialogues with ATC that are initiated with CPDLC should be completed using CPDLC and dialogues begun with voice should be completed by voice. Crews should make every effort not to mix the two media.

H. Crews should avoid using the free-text method when standard messages are available and appropriate. Free-text messages are not machine-read, which can complicate processing of information. For example, when receiving the CPDLC uplink "CONFIRM ASSIGNED ROUTE," crews should follow CPDLC menu prompts to send the active route. A free-text reply would defeat automated conformance checking.

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

I. DLC-capable aircraft will receive an automated "CONFIRM ASSIGNED ROUTE" message, along with a SEND prompt, within approximately 5 minutes after entering the Shanwick and Reykjavik OCAs. Crews should respond by reviewing the active flight plan in the FMSs to ensure it is accurate, then selecting SEND to transmit this data to ATC. If unable to utilize the SEND prompt for any reason, crews should respond with the free text message, "*UNABLE TO SEND ROUTE*."

2.3.3.2 Use of CPDLC in the North Atlantic

A. CPDLC and ADS-C services are offered in the Bodo, Gander, New York East, Reykjavik, Santa Maria, Shanwick, and Dakar Oceanic OCAs / FIRs.

Note: CPDLC position reports are not accepted in the Bodo FIR.

B. FMC waypoint reporting is offered within Bodo, Gander, and Shanwick OCAs.

C. Any aircraft not equipped with FANS 1/A (or equivalent) systems may request a continuous climb or descent without intermediate level off through NAT DLC airspace. Such requests will be considered on a tactical basis.

D. Altitude Reservation (ALTRV) requests will be considered on a case-by-case basis, irrespective of the equipage status of the participating aircraft.

E. Some portions of the NAT may support FMS-loadable clearances via CPDLC (i.e., "push-to-load"), including the Gander OCA. Crews who wish to take advantage of this ability must ensure their aircraft are capable of push-to-load and that such capability is included on any CPDLC operational authorizations.

2.3.4 Oceanic Control Area-Specific Procedures

2.3.4.1 Route Structures Adjacent to NAT Airspace

A. *North American Routes (NARs)* consist of a numbered series of predetermined routes to provide interface between NAT oceanic and North American domestic airspace. They extend to / from established coastal fixes to major airports in Canada and the US.

- Specific details of the NARs, including a complete list of designators, routes, and coastal fixes, can be found in the "North American Routes" section of the FAA's "Chart Supplement, Northeast US." A digital copy can be found at the URL below:

  https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/

- There is no requirement to flight plan and operate using the NAR system when the NAT OTS will not be used. However, eastbound aircraft intending to operate on the NAT OTS and operating wholly on or south of a line between the intersections BAREE and TUDEP must flight plan and operate using one of the NARs published in the daily OTS Message (except if participating in the trial described below).

- Westbound aircraft exiting the ocean via oceanic/coastal fixes JEBBY, CARAC, BOBTU, JAROM or VODOR must file via one of the NAR common portions as specified in the Chart Supplement, Northeast US, unless re-entering NY oceanic via M201, M202, or M203:
  - JEBBY CARAC - N14B, N16B, N18D, N20A, N22A
  - BOBTU JAROM - N24A, N26A, N28A, N30A, N32A, N34A, N36F, N38F, N40F
  - VODOR - N42C, N44C, N46F, N48F, N50F, N52F, N54F, N56F

- The Eastbound NAT Track Message includes the NARs for access to each OTS Track. The Westbound NAT Track Message does not include NARs; instead, daily NOTAMs issued by the Moncton FIR should be consulted.

- A trial is ongoing that removes the eastbound flight planning requirement for NARs. As part of the trial, departures from several North American cities are permitted to optimize their routings to the OEP, with additional departure airports to be considered in the future.

Note 1: Departures must still comply with any departure routes, structures, and/or restrictions from the departure airport. Optimized routings can only begin from points within the Boston ARTCC and/or Moncton FIR. Once inside the Boston ARTCC and/or Moncton FIR, random routings to the OEP will be permitted.

Note 2: The daily ZBW NAT Advisory will be the primary method of communicating specific details of this trial.

Note 3: The trial may be discontinued via NOTAM at any time, based on the trial's impact.

- If crews intend to participate in the trial (i.e., not use an NAR), they must include the message "*NO NARS EAST TRIAL*" in the remarks section of the flight plan.
- The optimized routing trial removes the requirement for flights operating within the OTS to file the associated NAR when departing from any airport.

  Note: Associated NARs are referenced under the "JFK Departures" section of the ZBW NAT advisory.
- NAT PBCS: When the NAT OTS design uses the oceanic entry and exit points from CUDDY and north, operators must file the published short leg NARs associated with each published NAT OTS track. When the area from CUDDY and north is not associated with NAT OTS design, operators may file random preferred routes or one of the existing NARs.

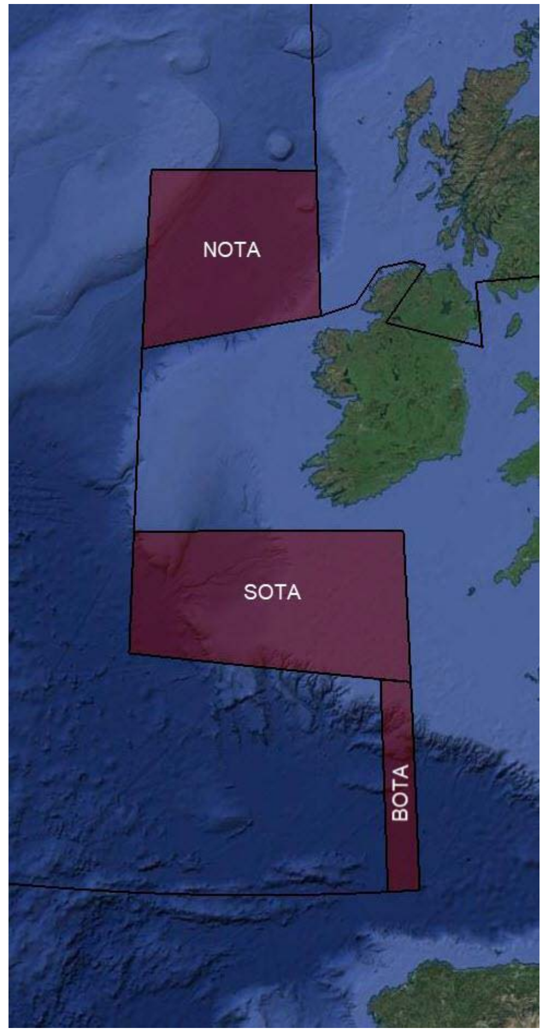
B. Shannon / Northern Oceanic Transition Area (SOTA / NOTA): Parts of the Shanwick OCA are designated as the Shannon Oceanic Transition Area (SOTA) and the Northern Oceanic Transition Area (NOTA). NOTA airspace is included in the NAT HLA and is subject to standard NAT HLA requirements from FL285 to FL420 as described earlier in this manual. The SOTA is not considered NAT HLA airspace, but any flights within SOTA routing toward oceanic entry are required to be NAT HLA approved.

- The SOTA / NOTA boundaries are depicted in the graphic to the right and are defined as follows:

  SOTA: 5100N 01500W- 5100N 00800W – 4830N 00800W – 4900N 01500W – 5100N 01500W (FL055 and up)

  NOTA: 5400N 01500W – 5700N 01500W – 5700N 01000W – 5434N 01000W – 5400N 01500W (FL055 and Up)

- Communications with ATC in the SOTA are via VHF. If VHF is unavailable, use HF.
- If an Eastbound NAT flight is rerouted via an Oceanic Landfall different to that filed in the flight plan, the flight may route DCT from the new Landfall to the original filed exit point from Irish airspace.



Source: ICAO NAT Doc #007

C. Brest Oceanic Transition Area (BOTA): Part of the Shanwick OCA is designated as the Brest Oceanic Transition Area (BOTA). BOTA is not included in the NAT HLA. The lateral / longitudinal boundaries of the BOTA are defined as:

4834N 00845W – 4830N 00800W – 4500N 00800W – 4500N 00845W – 4834N 00845W (FL055 and up)

Note: Flights within BOTA routing toward oceanic entry are required to be authorized for NAT HLA.

2.3.4.2 New York West OCA

A. The New York Oceanic FIR is split into two OCAs: New York West and New York East. Details of the geographical boundaries are published in ICAO Docs 9634 and 8733.

Note: New York West OCA is not considered part of the ICAO North Atlantic Region.

B. The New York West OCA is one of a few oceanic control areas that make up the WAT. More information on the WAT can be found in Section 2.2.1.2.

C. Properly-equipped aircraft will experience reduced separation as follows:

- CPDLC-capable and RNP-10 authorized aircraft will be separated by 50 NM longitudinally.
- CPDLC-capable and RNP-4 authorized aircraft will be separated by 30 NM longitudinally or laterally.

2.3.4.3 New York East OCA

A. Reduced lateral separation standards have been implemented in the New York East OCA for RNP-10 or RNP-4 authorized operators. Crews must ensure the flight plan is appropriately annotated to receive lateral separation benefit.

B. In cases where aircraft have been cleared via the NAT OTS, the Track Message Identification (TMI) number will be confirmed prior to reaching the NAT OTS entry fix.

C. Surveillance Requirements for Reduced Separation: The following surveillance requirements will be expected of CPDLC-capable aircraft:

Separation Minimum	Aircraft RNP Level	Surveillance Requirements
50 NM (longitudinal)	RNP-10	Position report at least every 27 minutes (or every 32 minutes if both aircraft are RNP-4 approved)
30 NM (longitudinal)	RNP-4	Position report every 10 minutes
30 NM (lateral)	RNP-4	ADS-C-based lateral deviation event contract with a 5 NM lateral deviation threshold for deviation reporting

Note: Positions should be reported automatically by the on-board ADS-C software. Flight crews must ensure that the DLC system is operating correctly before operating into the FIR.

2.3.4.4 Gander Oceanic Transition Area (GOTA)

A. The GOTA consists of airspace from 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, from FL290 to FL600 inclusive.

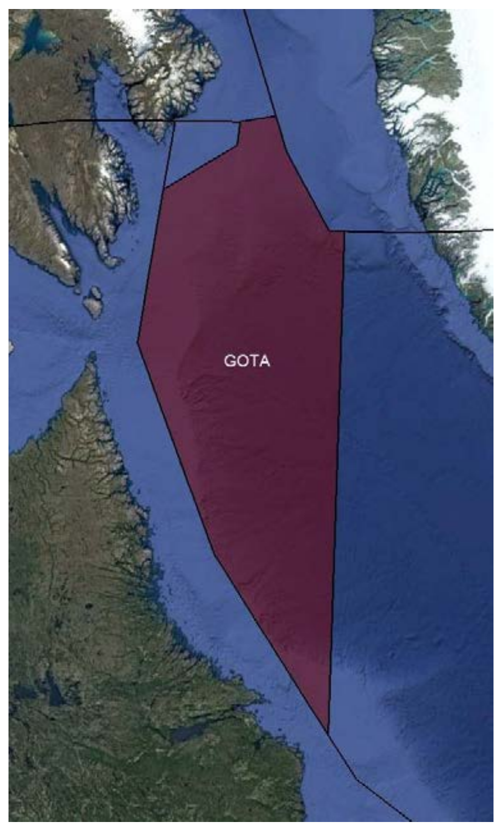
B. In conjunction with formation of GOTA, additional fixes will be incrementally added along the Gander FIR domestic/oceanic boundary. These fixes will be aligned to accommodate half-degree track spacing associated with reduced lateral separation in the NAT.

C. The GOTA will allow for availability of more efficient flight profiles and will facilitate further service improvement initiatives such as reduced lateral separation.

D. ADS-B and DLC services are provided and may be required on certain tracks.

E. Fix names and coordinates can be found in the Transport Canada Aeronautical Information Manual (TC AIM), available on the website below:

https://tc.canada.ca/en/aviation/publications/transport-canada-aeronautical-information-manual-tc-aim-tp-14371



Source: ICAO NAT Doc #007

F. Flight Planning Rules

1. Westbound (Gander OCA to Montréal FIR):

   a. Below FL290

      - Via 060°W followed by both a Montréal boundary reporting point and an inland fix contained in Montréal FIR.
        - Montréal boundary reporting fixes include: NALDI, MUSVA, KAGLY, BERUS, IKMAN, GRIBS, MIBNO, MUSLO, PEPKI, SINGA.
        - Montréal inland fixes include: LAKES, LOPVI, RODBO, JELCO, FEDDY, TEFFO, DUTUM, or BEZED.
      - KENKI and IRBIM **may not** be used as boundary reporting points.

   b. FL290 up to and including FL600

      - Via an oceanic entry point followed by a Montréal inland fix.

2. Eastbound (Montréal FIR to Gander OCA):

   a. Flights operating below FL290 into Gander north of HOIST must route via 050°W followed by a Gander boundary fix (MOATT, PRAWN or PORGY) and an inland fix contained in Gander.

   b. Flights operating from FL290 and above may flight plan a NAR (Section 2.3.4.1, Paragraph A) to or from an oceanic entry point.

G. Aircraft operating within the GOTA may not require a SLOP procedure if in contact with Gander ACC on VHF and within radar coverage.

2.3.4.5 Gander OCA

A. If an aircraft in the Gander OCA is unable to communicate with Gander Oceanic, pilots are to endeavor to pass position reports by relay through:

1. Another Oceanic Center with which communication has been established; or
2. Another aircraft in the NAT when out of range with VHF ground stations (123.45 MHz may be used for air-to-air communications including the relaying of position reports); or
3. Another aircraft on frequency 121.5, if no other means is available.

B. Notification of Higher Levels: Crews transiting the Gander OCA will be notified if a higher FL becomes available during their flight, and flight crews should respond as follows, either by HF or DLC:

ATC Message	*HIGHER FLIGHT LEVEL IS AVAILABLE IF REQUESTED, ADVISE INTENTIONS*
If higher level is desired, crew responds:	*REQUEST CLIMB TO [level]*
If higher level is not desired, crew responds:	*ROGER*

C. NAT PBCS: The Gander Domestic CTA has been realigned to support reduced lateral separation / PBCS tracks within the NAT OTS at oceanic entry and exit points DORYY south to SUPRY.

- Additional NARs have been established to enable NAT PBCS tracks to be anchored at oceanic entry and exit points CUDDY north to KETLA.
- When NAT OTS tracks are over CUDDY or north, westbound NARs will be mandatory and published on the track message. These will be short leg NARs to ensure enough time for controllers to transition flights from a non-radar environment to a radar environment.
- NAT PBCS tracks will not be established north of KETLA or south of SUPRY.

2.3.4.6 Shanwick Oceanic FIR

This section is reserved for future use.

2.3.4.7 Reykjavik OCA

A. When operating in BIRD and BGGL FIRs, crews unable to make position reports via VHF or CPDLC, ADS-C, or FMC are expected to use HF or SATCOM telephone (425105), if equipped.

B. ADS-B surveillance services will be gradually implemented in specified parts of the Reykjavik CTA. When fully implemented, radar-like ADS-B services will be provided using 10 NM separation at or above FL270 and five (5) NM separation below FL270.

   Note: As of March 2020, space-based ADS-B is provided at FL255 and above south of 70 North in the Reykjavik OCA. Further enactment of surveillance services / separation is expected at a later date.

C. Reduced Separation: Reduced separation standards have been implemented in both the domestic and oceanic portions of the Reykjavik CTA below FL285. Aircraft fitted with GNSS equipment and using VHF to communicate with ATC may be separated by as low as 10 NM longitudinally or 7 NM laterally.

   Note: Aircraft fitted with suitable GNSS equipment and using CPDLC for communications with ATC may be separated as low as 15 NM laterally.

D. SLOP is not allowed when the applied lateral separation is less than 23 NM or below FL285 in the Reykjavik CTA.

2.3.4.8 Bodo OCA

This section is reserved for future use.

2.3.4.9 Santa Maria OCA

A. Reduced lateral separation standards have been implemented in the Santa Maria OCA for RNP-10 or RNP-4 authorized operators. Crews must ensure the flight plan is appropriately annotated to receive lateral separation benefit.

B. A “When Able Higher” (WAH) report must be provided by all flights entering the Santa Maria OCA.

   1. WAH reports on entering other OCAs are optional but useful and may be requested by ATC.
   2. The WAH report includes the time or location the flight will be able to accept the next higher FL. More than one level may be quoted if that information is available.
   3. Crews can request one or more future step climbs by using the word “REQUEST” instead of “ABLE.”
   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.
   5. When inclusion in a position report message is not appropriate, the following standard format should be used:
      a. Flight identification;
      b. Requested or acceptable FLs;
      c. At position or time.

      Note: ATC acknowledgement of a WAH report (and any included requests) is NOT a clearance to change altitudes.
   6. Pilots are to report immediately upon reaching any new cruising level following a reclearance or completing a step climb, etc.

2.3.5 Approaching the Ocean

A. Oceanic Communications

1. Upon Entering NAT Oceanic CTAs

- Prior to or upon entering each oceanic CTA in the NAT, the flight crew should contact the appropriate aeronautical radio station. Depending on which data link services are offered, ATC will provide appropriate information and instructions to the flight crew.
- If the flight enters an oceanic CTA followed by another oceanic CTA, the flight crew should, on initial contact:
  a. Not include a position report;
  b. After ATC responds, request a SELCAL check and state the next CTA; and
  c. After ATC assigns primary and secondary frequencies, perform the SELCAL check and designate the position and frequencies to contact the radio station serving the next oceanic CTA. If communication instructions are not issued at this stage, the crew should assume that the frequencies to use prior to or upon entering the next CTA will be delivered at a later time by CPDLC or voice.
- If the flight will exit an oceanic CTA into continental airspace or surveillance airspace, the flight crew should:
  a. Not include a position report; and
  b. After the radio operator responds, request a SELCAL check.
  c. For flights on T9 and T290, monitor VHF channel 128.360 as advised by Shanwick Radio. In the event of navigational non-conformance or emergency, ATC may communicate directly with the flight using the callsign “Shanwick Control.”
- Depending on which data link services are offered, the aeronautical radio operator will provide appropriate information and instructions to the flight crew.
- If a data link connection cannot be established, maintain normal voice communication procedures. In the event of data link connection failure after a successful logon, revert to voice and notify the appropriate radio station. Inform the OCA in accordance with established problem reporting procedures.

  Note: Flights on T9 or T290 should contact Shanwick Radio on HF voice.
- To reduce frequency congestion, flight crews of flights using ADS-C should not additionally submit position reports via voice unless requested by ATC.
- ADS-C flights are exempt from all routine voice meteorological reporting; however, the flight crew should use voice to report unusual meteorological conditions such as severe turbulence to the aeronautical radio station.
- For any inquiries regarding the status of ADS-C connections, the crew should use CPDLC.
- When leaving CPDLC/ADS-C or ADS-C-only airspace, the crew should comply with all communication requirements applicable to the airspace being entered.
- If the crew does not receive its domestic frequency assignment by 10 minutes prior to entry into the next oceanic CTA, the crew should contact the radio station and request the frequency, stating the current CTA exit fix or coordinates.

  Note: Flights on T9 or T290 should contact Shanwick Radio on HF voice.

2. The crew should complete a SELCAL check as described in Section 2.2.6.1.
3. Aircraft operating beyond the communications capability of VHF are required to maintain a continuous air / ground communication watch and communication capability on the assigned HF frequencies.

4. When initiating contact with an HF station (position report, etc.), pilots are to state the HF four digits frequency used after the *callsign* (e.g., “[aircraft ID] *ON 5649”*).
5. If en route HF communications fail, every effort should be made by the flight crew to relay progress reports through other aircraft using the 123.45 MHz. In emergencies, initial contact for such relays can be made on 121.5 MHz and transferred as necessary.
6. Aeronautical Mobile Satellite Route Service (SATCOM Voice) may be used as a supplement to HF communications throughout the NAT Region for non-routine or emergency ATS air/ground communications.

   Note 1: Pilots electing to use SATCOM voice remain responsible for operating SELCAL or maintaining a continuous air / ground communication watch on the assigned HF.

   Note 2: SATCOM Voice calls should be made to aeradio facilities rather than the ATC centers themselves. The applicable telephone numbers and/or short codes may be referenced in state AIPs and/or Appendix S of this manual.
7. Continuous guard of the VHF emergency frequency 121.5 MHz is required on long overwater flights. Guarding of this frequency is particularly critical when operating in proximity of FIR boundaries.
8. General Purpose VHF Communications (GP / VHF): The operation of GP / VHF outlets is remotely controlled from Gander Aeradio Station, and at Qaqatoq, Kulusak and the Faroes, via Iceland Radio. These are especially valuable in the vicinity of Iceland, Faroes and Greenland.
   a. When using GP / VHF frequencies in fringe areas, care should be taken to maintain a SELCAL watch on HF.
   b. Pilots should be reminded that GP / VHF communications are with aeradio stations and not directly with ATC. Direct controller / pilot communications can be arranged, if necessary, on some GP / VHF frequencies.

B. A position / navigation system accuracy check should be accomplished prior to entering oceanic airspace. The aircraft position can be checked for accuracy by overheading a known fix or using VOR / DME information to locate aircraft position, or ATC radar.

   Note: Crews will crosscheck and compare the FMSs, altimeters, compasses, and all navigation sensors to ensure they are providing reliable information. Equipment should fall within the following tolerances:

Equipment	Tolerance
FMS Units	+ / - 1 NM
Inertial Reference Units	+ / - 1 NM
Global Positioning System Units	+ / - 0.5 NM
Altimeters	+ / - 200 ft
HSI / RMIs	+ / - 2°
Standby Compass	+ / - 5°

C. At the Oceanic Boundary, *the PM shall record all altimeter readouts on the Altimeter Accuracy Log* (Appendix G).

D. After departure and before the first oceanic waypoint, *the Estimated Time of Arrival at each waypoint will be recorded on the Master Document*.

2.3.5.1 Use of SATVOICE in Oceanic Airspace

A. <u>FAA-Controlled Oceanic Airspace</u>

- SATVOICE communications services are available in Anchorage, New York, and Oakland OCAs to communicate with New York and San Francisco radio only "when unable to communicate on HF" radio. This includes:
  - Poor HF propagation conditions (i.e., HF blackouts);
  - Inflight HF radio failure; and
  - A one-time return flight through Anchorage, New York, and Oakland OCAs for the purpose of obtaining HF radio maintenance.

    <u>Note</u>: Crews must still comply with applicable MEL provisions.
- When first establishing communications with New York or San Francisco radio via SATVOICE, the crew should request a callback check to ensure ATC can contact the crew during the period of SATVOICE use. If multiple SATVOICE capabilities are included on the flight plan (e.g., both Inmarsat and Iridium), the crew should inform the radio operator of the service to use for communicating with the aircraft.

Sample Transcript of a SATVOICE Callback Check	
SATVOICE call from the air:	"*New York Radio, Airline 123, request SATVOICE Callback Check*." For aircraft equipped with both Inmarsat and Iridium: "*… on Inmarsat/Iridium*" (as applicable)
Answer from the ground:	"*Airline 123, copy, terminating call, will call you right back*"
New SATVOICE call from ground:	"*Airline 123, New York Radio with your SATVOICE Callback, how do you read?*"
SATVOICE answer from the air:	"*Loud and clear, SATVOICE Callback Check good, good day!*"

B. <u>North Atlantic Airspace</u>

- ICAO permits the use of SATVOICE as a supplement to HF and CPDLC communications throughout the NAT region for any routine, non-routine or emergency ATS air/ground communications. State AIPs contain the necessary telephone numbers and/or short-codes for air-initiated call access to radio stations and/or direct to OACCs.
- Since oceanic traffic typically communicates with ATC through radio facilities, routine SATVOICE calls should be made to such a facility rather than the ATC center. Only when the urgency of the communication dictates otherwise should SATVOICE calls be made to the ATC Centre. SATVOICE communication initiated due to HF propagation difficulties does not constitute urgency and should be addressed to the air-ground radio facility.
- The permissibility of SATVOICE described above does not exceed any restrictions on SATVOICE that may be set by the aircraft's state of registry; as always, the most restrictive regulation should be followed in situations where there is conflict.

  <u>Note 1</u>: Prior to using SATVOICE as a secondary LRCS, crews must confirm via all available AIPs and NOTAMs that SATVOICE is permissible in all states / FIRs to be overflown.

  <u>Note 2</u>: The FAA requires that SATVOICE equipment be installed in accordance with AC 20-150B (described below) and allowable per the provisions of the aircraft MEL in order to be acceptable for use as a secondary LRCS.

C. Permissible SATVOICE equipment for use in oceanic operations must meet the following criteria:

- The aircraft must be able to record all crew SATVOICE communications in crash survivable memory (i.e., the SATVOICE must comply with operating rules applicable to a CVR).
- The SATVOICE equipment must interface with existing audio management hardware in such a way as to permit continued crew awareness and normal conduct of crew duties (i.e., the physical use of SATVOICE must be equivalent to that of HF radios).
- The system must adequately support priority handling of calls, including but not limited to: giving crews the ability to set the priority level for individual calls, automatically clearing lower-priority calls to support higher priority calls, and giving crews the ability to clear non-safety calls when necessary (e.g., in cases where only a single channel is available and/or the equipment use is shared with the cabin).

  Note: The use of "camp-on" call queuing is permissible as long as priority is continuously given to emergency and safety of flight calls.
- The system must provide adequate aural and visual annunciations for all aspects of the status of the SATVOICE system, including but not limited to: when satellite connection has been established, the priority of each call, when "camp-on" capability is in use, when the SATVOICE system is inoperative, and when the satellite signal is lost or a call otherwise cannot be completed.

2.3.5.2 Space-Based ADS-B Surveillance in the NAT

A. Prior to entering the NAT from adjacent continental FIRs, most flights are provided ATC service by ANSPs using radar and/or ADS-B combined with direct voice communications. These flights have previously been advised that "*radar service is terminated*" or "*surveillance service is terminated*" upon transfer to the appropriate oceanic control center.

B. As space-based surveillance service becomes more widely available in the NAT, the transition of aircraft (operating ADS-B and SSR equipment) across adjoining areas of radar and/or ADS-B systems coverage will not normally constitute an interruption in identification. Accordingly, ATC may no longer announce "*surveillance/radar service is terminated*" to flights entering the NAT. Crews are advised **not** to rely upon the "*service is terminated*" announcement as a reminder to adopt NAT procedures.

C. The termination of an ATS surveillance service by any individual ANSP no longer implies that the identification of the aircraft to the ATC system is also terminated.

2.3.6 Oceanic and Remote Airspace

Note: The procedures stated below will be followed in all oceanic airspace.

A. Position Reporting

1. The aircraft's present position will be continuously monitored.
2. For flights outside the ATS route network, the position shall be expressed in terms of latitude and longitude:
   a. For flights whose tracks are predominately east or west, latitude shall be expressed in degrees and minutes; longitude in degrees only.
   b. For flights whose tracks are predominantly north or south, latitude shall be expressed in degrees only; longitude in degrees and minutes.
3. "Next position" shall normally be expressed as the significant point at which the aircraft is next required to report its position.
4. Aircraft cleared for cruise climb shall report their level to the nearest 100 ft.
5. All times shall be expressed in four digits, giving both the hour and minutes, when making a position report.

6. Position reports made by aircraft operating within an Oceanic Control Area (OCA) at a distance of 60 NM or less from the common boundary with an adjacent OCA shall also be made to the area control center serving the adjacent control area. This includes aircraft operating on track through successive points on the common boundary.
7. All waypoints will be communicated as individual digits: e.g., 55N = "five five north."
8. If the estimated time for the "next position" reported to ATC is found to be in error in excess of two (2) minutes and the crew is reporting via voice (HF), then a revised estimate shall be transmitted to ATC as soon as possible.
9. Per ICAO Annex 2: If the average True airspeed at cruising level between reporting points varies or is expected to vary by ± 5 percent of the True airspeed from that given in the flight plan, the appropriate ATS unit shall be so informed.

   Note: The flight crew must not deviate from the Mach number assigned by ATC.
10. Position Report
    - "*POSITION* [aircraft ID] *ON 6643 OVER*"
    - "[aircraft ID] *POSITION FOUR NINE NORTH ZERO FOUR ZERO WEST ONE FIVE ONE EIGHT; FLIGHT LEVEL THREE SIX ZERO; ESTIMATING FIVE ZERO NORTH ZERO FIVE ZERO WEST ONE SIX TWO SIX; KOBEV NEXT*"

B. Prior to reaching the waypoint:

1. The present position coordinates of each navigation system will be checked against the cleared route on the Master Document.
2. The next two waypoints in each navigation system will be checked against the Master Document.
3. The next leg's planned magnetic heading and distance will be determined.

C. At the waypoint the flight crew will:

1. Set the heading bug to the next leg's planned heading as a reference. Flight crews shall observe the aircraft turns to this approximate heading.
2. Check that the LRNS auto-sequences to the next position.
3. Check the distance, time, heading, and fuel remaining to the next waypoint against the Master Document.
4. Check the next two (2) waypoints in each navigation system against the Master Document.
5. When passing waypoints or at intervals not exceeding 60 minutes (whichever occurs earlier), a crosscheck of primary and standby altimeters should be conducted. If at any time the readings of the two primary altimeters differ by more than 200 ft, the aircraft altimetry system should be considered defective and ATC must be informed as soon as possible.
6. *Record time and fuel remaining on the Master Document*. Check time and fuel against the flight plan to determine ahead (+) or behind (–). Include FMS / LRNS and wind model information in determining ETA to next waypoint.

   Note: If the estimated time for the next position last reported to ATC is found to be in error in excess of two (2) minutes and the crew is reporting via voice (HF), then a revised estimate shall be transmitted to the ATS unit concerned as soon as possible.

D. Pilots must ensure crosstrack error / deviation does not exceed the following limits when conducting RNP-10 or RNP-4 operations:

- RNP-10 Operations: ± 5 NM from centerline.
- RNP-4 Operations: ± 2 NM from centerline.

Note: Brief deviations from these limits are acceptable during or immediately after route turns (i.e., undershoots or overshoots), up to a maximum of one times the navigation accuracy required by the route (i.e., ± 4 NM for RNP-4 operations, or ± 10 NM for RNP-10 operations).

E. When operating an aircraft with a lateral deviation indicator, scaling will be adjusted appropriate to the navigation accuracy requirements of the associated route (i.e., ± 4 NM for RNP-4 operations, or ± 10 NM for RNP-10 operations).

F. Flight crews are reminded of the importance that the establishment and subsequent monitoring of longitudinal separations is totally reliant upon the flight crew providing accurate waypoint passing times in position reports.

Note: A one-minute error in a reported time equates to an 8 NM error in the aircraft's along track position expected by ATC.

G. All routine position reports will be transmitted in standard ICAO phraseology. The "Standard Air-Ground Message Types and Formats" as stated on the *Jeppesen Airway Manual: Atlantic Orientation Chart* may be used for guidance.

Note: Position reports for aircraft operating on tracks through successive points on each boundary should also be made to the Area Control Center (ACC) serving the adjacent OCA (e.g., "*Shanwick copy Santa Maria*").

H. *The PM will record the time of the report and will place a diagonal line through the waypoint on the Master Document* to indicate that these duties have been completed.

I. Approximately ten (10) minutes after waypoint passage, the latitude and longitude will be crosschecked using one of the following methods, as available / appropriate:

1. The Paper Method: Plot the aircraft position as shown on the non-steering LRNS, then use the steering FMS to verify that next waypoint is consistent with currently effective route clearance. *Position sensors information will be recorded on the LRNS Performance Log* (Appendix G).

2. The Electronic Method: Check the FMS-generated cross-track deviation from the programmed route of the flight and use the steering LRNS to verify that the "TO" waypoint is consistent with currently effective route clearance.

Note: Regardless of which method is used, *a final diagonal line (creating an "X") will be placed through the waypoint on the Master Document* to confirm that the ten-minute check has been completed and that the aircraft position is correct, unless this check will be documented via an equivalent software alternative (Appendix B).

J. On random routes the present position will be noted at the midpoint between waypoints and *the temperature and winds will be recorded*. Although not mandatory, these data may be included with the next position report.

K. The crew will be prepared for possible ATC follow-up to the position report (SELCAL watch). SELCAL will be checked on initial callup when entering a new FIR.

L. En Route Climb Procedures: To facilitate en route climbs, pilots are encouraged to indicate:

1. At each OCA boundary on initial contact with ATC, the highest level they can accept and time and position at which this can be achieved.

2. At other than standard 10 degrees longitude position reports:

   a. When on the OTS, the aircraft identification, track designation, and FL desired.

   b. When on a random route, the aircraft identification, ETA to next position in latitude and longitude, and FL desired.

2.3.6.1 Transponder Operations in the North Atlantic

A. The last assigned code will be retained for no more than 10 minutes after entering NAT airspace (regardless of the direction of flight), and by then transponders must be set to Mode A, Code 2000.

Exception 1: All eastbound flights routing Reykjavik – Shanwick – Scottish (BIRD-EGGX-EGPX) should set transponders to Mode A, Code 2000 upon transferring from Reykjavik (BIRD) and no more than 10 minutes after entering EGGX airspace.

Exception 2: Reykjavik provides a radar control service in the southeastern part of its control area; transponder codes issued by Reykjavik ACC must be retained throughout the Reykjavik OCA until advised by ATC.

B. Pilots operating in the WAT should leave their transponders on the code last assigned by ATC. They should not change to a non-discrete code 30 minutes after radar service is terminated.

C. Aircraft operating within the NOTA/SOTA have to select Mode A/C. Codes will be allocated by Shannon Air Traffic Control Center (ATCC).

D. All aircraft transitioning from Miami Center and San Juan CERAP into the WAT area via fixed ATS routes shall remain on their last assigned beacon code.

2.3.6.2 Weather Reporting

A. Aircraft in the NAT are no longer required to provide voice reports of MET observations of wind speed and direction nor outside air temperature. Nevertheless, any turbulence or other significant meteorological conditions encountered should be reported to ATC. The format to be used for reporting of the additional observations shall be by reference to the geographical coordinates.

B. Significant meteorological data should be recorded on the Master Document at each designated reporting point as evidence, in case it may be needed during any investigation.

2.3.7 Avoiding Oceanic Errors

A. Dual checking of clearances must be an SOP. Avoid physiological breaks or distractions when copying and reprogramming route amendments. Route amendments must be communicated clearly in changeover briefings.

B. All HF oceanic communications such as position reports or flight crew requests go through a radio operator. The radio operator is not an ATC controller. Radio operators must relay all reports and requests to ATC for approval and processing. Relays of ATC instructions between aircraft *must* be accurate. Ensure a correct readback is received from every communication link in the relay.

C. Always read the route loaded in the FMS first and then compare it to the Master Document. This mitigates against expectation bias, where a pilot sees what they expect to see.

D. Crews must immediately clarify any confusion about any received clearances.

E. During flight planning, the following practices will help to mitigate oceanic errors:

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

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

- Ensure that Items 10 and 18 of the ICAO flight plan correctly reflect capabilities and authorizations.

- Use all available resources to learn about meteorological phenomena affecting the route, and ensure the crew is knowledgeable about information on the operational flight plan. The crew should conduct basic crosschecks of fuel, winds, and groundspeeds.

2.3.7.1 Adherence to Clearances

If there is ever any difference between the flight planned route and instructions provided by ATC (i.e., clearances), **ATC's instructions must be followed**. If the crew cannot comply with any part of the clearance, or discovers that any part of the clearance cannot be maintained after commencing (i.e., due to degrading performance), ATC must be informed immediately.

2.3.7.2 Large Height Deviations

A. Conditional clearances, especially climb clearances with delayed execution, are associated with a disproportionately high error rate and require special attention. Refer to the procedures in Section 2.3.2.3 for more information.

B. Crews must be diligent in reviewing performance data for their particular aircraft, in order to avoid either requesting or accepting clearances to unrealistic FLs that are outside of the performance envelope of the aircraft.

Note: During preflight planning, crews must carefully consider temperature inversions that can occur over the Atlantic, particularly when operating near maximum gross weight and when requesting FLs approaching oceanic entry points.

C. Failure to attain FLs as assigned can result in a loss of planned separation between aircraft. In addition, making a last-minute request for a lower FL and/or amended routing can create challenges for ATC, and should be avoided.

Note: If there has been a significant change affecting the aircraft weight after the flight plan has been computed, obtain an updated flight plan with a more realistic altitude profile.

D. If a crew finds itself at an FL that becomes unsustainable due to degrading performance (e.g., low temperatures affecting fuel, or high temperatures affecting aerodynamics), it is imperative to coordinate an FL change with ATC as soon as possible. If a climb or descent must be made without ATC clearance, applying the 5 NM lateral offset contingency procedure (Section 3.1.1) will mitigate some of the risk. The crew should then work to reestablish an ATC clearance.

E. Crews must be alert for situations in which ATC issues clearances that have only a latitude OR a longitude (e.g., "*AT/AFTER PASSING 30W*") rather than both a latitude and a longitude. The clearance should be clearly understood as to when to make an FL change.

F. Crews must ensure they are following the correct contingency procedure in case of lost communications. (Consult the applicable AIP, Jeppesen Airway Manual, and/or JeppFD under the "Regional" or "Operational" tabs in map mode.)

Note: Unlike other oceans, the NAT lost communications procedure is to maintain the last assigned FL. ATC approval is required for all FL changes.

2.3.7.3 Gross Navigational Errors (GNEs)

A. The threshold for a GNE in the NAT and all FAA-controlled oceanic airspace is a lateral deviation of 10 NM or greater.

B. The majority of GNEs arise because the FMSs have not been updated to reflect the currently effective route clearance. Refer to Section 2.2.5 and Section 2.3.2 (and subsections) for more information on LRNS programming and clearances, as well as procedures to minimize the risk of a GNE.

Note: Crews must ensure that half-degree waypoints are properly loaded and recognized. Refer to Section 2.2.2.5 and Appendix B.

C. GNEs can also result when the aircraft navigation mode is different from that assumed by the crew. (For example, the crew may utilize "heading select," but then fail to return to "LNAV.")

D. Crews must be alert for similar sounding named oceanic waypoints (e.g., “PITAX” versus “BERUX”). Also, crews should note that oceanic routes often contain two subsequent named waypoints (e.g., DOGAL BEXIT).

E. Crews should know that ATC coordination is necessary when transiting FIR boundaries. Pilots must give controllers adequate lead time when making requests for track deviations or altitude changes, especially in areas where multiple FIRs (e.g., Brest, Madrid and Shanwick) are in close proximity. ATC coordination in such areas can become quite complex.

F. SLOP should be an SOP, not a contingency, in all oceanic and remote airspace. Refer to the procedures in Section 2.3.10.2.

2.3.7.4 Erosion of Longitudinal Separation

A. When providing position reports via voice, ensure that a revised estimate is sent to ATC if a previously notified estimate is found to be in error in excess of two minutes.

Note: Time restrictions issued by ATC must be strictly adhered to. A restriction is issued to ensure required spacing between two aircraft is maintained.

B. Crews must adhere to the assigned (True) Mach. Crews selecting “Long Range Cruise” or “ECON” modes are in fact are flying variable Mach, which negatively affects ATC’s ability to independently calculate projected position. As needed, crews can request speed adjustments with ATC via a CPDLC request to “*RESUME NORMAL SPEED*.”

Note: Refer to Section 2.3.10.5 for procedures to fly without a fixed speed, if desired.

C. Crews must ensure that the aircraft master clock (typically the FMS) is set to UTC, and is used for all ETAs and ATAs. Where possible, clocks should be in GNSS-synchronized mode.

2.3.8 Altimetry Procedures

A. A standard pressure setting of 29.92 inches of mercury (1013 hPa) will be set in the primary and secondary altimeters when passing the transition altitude or height (18,000 ft in the U.S.) and rechecking / crosschecking for proper setting when reaching the Cleared Flight Level (CFL). Transition Levels differ from country to country, and pilots should be particularly alert when making a climb or descent in ICAO states other than the U.S.

B. An altimeter crosscheck will be accomplished at the Oceanic Boundary *and will be recorded (including differences) on the Altimeter Accuracy Log* (Appendix G). Maximum difference is 200 ft (60 m).

Note: Any difference between the primary and standby altimeters should be noted for use in contingency situations. *At a minimum, the initial altimeter crosscheck should be recorded.*

C. Flight crews will:

1. Report level to ATC upon reaching the CFL. It is essential that the aircraft be flown at the CFL.
2. Ensure that the altitude control system is operative and engaged during level cruise.
3. Monitor the altitude control system and not allow the aircraft to overshoot or undershoot the CFL by more than 150 ft (45 m).
4. Confirm that the altitude alert system is operational.
5. Crosscheck the primary and standby altimeters at approximately one-hour intervals and *record the data on the Master Document*. Maximum difference is 200 ft (60 m).
6. Confirm that the altimeter system used to control the aircraft provides input to the altitude reporting transponder.

2.3.9 Adherence to ATC Approved Route

If an aircraft has inadvertently deviated from the route specified in its ATC clearance, the flight crew shall, upon learning of the deviation, immediately take action to regain the specified route.

Note: When notified by ATC of such a deviation, crews should immediately display the **full degrees and minutes** loaded into the FMS for the next two waypoints and verify against the cleared route before responding. Specific attention should be paid to half-degree waypoints.

2.3.10 Special Inflight Procedures

A. Crews will conduct routine monitoring to ensure correct autopilot engagement with the navigation system. Aircraft malfunctions, interruptions, or distractions to normal routine cannot distract the crew. Crew monitoring is essential to prevent possible insidious departures from the cleared track.

B. Deliberate deviations must not be made without prior ATC clearance, except in an emergency.

1. Crews should be cautioned that such deviations can cause Gross Navigational Errors (GNE) if the autopilot is not reengaged.

   Note: Autopilot ALT HOLD should remain engaged while using the HDG mode for deliberate deviations.

2. The diversion maneuver should be monitored by all crewmembers to ensure that the aircraft has returned to the desired track and the autopilot has been properly reengaged.

3. After return to route has been completed, the PM will check the ETA at the next waypoint and the assigned Mach number and advise ATC.

C. Inadvertent Deviations: If, during any type of operation in NAT airspace, a deviation from flight plan track is noted, immediate corrective action to return on track is required. At the same time, ATC must be advised, giving the reason for the excursion and action taken to return on route.

1. All observed lateral deviations are reported to the Central Monitoring Agency and investigated by the FAA.

2. The observing ATC unit should, if possible, inform the pilot of the observed error that an error report will be processed, and record any comment made by the pilot at the time of notification.

3. A full report of such deviations will be presented to the Director of Aviation within three (3) working days to include:

   a. Crew narrative analyzing the cause of the deviation; and

   b. Copies of complete inflight records.

4. United States: Pilots may participate in the Aviation Safety Reporting System (http://asrs.arc.nasa.gov/).

   Note: This program has been established by NASA to identify problems requiring corrective action and to provide safety feedback to all aircraft operators. Participation in this program will provide limited immunity.

5. United Kingdom: Similar to the NASA Program above, flight crews may also participate in the CHIRP Program.

   a. The aim of the UK Confidential Human Factors Incident Reporting Program, known by the acronym CHIRP, is to contribute to the enhancement of flight safety in the UK commercial and general aviation industries.

b. This is accomplished by providing a totally independent and confidential (not anonymous) reporting system for all individuals employed in or associated with the industries.

c. Pilots can access, complete, and submit the form by going to the following URL:

http://www.chirp.co.uk/

d. CHIRP complements the Mandatory Occurrence Reporting system and other formal reporting systems operated by many UK organizations, by providing a means by which individuals are able to raise issues of concern without being identified to their peer group, management, or the Regulatory Authority.

6. Other Territories: The US Aviation Safety Reporting System website contains a list of links to other agencies and programs to whom confidential event reports can be submitted:

http://asrs.arc.nasa.gov/international/overview.html

2.3.10.1 Mach Number Technique

A. The minimum longitudinal separation between aircraft may be reduced with the application of Mach Number Technique (MNT), thereby improving airspace utilization.

Note 1: Flight crews are reminded that when operating under MNT, they are required to maintain TRUE (corrected) Mach.

Note 2: The ATC clearance "RESUME NORMAL SPEED" allows the crew to fly a variable (ECON) speed instead, with the condition that ATC must be advised if the speed changes by ±Mach 0.02 from the last assigned Mach. Refer to Section 2.3.10.5.

B. MNT may be used only between aircraft following the same or continuously diverging track, which have reported over a common point.

C. MNT can only be applied between aircraft that are assigned a single cardinal altitude or the aircraft concerned are in level, climbing, or descending flight.

D. Longitudinal separation between aircraft using MNT is based on the aircraft maintaining the assigned Mach number at all times, including during climb and descent. If it is not feasible to maintain the last assigned Mach number, the pilot shall advise ATC at the time of the initial clearance or subsequent climb / descent request or clearance.

E. Aircraft shall adhere to the Mach assigned by ATC and shall obtain approval before making any change to the Mach. If it is essential to make an immediate change in Mach number (e.g., due to turbulence), ATC shall be notified as soon as possible that such a change has been made.

F. MNT Separation Minima: When the lead aircraft maintains the same Mach number of the following aircraft, the minima when using MNT is 10 minutes.

G. Reductions to Separation when Applying MNT

1. It must be possible to ensure that the required time interval will exist at the common point for which the aircraft follow the same track or continuously diverging tracks.

2. Both aircraft will be assigned an appropriate Mach. The lead aircraft will be assigned a Mach greater than the following aircraft. Separation minima are as follows:

Difference in Mach Number Between Aircraft	Minimum Separation Between Aircraft
0.02	9 Minutes
0.03	8 Minutes
0.04	7 Minutes
0.05	6 Minutes

Difference in Mach Number Between Aircraft	Minimum Separation Between Aircraft
0.06	5 Minutes

H. MNT With Faster Aircraft Behind: MNT may be applied when faster aircraft will follow another aircraft at the same flight level. In this case, longitudinal separation may be established during transition from offshore airspace to the OCA, or when both aircraft are within oceanic airspace. Sufficient longitudinal separation will be applied to ensure at least 10 minutes separation until another form of separation is achieved.

2.3.10.2 Strategic Lateral Offset Procedure (SLOP)

A. This procedure is to be used for **both** wake vortex encounters and to mitigate the heightened risk of collision when non-normal events such as operational altitude deviation errors and turbulence-induced altitude deviations occur due to highly accurate navigational systems.

B. The procedure provides for the application of lateral offsets within the following guidelines:

1. In relation to a route or track, an aircraft may fly up to a maximum of 2 NM to the **right** of centerline. If the aircraft is capable, a micro-offset may be applied, in increments of 0.1 NM up to a maximum of 2 NM.

   Note 1: Crews must confirm in the applicable state AIP whether or not micro-offsets are allowed prior to application.

   Note 2: Micro-offsets should be used in the North Atlantic.

   Note 3: Micro-offsets are authorized in US-controlled oceanic airspace, as well as the airspace surrounding the island of Bermuda, the airspace controlled by Honolulu Control, and the airspace controlled by Guam CERAP.

2. If the aircraft is not capable of micro-offsets, or if micro-offsets are not permitted in the airspace, then aircraft performing SLOP must fly centerline, 1 NM to the right, or 2 NM to the right.
3. Offsets must not exceed 2 NM right of centerline.
4. Offsets are **not to be made to the left** of a route or track.

C. The intent of this procedure is to reduce risk by distributing aircraft laterally and equally across all available positions. Pilots must take account of the following:

1. Aircraft without automatic offset programming capability must fly the centerline.
2. To support equal distribution of offsets, it is recommended that pilots of aircraft capable of programming automatic offsets randomly select flying centerline or an offset. In order to obtain lateral spacing from nearby aircraft (i.e., those immediately above and/or below), pilots should use whatever means are available (e.g., TCAS, communications, visual, GPWS) to determine the best flight path to fly.
3. 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.
4. For wake turbulence purposes, crews should fly one of the offset positions. Crews may contact other aircraft on 123.450, as necessary, to coordinate the best mutual option.

   Note: It is recognized that pilot judgment will determine the action most appropriate to any given situation and that the pilot has the final authority and responsibility for the safe operation of the airplane.

5. Pilots may apply an offset outbound at the OEP but must return to centerline prior to the oceanic exit point unless otherwise authorized by ATC.

6. No ATC clearance is required for SLOP in the NAT. It is not necessary that ATC be advised.
7. Voice position reports are to be based on the current ATC clearance and not the exact coordinates of the offset position.
8. The offset should be applied from the time the aircraft reaches its cruising level until top of descent.

D. Turbulence Reporting: Tables along with Turbulence Intensity and Frequency Reporting procedures should be reviewed. (Reference the AIM, *Chapter 7: Safety of Flight*.)

E. The decision to apply SLOP is the responsibility of the crew. Crews will only apply offsets in airspace where SLOP has been authorized by the appropriate ATC authority.

Note 1: SLOP has been implemented as an SOP in the entire NAT Region and pilots are required to apply SLOP as appropriate.

Note 2: Aircraft must not apply SLOP below FL285 in the Reykjavik CTA or Bodo OCA.

F. Crews should use sound management of automated flight guidance systems when establishing offsets (i.e., avoid the use of "HDG" mode due to the risk associated with neglecting to re-select "LNAV/NAV" mode).

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

H. For a brief visual demonstration of SLOP, consult the URL below for a video produced by the US FAA:

https://www.youtube.com/watch?v=-rigf7UngN0

2.3.10.3 In-Trail Climb / Descent Procedure

A. The Gander, Reykjavik, and Santa Maria OCAs utilize an In-Trail Climb / Descent Procedure to clear an aircraft to climb or descend through the level of another aircraft, with as little as five (5) minutes longitudinal separation, provided that the following requirements are met:

- Aircraft must be equipped with a GNSS receiver that is approved in accordance with the requirements specified in TSO C-129a or higher;
- Application of this procedure will be transparent to flights that have requested and / or received an altitude change clearance;
- Pilots shall advise ATC of any deterioration of navigation performance, including loss of GNSS integrity as soon as practicable; and
- Application of the climb / descend procedure is based on the assumption that the last assigned Mach will be maintained during step climbs or descents, and in the event that this is not feasible, ATC will be informed at the time of the climb / descent request or clearance.

B. The rule allowing ATC to use this procedure includes a caveat that the climb or descent needs to be undertaken within ten (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 FL, should be alerted to the possibility of a potential TCAS alert by the controller's use of the conditional phrase *"BY"* or *"AT or BEFORE"* in the clearance received. However, the pilot of the "passive participant" aircraft of the five (5) minutes separated pair, if it is the following aircraft, could be presented with a "pop-up" TCAS target without such a warning.

C. 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.

D. 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 FL. Nevertheless, even at these separations, Resolution Advisories (RAs) are not anticipated and it is not expected that pilots will consider deviating from their clearance as "appropriate action."

2.3.10.4 CPDLC Route Clearance Uplinks

A. CPDLC route clearance uplinks allow the flight crew to LOAD the CPDLC route clearance directly into the FMS without having to manually enter waypoints, possibly introducing navigational errors.

B. There are four possible CPDLC route clearance uplinks that can be used:

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

C. Crews should be aware that these clearance uplinks are not universally used in NAT airspace; messages are supported / used by OCAs as described on the table below:

	UM74	UM79	UM80	UM83
Reykjavik	Yes	Yes	No	No
Shanwick	Yes	Yes	No	No
Santa Maria	Yes	Yes	Yes	Yes
New York	Yes	Yes	Yes	Yes
Gander	Yes	Yes	No	No
Bodo	Yes	No	No	No

D. Flight crews should ensure that the CPDLC route clearance uplink properly "loads" before sending WILCO.

E. Crews must pay careful attention to CPDLC uplinks that contain "[route clearance]." The details of "[route clearance]" are not displayed to the flight crew until they LOAD the uplink into the FMS. For example, prior to loading uplink UM79 / RTEU-6, the display to the flight crew is "CLEARED TO [position] VIA ROUTE CLEARANCE," which could be misinterpreted to mean "Cleared directly to the position" rather than the "route clearance," which may contain several other waypoints.

F. To mitigate ambiguity, flight crews should always LOAD the CPDLC uplink first to ensure proper load and to verify the routing on the FMS before sending WILCO and executing the clearance.

G. 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.

H. Flight crews should revert to voice if in doubt about any CPDLC uplink.

2.3.10.5 Operations Without an Assigned Fixed Speed

A. The requirement to issue an assigned fix Mach to all flights has been removed from the NAT SUPPs (ICAO Doc 7030); however, oceanic clearances issued to turbojet in the NAT include an assigned Mach. If any variation to the fixed Mach is desired, crews must request such a change from ATC.

B. Manufacturers, however, recommend a variable cruise Mach for maximum efficiency. Accordingly, some OCAs permit Operations Without an Assigned Fixed Speed (OWAFS) to allow operators to use variable cruise Mach. The AIP for each NAT ATC provider state should be consulted to determine the implementation of OWAFS.

C. The following procedures will generally apply for OWAFS:

- All aircraft are eligible for OWAFS regardless of FANS equipage. Current voice oceanic clearance procedures will be retained.
- Oceanic clearance procedures will remain unchanged. A fixed Mach will continue to be part of the oceanic clearance.
- There will be two modes of operation regarding speed:
  - Clearance with an assigned speed; or
  - No speed assignment.
- ATC will apply "speed control" as needed in accordance with guidance in ICAO Doc 4444.
- The terms "Cost Index" or "ECON" should not normally be used in communications between ATC and aircraft with respect to the authorization for or use of OWAFS. Implementation of OWAFS will, where possible, make use of existing CPDLC message sets and/or standard voice phraseology.
- The following phraseology will be implemented across the NAT:

From ATC		
Message (CPDLC / Voice)	**Meaning**	**Reason**
RESUME NORMAL SPEED	Instruction to resume a normal speed (i.e., OWAFS). Aircraft no longer needs to comply with previously issued speed restriction.	Allows for the use of cost index to produce a variable Mach. A fixed Mach is no longer required.
MAINTAIN [SPEED]	Instruction to maintain the specified speed / Mach.	An assigned speed is required for traffic separation.
Response from Crew		
Voice	*NO* [ATC] *SPEED RESTRICTION*	
CPDLC	*NO SPEED RESTRICTION*	

- After the aircraft has been cleared on a fixed Mach speed, crews will not need to request OWAFS. ATC will offer a variable Mach when possible. If crews deviate from the ATC assigned Mach, the appropriate ATC unit must be informed immediately.
- If the aircraft then receives "*RESUME NORMAL SPEED*" (via CPDLC or Voice), the flight crew no longer needs to comply with a previously issued Mach. However, the flight crew shall advise ATC if, as the result of the *RESUME NORMAL SPEED* message, they intend to adjust their speed by plus or minus Mach 0.02 or more from their last assigned speed.

- Once cleared by "*RESUME NORMAL SPEED*," the crew should insert the appropriate current flight plan variable speed (ECON) into the FMS. This should typically be within ± Mach 0.01 of the previously assigned Mach.
- ATC will assign a fixed Mach number when required due to traffic.
- Crews must advice ATC immediately of any CPDLC issues that require a more significant speed change.
- OWAFS will be offered to aircraft whenever the opportunity exists.
- OWAFS will be managed by each NAT ANSP in a manner dictated by required separation standards and safety of operations.

2.4.0 High Latitude / Polar Operations (Areas of Magnetic Unreliability)

A. The procedures specified in this section must be followed when flying through Areas of Magnetic Unreliability (AMU). The AMUs are centered around Earth's magnetic poles and are defined as follows:

- The Northern AMU is the area within 1,000 NM of the Northern Magnetic Pole (except for airspace over Alaska and its territorial waters) as well as Canadian Northern Domestic Airspace (NDA) (i.e., north of 60° N latitude).
- The Southern AMU is the area within 1,000 NM of the Southern Magnetic Pole (i.e., south of 60° S latitude).

B. As aircraft head closer to the North and South Poles, they may travel through these AMUs. All flight operations in an AMU must be conducted using long-range navigation equipment (e.g., IRSs or GNSSUs connected to an FMS) that are referenced to True North instead of Magnetic North.

C. There are two reasons why other methods of navigation into an AMU are impractical and unreliable:

1. First, magnetic compasses depend upon the horizontal component of flux lines to provide the force needed to provide directional information. Since the flux lines incline more and more toward the vertical as an aircraft approaches either of the poles, the magnetic compass becomes unreliable as far out as 1,000 miles.
2. The second reason is the fact that meridians converge rapidly in the higher latitudes. It is virtually impossible to navigate using dead reckoning techniques through high latitudes using conventional, non-grid methods. Numerous heading changes would be required to maintain a great circle path over the ground. Moreover, following a heading of 180° directly at the North Pole could take the aircraft in all directions, to Europe, Asia, and North America.

D. Long range inertial or GNSS based navigation systems oriented to True North are the most acceptable methods of navigating the high latitudes.

E. Prior to conducting flights into the High Latitude Area and Polar Region, it is recommended that flight crews review the FMS procedures and messages of the FMS Operating Manual. Particular attention should be paid to whether or not the FMS will automatically switch from magnetic heading to true heading and back.

F. Polar Region FMS Procedures

1. Upon entering the Polar Region (above 85°N or below 85°S), the message ENTERING POLAR REGION, for example, is displayed. The FMS drops all except its highest priority sensor for navigation (blending of sensors is suspended). Since the heading displayed on EFIS is directly from the IRS, it is important that both the FMS and IRS cross the pole at the same time. This is part of the reason for using only one sensor while in the Polar Region.
2. The FMS uses its highest priority sensor during all operations in the Polar Region. When leaving the region (below 84°N or above 84°S), the message EXITING POLAR REGION, for example, is displayed.

3. During operations in the Polar Region, lateral offset capability of the FMS is inhibited. Any entered lateral offset is removed when entering the Polar Region, and entry of a lateral offset is not permitted while in the Polar Region.
4. It is recommended that the Plan Mode not be used during operations at or near the poles. (The Plan Mode is presented north up.) The Map Mode should be used.
5. Holding patterns are possible while in the Polar Region when flown correctly. Pilots should be cautioned that the EFIS airplane symbol may not always be shown on the holding pattern. If a holding pattern is hand flown in the Polar Region, the HSI presentation should be used for desired track and deviation.
6. Since the FMS position is tied to the highest priority IRS (GNSSU, if no IRS is available) and the IRS position cannot be updated, manual FMS position update is not permitted in the Polar Region.

G. Arctic Air Traffic Service Routes

1. Flights are expected to flight plan via ATS tracks M450, M451, or M452 within the Anchorage FIR. Flights should leave or join M450 at COALL, M451 at JESRU, or M452 at TAYTA. If additional information is needed, please contact Anchorage ARTCC International Procedures Office at 907-269-1801.
2. The ATS tracks sometimes referred to as Polar Routes/tracks are now described in terms of compulsory reporting points (REP):
   - M450: REP KARLL - REP COALL.
   - M451: REP ARBEZ - REP JESRU.
   - M452: REP HARVZ - REP TAYTA.

H. Polar Flights

Polar 2: DEVID   Polar 3: RAMEL   Polar 4: ORVIT

Note: All polar routes are available 24 hours / 7 days a week.

I. Communications

- On Polar 1, 2 and 3, SATCOM is typically used until the aircraft reaches about 82°N, at which point line-of-sight connection is lost with the satellites. Flight crews should switch to HF voice communications. The location of Polar 4 in the northern latitudes provides SATCOM coverage throughout a flight.
- HF voice communications to ATC in the Western Hemisphere are provided by Arctic Radio, based in North Bay Ontario, for the Edmonton, Alberta, ATCC. Managed by Nav Canada, Arctic Radio has HF antennas located at Cambridge Bay, Northwest Territories, which are remotely operated from the North Bay International Flight Service Station.

2.5.0 TCAS Operations

A. All aircraft above 12,500 lbs (5700 kg) Maximum Takeoff Mass or authorized to carry more than 19 passengers must be upgraded to TCAS II Version 7.1 per ICAO Annex 10.

- Version 7.1 brings improvements to the reversal logic by detecting situations in which, despite the Resolution Advisory (RA), the aircraft continue to converge vertically. When an aircraft is not responding correctly to an RA, the TCAS will issue a reversal RA to the aircraft that maneuvers in accordance with the RA.
- In single equipage encounters (i.e., when only one aircraft is TCAS II equipped), Version 7.1 will recognize the situation and will issue a reversal if the unequipped threat aircraft moves in the same vertical direction as the TCAS II equipped aircraft. The reversal logic change is transparent to flight crews.
- When it is detected that an aircraft is not responding correctly to an RA, it circumvents the “100 ft box” rule, allowing reversal RAs for aircraft closer than 100 ft vertically.

- Version 7.1 can predict the vertical separation at the closest point of approach, based on current vertical speeds, to detect the need for a reversal RA. When this prediction shows that the aircraft are probably going to be closer than a predefined threshold, reversal RAs are considered as a valid option for aircraft closer than 100 ft vertically.

B. Recommended Operating Practices

1. TCAS will be operated in the TA / RA mode during all operations in RVSM airspace.
2. Climb and descent rates in RVSM airspace should be limited to 1,000 fpm when operating within five (5) NM and 2,000 ft of other aircraft to minimize the generation of TAs and RAs.

   Note: In the event that an RA is issued, the required maneuver should be initiated immediately. An aircraft seen visually may not necessarily be the aircraft causing the RA or may not be the only aircraft that TCAS considers a threat.
3. ATC may have older data than TCAS and could unknowingly issue an instruction that is contrary to an RA. Crews must not maneuver contrary to an RA based solely on ATC instructions.

C. Reporting Requirements

1. A written report is needed for all RAs requiring a change in the existing vertical speed while operating in RVSM airspace. RAs should also be reported:
   a. Verbally to ATC, as soon as practical;
   b. To the Director of Aviation; and
   c. In writing to the controlling authority (e.g., NAT CMA, APARMO, NAARMO, MIDRMA, ARMA, CARSAMMA, SATMA, or EUROCONTROL, as appropriate), within 72 hours, using the Altitude Deviation Report Form in Appendix K of this manual.
2. United States: An RA issued when an aircraft is being operated on an IFR flight plan and compliance with the advisory is necessary to avert a substantial risk of collision between two or more aircraft is a reportable incident. TCAS RA reports may be emailed to: TCAS@ntsb.gov

   Note: Crews experiencing TCAS RAs in states other than the US will comply with reporting procedures published in the state's AIP. States AIPs may be referenced in the *Jeppesen Airway Manual*.

D. PANS-ATM (Doc. 4444) Phraseology:

Circumstance	Phraseology (Pilot Transmission in Bold)
...after modifying vertical speed to comply with a TCAS resolution advisory (pilot/controller interchange)	**TCAS RA** (acknowledgement)
...after the response to a TCAS resolution advisory is completed (pilot/controller interchange)	**CLEAR OF CONFLICT, RETURNING TO** (assigned clearance) (acknowledgement) (or alternative instructions)
...after returning to clearance after responding to a TCAS resolution advisory (pilot/controller interchange)	**CLEAR OF CONFLICT** (assigned clearance) **RESUMED**
...when unable to comply with a clearance because of a TCAS resolution advisory (pilot/controller interchange)	**UNABLE, TCAS RA** (acknowledgement)

2.6.0 Equal Time Point (ETP) Calculations / Wet Footprints

A. All flights must be planned to avoid a wet footprint. Equal Time Point (ETP) calculations are required on all flights when the nearest suitable airport exceeds one (1) hour cruise.

B. The ETPs shall be computed for all engine cruise, engine failure with driftdown and pressurization failure necessitating a descent.

C. When all engine cruise, engine failure, and pressurization failure ETPs are separated by no more than 100 NM, the most restrictive in terms of fuel required will be plotted.

1. All engine cruise ETP allows the flight crew to determine the shortest time to a usable airport (Defined in Appendix E).
2. At the engine failure with driftdown (to the appropriate single engine cruise altitude) enough fuel must remain to reach an airport with a fuel reserve (overhead the destination airport) of 30 minutes.
3. Pressurization ETP assumes a total pressurization loss, emergency descent, and, if required, subsequent climb to a higher unpressurized altitude. At the pressurization ETP, enough oxygen must be available to complete the flight. In addition, there must be enough fuel to reach a suitable airport with a reserve of 30 minutes, computed at the appropriate unpressurized altitude.
4. *ETPs will be noted on the Master Document*. An additional notation should be made when the flight proceeds beyond the ETP.
5. A third airport should be considered by applying the "Usable / Unusable Airport" formula as defined in Appendix E. Crews should communicate with the Flight Planning and Weather Service to get weather, winds, and possible routings for their flight. Then ETPs most suitable to those circumstances can be requested.

2.6.1 Point of Safe Return (PSR)

A Point of Safe Return (PSR) should be calculated when the destination airport has no usable alternate. *A notation will be made on the Master Document when the flight proceeds beyond the PSR.*

2.7.0 Approaching Landfall

A. The PM shall tune the radio facility to the first landfall NAVAID to monitor the accuracy of the FMS / LRNS steering. Should a discrepancy exist, the PF shall consider the short range (raw data) NAVAID as the primary navigation source and the FMS as secondary for the remainder of the flight. *All discrepancies will be recorded on the Master Document or LRNS Performance Log* (Appendix G).

B. Should any long range navigation sensor generate a warning message, the sensor may be deselected. This action will prevent the FMS from using that sensor for position computations.

C. Flight crews will utilize the ground mapping capability of the onboard radar or EGPWS to observe any land masses as an aid to determining the accuracy of their navigation.

2.8.0 Postflight Procedures (Aircraft / Equipment)

2.8.1 Navigation System Accuracy Check

A. A navigation system accuracy check should be made. If so equipped, the displayed IRS position should be compared with the FMS position and the total time that the system has been in the NAV mode. *The IRS positions should be recorded on the Master Document on shutdown.*

B. Any deviations greater than the following tolerances, or any degrade / warning light, will be noted:

GNSSU	0.27 NM for the entire flight
IRS	1 NM / Hour

Note: A report of GNSS degradation, outage, or other incidents or anomalies may be submitted at: http://www.navcen.uscg.gov/?pageName=gpsUserInput

2.8.2 Altimeter Accuracy Check

A. On landing, *altimeter readings on Captain's, Copilot's, and standby altimeters will be recorded on the Altimeter Accuracy Log* (Appendix G).

B. In making maintenance log entries against malfunctions in heightkeeping systems, the pilot should provide sufficient detail to enable maintenance to effectively troubleshoot and repair the system.

C. Any time that an RVSM-certified aircraft becomes incapable of operating within RVSM airspace due to maintenance discrepancies or heightkeeping errors, the Director of Aviation will ensure that all crews are aware of the problem. The Director of Maintenance will ensure that the aircraft is placarded "AIRCRAFT NOT RVSM QUALIFIED."

2.8.3 Postflight Documentation

The following information / documents will be retained in the flight department office for a minimum of six (6) months after every international flight:

- Date;
- Departure / Destination;
- PIC / SIC;
- Completed Master Document with appropriate symbology and notations per Appendix B;
- Completed LRNS Performance Log / Altimeter Accuracy Log (Appendix G);
- Completed plotting chart (required notations) or a printout from the electronic plotting software (e.g., ForeFlight, ARINC, ScottIPC, etc.), as applicable;
- Weather and Significant Weather Chart;
- NOTAMs;
- Track Messages; and
- Overflight and Landing Permits.

2.8.4 Emissions Monitoring

A. Per the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), carbon emissions must be monitored for all international flights. Following any international flight, the Director of Aviation must ensure that emissions are accurately tracked using a fuel use monitoring method, or by use of ICAO's online Carbon Estimation and Reporting Tool (CERT):

https://www.icao.int/environmental-protection/CORSIA/Pages/CERT.aspx

B. CORSIA requires additional monitoring and/or offset purchasing actions if total emissions exceed 10,000 tons annually. It is expected that the flight department will not reach this threshold. However, the Director of Aviation will be responsible for tracking data to ensure no further actions are needed.

C. The following flights are exempt from CORSIA:

- Wholly domestic flights;
- Head of state, military, customs, police, medical, firefighting, or humanitarian flights; and
- Flights in helicopters or fixed-wing aircraft with an MTOM of 5,700 kg or less.

  Note: Although carbon emissions from these flights do not need to be monitored for the purpose of CORSIA compliance, additional state or regional programs / requirements could potentially apply, such as the EU ETS. The Director of Aviation will ensure the flight department participates in any such programs as applicable.

2.9.0 Postflight Procedures (Personnel / Passengers / Cabin)

2.9.1 Disembarking Passengers

A member of the flight crew will escort disembarking passengers from the aircraft to the ground handler or appropriate local facility and will continue to be responsible for them until such time as they are accepted for examination for entry into that state.

2.9.2 General Customs Procedures

A. For flights entering or exiting the US, the submission of an eAPIS form is mandatory. Specific procedures for this can be found in Appendix M.

B. Pilots may be required to provide advance notice of the flight's ETA to the customs department of the destination country. The applicable AIP should be consulted.

C. Crews and passengers must be prepared to show valid aircraft and personal documentation.

D. Crews should be familiar with any country-specific rules and requirements to follow. These rules may include, but are not limited to:

1. Regulations (including customs, immigration and quarantine, and requirements for advance notification and applications for permission) concerning entry, transit and departure of passengers and crew.
2. Information on customs requirements concerning, inter alia, acceptance of oral declarations or formalities required in connection with passengers' and crews' accompanied baggage, tax clearance where required, etc.
3. Clearance documents and formalities required including items such as visas (entry/exit), where required, embarkation/disembarkation cards, passports, acceptance of existing identity documents in lieu of valid passports and, as regards crew members, licenses and certificates in lieu of passports and visas.
4. Information in regards to public health requirements concerning passengers and crew, including the requirement for vaccination or revaccination certificates.

2.9.3 Disposal of International Garbage

A. Catering waste and garbage that contains, or is suspected of containing, animal products or by-products, originating outside the country of destination either as food taken on board or as a result of transportation of animals in an aircraft will be bagged in designated trash bags and must be disposed of in approved international garbage disposal facilities.

B. International garbage disposal will be accomplished by the FBO whenever possible. If no FBO is available or capable, then any international garbage bags should be taken to the airport international garbage disposal depot and logged by the depot. If the flight arrives when the disposal depot is closed, or if the airport does not have an approved garbage disposal depot, the garbage will be stored in a marked closed container and taken to an approved disposal depot at the earliest opportunity.

C. When planning for international operations, the PIC shall ensure that approved international garbage handling facilities are available at the destination airports. If there is doubt regarding the status of ground handling facilities, the garbage shall be kept on board the aircraft in a marked closed container until approved handling facilities are available.

Section 3: Contingency Procedures

3.1.0 Introduction – Oceanic Operations

A. Guidance for contingency procedures should not be interpreted in any way that prejudices the final authority and responsibility of the PIC for the safe operation of the aircraft.

B. Although all possible contingencies cannot be covered, these procedures provide for more frequent cases such as:

- Inability to comply with assigned clearance due to meteorological conditions, aircraft performance, or pressurization failure;
- En route diversion across the prevailing traffic flow; and
- Loss of, or significant reduction in, the required navigation capability when operating in airspace where the navigation performance accuracy is a prerequisite to the safe conduct of flight operations.

C. The following procedures are applicable primarily when rapid descent and / or turnback or diversion is required. The pilot's judgment shall determine the sequence of actions taken, and ATC will provide all possible assistance with regard to the specific circumstances.

D. If the pilot is unsure of the vertical or lateral position of the aircraft or the aircraft intentionally deviates from its assigned altitude or track without prior ATC clearance, then the pilot must take action to mitigate the potential for collision with aircraft on adjacent routes or FLs.

Note: In this situation, the pilot should alert adjacent aircraft by making maximum use of aircraft lighting and broadcasting position, FL, and intentions on 121.5 MHz (or 123.45 as a backup). Transponder Code 7700 will also be utilized.

E. Unless the nature of the contingency dictates otherwise, the pilot should advise ATC as soon as possible of a contingency situation and, if possible, request an ATC clearance before deviating from the assigned route or FL.

Note: If all other means of communication fails, emergency satellite voice transmissions may be made to the controlling ATC unit (Appendix S).

3.1.1 General Procedures

A. If the aircraft is unable to continue the flight in accordance with its ATC clearance, and/or the aircraft is unable to maintain the navigation performance accuracy specified for the airspace, a revised clearance shall be obtained, whenever possible, prior to initiating any action.

B. The radiotelephony distress signal *(MAYDAY)* or urgency signal *(PAN PAN),* preferably spoken three times, shall be used as appropriate. Subsequent ATC action with respect to that aircraft shall be based on the intentions of the pilot and the overall air traffic situation.

Note: The transponder should be set to Code 7700 in the event of an emergency.

C. If deviation is required and prior clearance cannot be obtained, the following contingency procedures should be employed until a revised clearance is received.

1. Leave the assigned route or track by initially turning at **least 30 degrees** to the right or to the left, in order to intercept and maintain a parallel direction, track or route **offset of 5 NM (9.3 km)**. The direction of the turn should be based on one or more of the following:
   - Aircraft position relative to any organized track or route system;
   - The direction of flights and flight levels allocated on adjacent tracks;
   - The direction to an alternate airport;
   - Any strategic lateral offset being flown; and

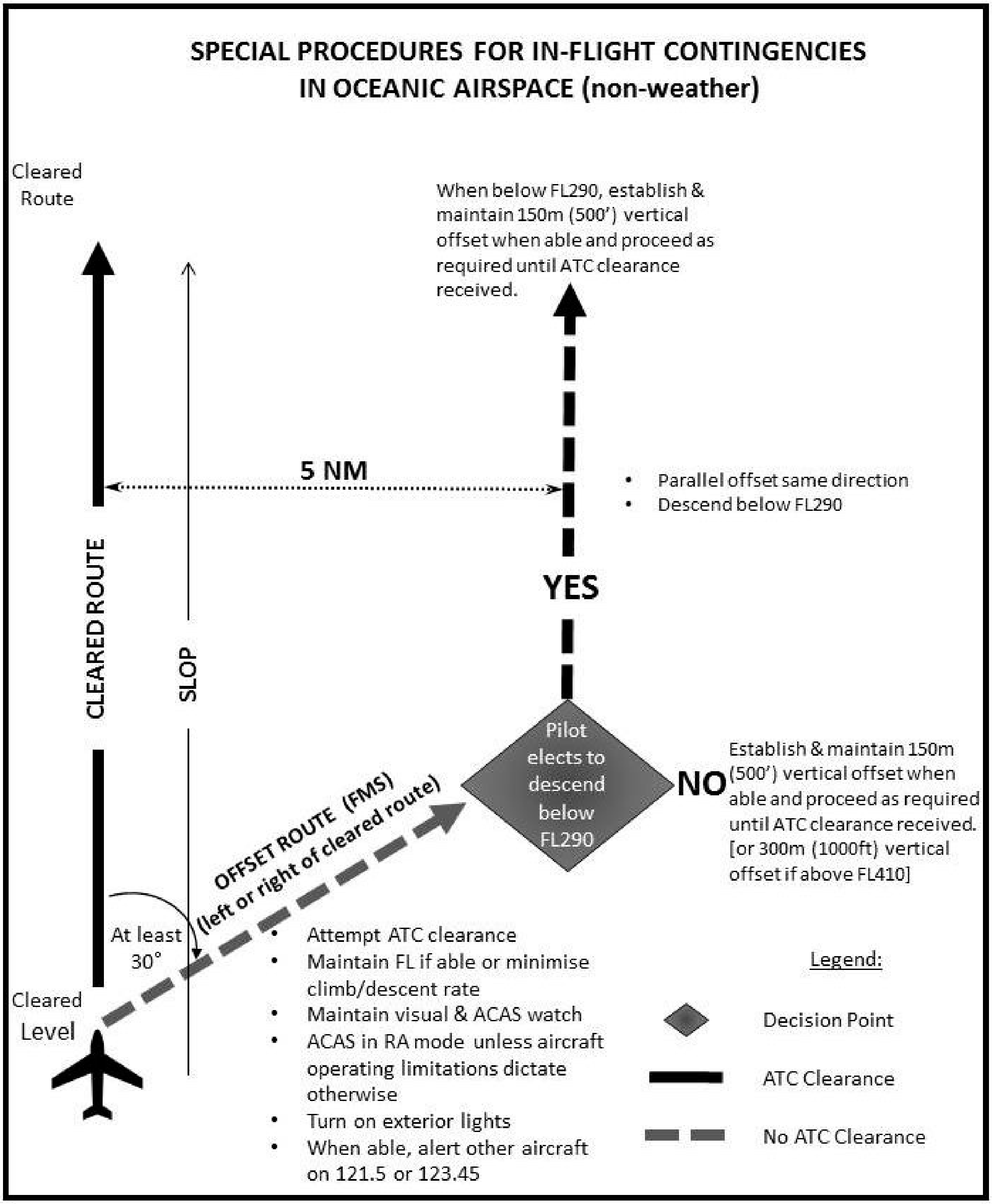
- Terrain clearance.

2. The aircraft should be flown at a flight level and an offset track where other aircraft are less likely to be encountered.
3. Maintain a watch for conflicting traffic both visually and by reference to ACAS (if equipped) leaving ACAS in RA mode at all times, unless aircraft operating limitations dictate otherwise.
4. Turn on all aircraft exterior lights (commensurate with appropriate operating limitations).
5. Keep the SSR transponder on at all times and, when able, squawk 7700, as appropriate.
6. As soon as practical, advise ATC of any deviation from assigned clearance.
7. Use whatever means is appropriate (i.e. voice and/or CPDLC) to communicate during a contingency or emergency.
8. When emergency situations are communicated via CPDLC, the controller may respond via CPDLC. However, the controller may also attempt to make voice communication contact with the aircraft.
9. Establish communications with and alert nearby aircraft by broadcasting, at suitable intervals on 121.5 MHz (or, as a backup, on the inter-pilot air-to-air frequency 123.45 MHz) and where appropriate on the frequency in use: aircraft identification, the nature of the distress condition, intention of the person in command, position (including the ATS route designator or the track code, as appropriate) and flight level; and
10. ATC will attempt to determine the nature of the emergency and ascertain any assistance that may be required. Subsequent ATC action with respect to that aircraft shall be based on the intentions of the pilot and overall traffic situation.
11. Actions To Be Taken Once Offset From Track:
    - If possible maintain the assigned flight level until established on the 9.3 km (5.0 NM) parallel, same direction track or route offset. If unable, initially minimize the rate of descent to the extent that is operationally feasible.
    - Once established on a parallel, same direction track or route offset by 9.3 km (5.0 NM), either:
        a) Descend below FL290, and establish a 150 m (500 ft) vertical offset from those flight levels normally used, and proceed as required by the operational situation or if an ATC clearance has been obtained, proceed in accordance with the clearance; or

        Note: Descent below FL290 is considered particularly applicable to operations where there is a predominant traffic flow (e.g. east-west) or parallel track system where the aircraft's diversion path will likely cross adjacent tracks or routes. A descent below FL290 can decrease the likelihood of conflict with other aircraft, ACAS RA events, and delays in obtaining a revised ATC clearance.

        b) Establish a 150 m (500 ft) vertical offset (or 300 m (1,000 ft) vertical offset if above FL410) from those flight levels normally used, and proceed as required by the operational situation, or if an ATC clearance has been obtained, proceed in accordance with the clearance.

        Note: Altimetry System Error may lead to less than actual 500 ft vertical separation when the above procedure is applied. In addition, with the 500 ft vertical offset applied, ACAS RAs may occur.



Source: ICAO NAT Doc #007

D. Deviations in the NAT (Reduced Lateral Airspace): Crews must be aware that when crossing adjacent tracks without a clearance, the potential vertical separation provided by the contingency procedures above may not be adequately accounting for the allowed RVSM altimetry system error. Accordingly, consideration should be given to intercepting the 5 NM lateral offset in the same direction of flight and then descending below FL280, or climbing above FL410 prior to crossing adjacent tracks or making a 180° turn back. However, if the crew is unable to carry out a major climb or descent, then any diversion or turn-back maneuver should be carried out at a level 500 feet different from those in use within the NAT HLA, until a new ATC clearance is obtained.

E. Crews should take into consideration whether the aircraft is capable of or operating in Emergency Descent Mode (EDM). This could automatically turn the aircraft 90 degrees left while descending in the event of pressurization loss and may potentially turn the aircraft across all traffic in the NAT OTS if SLOP is applied.

3.1.2 Weather Deviation Procedures in Oceanic Airspace

A. The following procedures are intended to provide guidance for deviations around weather (e.g., thunderstorms). All possible circumstances cannot be covered. The pilot's judgment shall ultimately determine the sequence of actions taken. ATC shall render all possible assistance.

B. The pilot must request a revised clearance from ATC prior to deviating and, whenever possible, advise the extent of the deviation expected.

Note: Crews must not deviate laterally or vertically without attempting to obtain an ATC clearance.

C. When initiating communications with ATC, a rapid response may be obtained by stating "*WEATHER DEVIATION REQUIRED*" to indicate that priority is desired on the frequency and for ATC response. When necessary, the pilot should initiate the communications using the urgency call "*PAN PAN*" (preferably spoken three times).

Note: If so equipped, a CPDLC lateral downlink message can also be used.

D. The pilot should notify ATC and request clearance to deviate from track, advising when possible, the extent of the deviation expected.

E. Actions to be Taken: Pilot-Controller Communications are Established

1. Pilot notifies ATC and requests clearance to deviate from track. When possible, pilot advises the extent of the deviation expected.
2. ATC takes one of the following actions:
   a. If appropriate separation can be applied, ATC will issue a clearance to deviate from track; or
   b. If there is conflicting traffic and ATC is unable to establish separation, ATC will:
      1) Advise the pilot of inability to issue clearance for requested deviation.
      2) Advise the pilot of conflicting traffic.
      3) Request pilot's intentions.
      4) May suggest that the pilot climb or descend to a contingency altitude.

      "*UNABLE* (requested deviation), *TRAFFIC IS* (callsign, position, altitude, direction), *ADVISE INTENTIONS*."
3. The pilot will take the following actions:
   a. Advise ATC of intentions by the most expeditious means available;
   b. Comply with ATC clearance issued; or
   c. Advise ATC of intentions and execute the procedures detailed below (ATC will issue essential traffic information to all affected aircraft).

F. Actions to be Taken: Pilot-Controller Communication Not Established or Revised ATC Clearance Not Available: An ATC clearance shall be obtained at the earliest possible time. Until an ATC clearance is received, the pilot shall take the following actions:

Note: These provisions apply to situations where a pilot needs to exercise the authority of a PIC under the provisions of ICAO Annex 2 in the interests of safety.

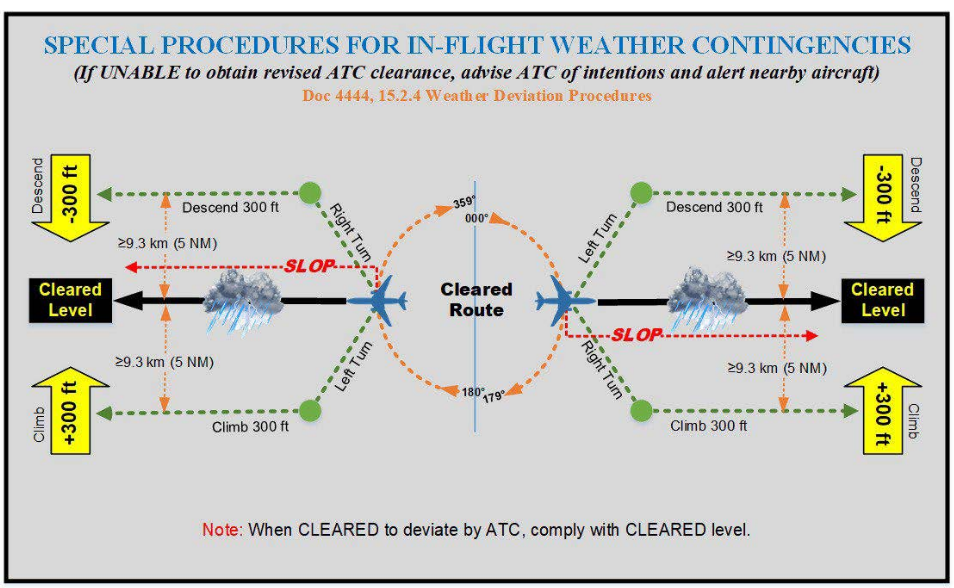
1. If possible, deviate away from an organized track or route system.

2. Establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: aircraft identification, FL, position (including ATS route designator or the track code) and intentions, on the frequency in use and on 121.5 MHz (or, as a backup, on the inter-pilot air-to-air frequency 123.45 MHz). Additionally, the use of the phraseology *"CAPTAIN'S AUTHORITY"* is recommended.
3. Watch for conflicting traffic, both visually and by reference to TCAS.

   Note: If the pilot determines that there is another aircraft at or near the same FL creating a potential conflict, the pilot is expected to adjust the path of the aircraft as necessary to avoid the conflict.
4. Turn on all aircraft exterior lights (commensurate with appropriate operating limitations).
5. For deviations of less than 9.3 km (5.0 NM) from the originally cleared track or route, remain at a level assigned by ATC.
6. For deviations greater than or equal to 9.3 km (5.0 NM) from the originally cleared track or route, when the aircraft is approximately 9.3 km (5.0 NM) from track, initiate a level change in accordance with the table below:

Originally cleared track or route center line	Deviations ≥ 9.3 km (5.0 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)

7. If the pilot receives clearance to deviate from cleared track or route for a specified distance, and subsequently requests, but cannot obtain, a clearance to deviate beyond that distance, the pilot should apply an altitude offset in accordance with the table above before deviating beyond the cleared distance.
8. When returning to track or route, be at its assigned flight level when the aircraft is within approximately 9.3 km (5.0 NM) of the center line.
9. If contact was not established prior to deviating, continue to attempt to contact ATC to obtain a clearance. If contact was established, continue to keep ATC advised of intentions and obtain essential traffic information.



Source: FAA (AC #91-70C, Oceanic and Remote Continental Airspace Operations)

G. The pilot shall inform ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to its cleared route.

3.1.3 Contingency Procedures After Entering RVSM Airspace

A. The following information is provided with the purpose of giving the pilot guidance on actions to take when encountering turbulence. It is recognized that the pilot and controller will use judgment to determine the action most appropriate to any given situation. The guidance material recognizes that for certain equipment failures, the safest course of action may be for the aircraft to continue in NAT HLA / RVSM airspace while the pilot and controller take precautionary action to protect separation.

B. The pilot should notify ATC of contingencies (equipment failures, weather conditions, no longer RVSM compliant) that affect the aircraft's ability to maintain the CFL and coordinate a plan of action. The following are examples of equipment failures that require ATC notification:

- Failure of automatic altitude control systems on board the aircraft;
- Loss of redundancy of altimetry systems;
- Loss of thrust on an engine, necessitating a descent;
- Turbulence that affects the capability to maintain CFL;
- Loss of pressurization;
- Any other equipment failure affecting the ability to maintain CFL.

C. If failure or loss of accuracy of one primary altimetry system (e.g., equal to or greater than 200 ft difference between primary altimeters), the pilot shall:

1. Crosscheck the standby altimeter, and confirm the accuracy of the primary altimeter system.
2. If the defective system can be determined, couple the functioning altimetry system to the automatic altitude control system.
3. If unable to confirm primary altimeter system accuracy, notify ATC of the loss of redundancy, and follow the pilot actions listed above.

D. Encounters with turbulence after entry into NAT RVSM airspace, Northern Canadian RVSM Airspace, ME RVSM airspace, and / or PAC RVSM airspace:

1. If the pilot is unsure of the vertical position of the aircraft due to loss or degradation of all primary altimetry systems or is unsure of the capability to maintain CFL due to turbulence or loss of all automatic altitude control systems, the pilot should maintain the CFL while evaluating the situation and notify ATC of the intended course of action.
2. Turbulence Reporting Tables along with Turbulence Intensity and Frequency Reporting procedures should be reviewed. (Reference AIM, *Safety of Flight*.)

3.1.4 Contingency Procedures After Entering RNP-10 / RNP-4 Airspace

Contingency procedures for operations in RNP-10 / RNP-4 airspace or on RNP-10 / RNP-4 routes are no different than normal oceanic emergency procedures with one exception: crews must be able to recognize and advise ATC when the aircraft is no longer able to navigate to its RNP-10 / RNP-4 approval capability.

3.1.4.1 Pilot Report of Non-RNP-10/RNP-4 Status

A. Flight crews shall report the lack of RNP-10 or RNP-4 status in accordance with the following:

- When the operator/aircraft is not authorized RNP-10 or RNP-4;
- If approval status is requested by the controller; or
- When an operator/aircraft previously granted RNP-10 or RNP-4 authorization is operating with only one operational LRNS.

B. ATC Phraseology – RNP-10 / RNP-4 Approval Status

Controller Request	Pilot Response
"(Call sign) *confirm RNP-10 or 4 approved*"	If so approved: "*Affirm RNP-10 / RNP-4 approved*" If not approved: "*Negative RNP-10*"

Note: The procedures above apply in the Gulf of Mexico.

3.2.0 Altimetry Errors

A. Height-keeping errors fall into two broad categories:

1. Errors caused by malfunction of aircraft equipment; and
2. Operational errors.

B. An operator who consistently commits errors of either variety may be required to forfeit authority for RVSM operations. If a problem is identified that is related to one specific aircraft type, then RVSM authority may be removed for the operator for that specific type.

C. The following errors will be reported and investigated:

- TVE (Total Vertical Error) equal to or greater than ±300 ft (±90 m);
- ASE (Altimetry System Error) equal to or greater than ±245 ft (±75 m);
- AAD (Assigned Altitude Deviation) error equal to or greater than ±300 ft (±90 m).

Note: When notified of an error in flight, pilots must take action to return to the CFL as quickly as possible.

D. These altimetry errors will be reported by the flight crew member to the Director of Aviation within 24 hours, and to the FAA within 72 hours. This report will include an initial analysis of causal factors and mitigation measures to prevent further events. An Altitude Deviation Report should be submitted within 72 hours to the applicable organization monitoring the airspace where the event occurred (Appendix K).

3.3.0 Continental Contingency Procedures

A. RVSM Airspace

1. The crew must notify ATC of contingencies (equipment failures, weather) that affect the ability to maintain the CFL and coordinate a plan of action appropriate to the airspace concerned.
2. ATC must be notified when encountering greater than moderate turbulence. A Wake Turbulence Report Form should be submitted (Appendix K).
3. Crews must not intentionally depart from the CFL without a positive clearance from ATC unless conducting contingency or emergency maneuvers. If unable to notify ATC and obtain a clearance prior to deviating from the CFL, the crew should follow any established contingency procedures and obtain ATC clearance as soon as possible.
4. More detailed contingency procedures in domestic US airspace can be found in Appendix M.

B. B-RNAV Airspace

1. Contingency Procedures

   a. Pilots should notify ATC of conditions (e.g., equipment failures and weather conditions) that may affect the ability of the aircraft to maintain position within the designated
   B-RNAV airspace. In this case, flight crews should state their intentions, coordinate a plan of action, and obtain a revised ATC clearance.

b. If unable to obtain an ATC clearance prior to deviating from B-RNAV airspace, the flight crew should follow established contingency procedures, as defined by the region of operation, and obtain an ATC clearance as soon as possible.

2. Emergency Procedures: Operations in B-RNAV airspace or on B-RNAV routes are the same as normal oceanic emergency procedures with two (2) exceptions:
   - Crews must be able to recognize when the aircraft is no longer capable of navigation in accordance with its B-RNAV approval requirements.
   - ATC must be advised accordingly.
3. Strategic Lateral Offset Procedures **are not authorized** in European B-RNAV and/or EUR RVSM-designated airspace.

3.4.0 Partial or Total Loss of LRNS

3.4.1 GNSSU Failures

A. If the GNSSU displays a "loss of navigation function alert," the pilot should immediately revert to other available means of navigation, including Dead Reckoning (DR) procedures, if necessary, until GNSS navigation is regained. The pilot must report the degraded navigation capability to ATC.

Note: A report of GNSS degradation, outage, or other incidents or anomalies may be submitted online at: http://www.navcen.uscg.gov/

B. Satellite Fault Detection Outage

- If the GNSS receiver displays an indication of a fault detection function outage (i.e., RAIM is not available), navigation integrity must be provided by comparing the GNSS position with the position indicated by another LRNS sensor (other than GNSS), if so equipped.
- If the only sensor for the approved LRNS is GNSS, a comparison should be made with a position computed by extrapolating the last verified position with airspeed, heading, and estimated winds.

  Note: If the positions do not agree within 10 NM, the pilot should maintain reversionary procedures until the exclusion function or navigation integrity is regained and should report the degraded navigation capability to ATC.

C. Fault Detection Alert: If the GNSS receiver displays a fault detection alert (i.e., a failed satellite), the pilot may choose to continue to operate using the GNSS-generated position if the current estimate of position uncertainty displayed on the GNSSU from the FDE algorithm is actively monitored.

Note: If this number exceeds 10 NM, the pilot should begin immediately using reversionary procedures until the exclusion function or navigation integrity is regained and should report the degraded navigation capability to ATC.

3.4.2 Loss of Navigation / FMS Capability

A. Aircraft incorporating a triple LRNS may proceed normally with only two systems operational. Aircraft with only two LRNSs should use the following guidance in case of system failure.

B. One System (of Two Operational Systems) Fails Before Takeoff

1. If the remaining system is fully operative, the pilot may file a new flight plan using the designated S-LRNS routes (Refer to Section 2.2.2.4) or obtain a clearance above or below airspace where two LRNSs are required (e.g., NAT HLA); or
2. Delay departure if timely repair is possible.

C. One System (of Two Operational Systems) Fails Before OCA Boundary: The pilot should consider:

1. Landing at a suitable airport before NAT HLA boundary or returning to the airport of departure.

2. Diverting via one of the Special Routes.
3. Obtaining a reclearance below the NAT HLA or above the NAT HLA.

   Note: Under no circumstances should a flight continue into the NAT HLA with unresolved navigational system errors or with errors caused by inertial misalignment or initial data input errors.

D. One System (of Two Operational Systems) Fails After OCA Boundary Is Crossed: The pilot should normally continue in accordance with the oceanic clearance already received. However, the pilot should:

1. Assess prevailing circumstances (i.e., performance of second system or remaining portion of the flight in the NAT HLA).
2. Exercise judgment with respect to prevailing circumstances (i.e., request clearance above or below the NAT HLA, reverse course, obtain reclearance to the Special Routes or divert to suitable alternate).
3. Consult with ATC so that the most suitable action can be selected.
4. Obtain ATC clearance prior to any deviation from current oceanic clearance.
5. If doubt exists with remaining system, the pilot should:
   a. Take special care in operating remaining systems.
   b. Check main and standby compass systems against information on the Master Document.
   c. Check performance record of remaining equipment – if in doubt, maintain outside vigilance and reference to TCAS and call OAC for information on other aircraft in the vicinity to obtain usable navigation information.

E. Remaining System Fails Within the NAT HLA: The pilot should:

1. Notify ATC.
2. Make the best use of procedures specified above.
3. Look for conflicting traffic and maximum use of external lights.
4. If no instructions from ATC, consider climbing / descending 500 ft (150 m):
   a. Broadcast actions on 121.5 MHz.
   b. Advise ATC as soon as possible.

   Note: This procedure also applies when the 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.

F. Dead Reckoning (DR) Procedures Considerations

1. Careful preflight planning;
2. Accurate plotting and measurement of intended flight path at least every 15 minutes;
3. Frequent and systematic reading and averaging information supplied by the navigation instruments;
4. Frequent determination of the wind;
5. Accurate computation of track, ground speed and distance.

   Note: If, during any type of operation in NAT airspace, a deviation from flight plan track is noted, immediate corrective action to return on track is required. At the same time, ATC must be advised, giving the reason for the excursion and action taken to return on route.

3.4.3 WAT: Basic / Inflight Contingency Procedures

A. LRNS Failure or Malfunction After Entry onto WAT Oceanic Routes or Areas: The following is WAT policy for LRNS failure or malfunction en route:

1. At least two (2) RNP-10 or RNP-4 authorized LRNSs shall be operational at entry onto oceanic route segments or areas in the WAT, unless authorized for S-LRNS Operations.
2. After entry onto an oceanic route segment or area within the WAT, if an LRNS fails or malfunctions and only one LRNS remains operational, the pilot shall inform ATC.
   a. ATC will acknowledge and monitor the situation.
   b. The aircraft may continue on the cleared route provided that, in the pilot's judgment, the remaining LRNS will enable the aircraft to be navigated within approximately 10 NM of the cleared route centerline.
3. If, in the pilot's judgment, the aircraft cannot be navigated within approximately 10 NM of the cleared route centerline:
   a. The pilot shall advise ATC of the situation and coordinate a course of action.
   b. The pilot shall:
      - Consider the best option to maintain the safety of the operation (e.g., continuing on route or turning back); and
      - Whenever possible obtain an ATC clearance before deviating from cleared route or FL and keep ATC advised.
   c. ATC will establish an alternative separation standard as soon as practicable, coordinate the safest course of action with the pilot, and monitor the situation.
   d. If coordination with ATC cannot be accomplished within a reasonable period of time, the pilot should consider climbing or descending 500 ft, broadcasting action on 121.5 and advising ATC as soon as possible.

B. Inflight Contingency Procedures (e.g., Rapid Descent, Turn-back, Diversion): Apply the same procedures as inflight contingencies for oceanic airspace (e.g., ICAO Doc 4444).

C. Special Emphasis - Maneuvering to Avoid Convective Weather in a 50 NM Separation Environment: Pilots are required to maneuver (deviate) around convective weather on a regular basis in the course of WAT operations. Weather deviation procedures, therefore, must be emphasized in accordance with the following:

- It is imperative that pilots keep ATC advised of their intentions during the initial weather avoidance maneuver and any subsequent maneuvers to avoid convective weather.
- For distress or urgent situations, direct Air/Ground satellite telephone service (SATVOICE) is available for communication with New York Oceanic, San Juan Center and ARINC (Appendix S).
- Pilots must be aware of the provision to climb or descend 300 ft (depending on the direction of flight and direction of deviation from track) to mitigate the chance of conflict with other aircraft when forced to deviate without a clearance.
- It is recommended that TCAS be operational.

D. Strategic Lateral Offset Procedures (SLOP): Pilots should use SLOP in the course of regular oceanic operations.

E. Flight of aircraft previously authorized RNP-10 with one Long Range Navigation System operational

1. To the maximum extent possible, operators that are authorized RNP-10 should operate on WAT oceanic routes in compliance with those standards. If the situation warrants, however, operators may fly an aircraft on WAT routes with one LRNS operational. The intent of this policy is to allow an aircraft to complete the flight to its destination and/or be flown to a location for repair.
2. If only one LRNS is operational prior to takeoff for flight into the WAT, the aircraft will be treated as Non-RNP-10 and appropriate lateral separation will be applied.
3. Failure or Malfunction of LRNS En route; One LRNS Operational Prior to Entering the WAT: In the situation where at least two LRNS are operational at takeoff, but LRNS failure or malfunction occurs en route and only one LRNS remains operational, the pilot shall take action to inform ATC.
   - The pilot shall report to ATC that only one LRNS is operational and request that ATC amend the flight plan Item 18 entry to delete “NAV/RNP10” and enter “STS/NONRNP10.”
   - In addition, after entering into the WAT, the pilot shall report the “Non-RNP-10” status of the aircraft to ATC.

F. Pilot Report of Non-RNP-10 Status: The procedures described in Section 3.1.3 apply in the WAT.

3.5.0 Communications Failure

A. VMC

1. Continue to fly in VMC.
2. Land at the nearest suitable airport.
3. Upon arrival, report arrival by most expeditious means.

B. IMC

Note: The following procedures are generally applicable, but there may be differences in regional airspaces. Crews must ensure any applicable state AIPs or regional ICAO documents have been consulted (e.g., NAT Doc 007).

1. Non-Radar
   - Maintain the last assigned speed and level, or a minimum flight altitude, if higher, for a period of 20 minutes following failure to report position over compulsory reporting point; thereafter
   - Adjust level and speed in accordance with the filed flight plan.
2. Radar
   - Maintain the last assigned speed and FL or minimum flight altitude, if higher, for a period of 7 minutes following (whichever is later):
     a. The time last assigned level or minimum flight altitude is reached; or
     b. The time the transponder is set to Code 7600 and, if applicable, the ADS-B transmitter is set to indicate the loss of air-ground communications; or
     c. The aircraft’s failure to report its position over a Compulsory Reporting Point; thereafter
     d. Adjust level and speed in accordance with the filed flight plan.
   - When being radar vectored, or having been directed by ATC to proceed offset using RNAV without a specified limit, proceed in the most direct manner possible to rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude.

- Proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination airport and, when required, hold over this aid or fix until commencement of descent.
- Commence descent from the navigation aid or fix specified above at, or as close as possible to, the expected approach time last received and acknowledged; or if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan.
- Complete a normal IAP as specified for the designated navigation aid or fix.
- Land, if possible, within 30 minutes after the estimated time of arrival specified above, or the last acknowledged expected approach time, whichever is later.

  Note: As soon as it is known that an aircraft is experiencing an apparent radio communications failure, the ATC unit will forward information concerning the radio communications failure to all ATS units concerned along the route of flight.

3.5.1 NAT Region - Air / Ground Communications Failure

A. The following procedures are intended to provide guidance for aircraft experiencing communications failure in the NAT. These procedures are intended to complement and not supersede state procedures / regulations.

B. General

1. If equipped (and functional), use CPDLC to communicate with the current ATC authority.
2. If equipped (and functional), use SATVOICE to contact the responsible facility via the short codes published in the applicable state AIPs. (Also refer to Appendix S.)
3. If neither of the above options are fitted or available, attempt to use VHF to contact any available ATC facility or another aircraft, inform them of the difficulty, and request 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. The emergency frequency 121.500 MHz should not be used to relay regular communications, but 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. If experiencing two-way communications failure, broadcast regular position reports on the inter-pilot frequency 123.450 MHz until communications are re-established.
6. If experiencing total two-way communications failure, including loss of HF, VHF, CPDLC, and SATVOICE, operate the transponder on identity Mode A Code 7600 and Mode C.

C. HF Failure: Coordinate with the initial NAT OCA, per the flight planned route, to determine eligibility for HF relief as described in Section 2.2.6, and include any coordinated waiver details in section 18 of the flight plan.

D. Communications Failure After Departure and Prior to Entering the NAT

1. Coordinate with the initial NAT OCA, per the flight planned route, to determine eligibility for HF relief as described in Section 2.2.6.
2. Follow the radio communication failure procedures of the airspace in which the aircraft is operating.
3. If the crew elects to continue the flight, then proceed to the Oceanic Entry Point at the Flight Level and speed resulting from the execution of the adjacent airspace RCF procedures.
4. Continue with the procedures in paragraph E below.

E. Communications Failure After Entering the NAT

1. Maintain the currently cleared route, Flight Level and speed until reaching the Oceanic Exit Point.
2. Crews must not any changes to route, Flight Level or speed before the Oceanic Exit Point unless the PIC deems that a change is critical to ensure the safety of the aircraft.
3. When being vectored or having been directed by ATC to proceed offset using RNAV without a specified limit, proceed in the most direct manner possible to re-join the current flight planned route no later than the next significant point, taking into consideration the applicable minimum flight altitude.

   Note: Paragraphs 1-2 above are rules specific to the NAT whereas paragraph 3 is a globally applicable rule (PANS-ATM).

F. Aircraft with a destination within the NAT should follow the procedures above until reaching the top of their descent point and then follow standard PANS-ATM procedures:

1. Proceed according to the current flight plan to the appropriate navigation aid or fix serving the destination airport and, when required to ensure compliance with the procedures below, hold over this aid or fix until final descent;
2. Commence descent from the aid or fix above at or as close as possible to the expected approach time last received and acknowledged by ATC;

   Note: If no approach time has been received and acknowledged, then commence descent at or as close as possible to the ETA from the current flight plan.
3. Complete a normal instrument approach procedure as specified for the navigation aid or fix; and
4. Land, if possible, within 30 minutes after the ETA specified in paragraph 2 above or the last acknowledged expected approach time, whichever is later.

G. In all cases, after exiting the NAT, crews must follow any applicable radio communication failure procedures of the airspace in which they are operating.

3.5.2 PAC Region - Air / Ground Communications Failure

A. Per ICAO Doc. 7030, the following procedures apply to aircraft operating in the oceanic airspace of the Anchorage Oceanic, Auckland Oceanic, Nadi, Oakland Oceanic, and Tahiti FIRs.

   Note: These procedures are intended to complement and not supersede state procedures/regulations.

B. In the event of total loss of communication, attempt to re-establish communication by all available means.

C. If all attempts to re-establish communication with ATC are unsuccessful:

1. Squawk 7600;
2. If able, broadcast in the blind at suitable intervals: flight identification, FL, aircraft position (including the ATS route designator or the track code) and intentions on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45 MHz);
3. Watch for conflicting traffic both visually and by reference to TCAS;
4. Turn on all aircraft exterior lights (commensurate with appropriate operating limitations);
5. Maintain the last assigned speed and level for a period of *60 minutes* following the aircraft's failure to report its position over a compulsory reporting point (including ADS-C flights), and thereafter adjust speed and altitude in accordance with the filed flight plan;

Note: In airspace where the strategic lateral offset procedures (SLOP) has been authorized, aircraft experiencing communication failure may also elect to initiate SLOP in accordance with state AIP, including an offset of one (1) NM or two (2) NM (1.8 or 3.7 km) right of track.

6. Upon exiting oceanic airspace, conform to the relevant state procedures and regulations.

   Note: In the event of lost communication, ATC shall maintain separation between the aircraft having the communication failure and other aircraft, based on the assumption that the aircraft having the communication failure will operate in accordance with the above procedures.

3.6.0 DLC Equipment Failure

For more detailed contingency procedures, flight crews should consult the Global Operational dataLink Document (GOLD), applicable manufacturer's AFM supplements, Flight Crew Operating Manuals, ICAO Oceanic Errors Safety Bulletin, and/or the procedures in Appendix C, as applicable.

3.6.1 NAT Region

A. If a flight experiences an equipment failure prior to departure that renders the aircraft non-CPDLC compliant, the flight should plan so as to remain clear of NAT DLC airspace.

B. If a flight experiences an equipment failure after departure that renders the aircraft unable to operate CPDLC and/or ADS-C systems, requests to operate in the NAT DLC airspace will be considered on a tactical basis. Such flights must notify ATC of their status prior to entering the airspace.

C. If DLC equipment failure occurs while the flight is operating within NAT DLC airspace, ATC must be immediately advised. Such flights may be re-cleared so as to avoid the airspace, but consideration will be given to allowing the flight to remain in the airspace, based on tactical considerations.

D Contingency Situations: NAT DLC airspace restrictions are not applicable to aircraft experiencing a contingency situation.

3.7.0 Unexpected Closure of ATC Facility (TIBA Procedures)

A. Flights within any oceanic airspace: Continue as last cleared and contact the next ATC unit as soon as possible with a position report. Flights operating with an oceanic clearance are expected to continue in accordance with the last clearance issued, unless otherwise advised by ATC. Flightcrews should use extreme caution and use all available means to detect any conflicting traffic.

B. Flights approaching any oceanic airspace when the contingency is activated:

- Flights not in receipt of an oceanic clearance should land at an appropriate aerodrome or, if feasible, request clearance to avoid the affected OCA.
- Flights in receipt of an acknowledged oceanic clearance (where applicable):
  - Aircraft operating with a received and acknowledged oceanic clearance can continue, at the crew's discretion, but should expect limited ATC service within the affected OCA. Due to the uncertainty surrounding the contingency situation, flightcrews should, if possible, consider seeking a clearance to reroute around the affected OCA.
  - Flightcrews are requested to broadcast traffic information in the blind to other flights/stations on 121.5 and on 123.45 (or 126.9 MHz as appropriate in designated IATA broadcast areas), in order to exchange position information. A continuous watch and regular broadcasts must be maintained.

- Crews should be advised that ATC may invoke the ICAO Traffic Information Broadcast by Aircraft (TIBA) procedure, with broadcasts in the following form:

  "*ALL STATIONS* [call sign], *FLIGHT LEVEL* [number] [or *CLIMBING/DESCENDING TO FLIGHT LEVEL* [number]] [direction] [ATS route] [or *DIRECT FROM* [position] *TO* [position]] *POSITION* [position] *AT* [time] *ESTIMATING* [next reporting point, or the point of crossing or joining a designated ATS route] *AT* [time] [call sign] *FLIGHT LEVEL* [number] [direction]."
- TIBA calls should be provided by the crew at the following times:
  a. 10 minutes before entering the designated airspace or, when taking off from an aerodrome located within the lateral limits of the designated airspace, as soon as appropriate after takeoff;
  b. 10 minutes prior to crossing a reporting point;
  c. 10 minutes prior to crossing or joining an ATS route;
  d. At 20-minute intervals between distant reporting points;
  e. 2 to 5 minutes, where possible, before a change in flight level;
  f. At the time of a change in flight level; and
  g. At any other time considered necessary by flightcrew.

C. Additional considerations:
- Flights involved in level change should complete the maneuver as soon as possible in accordance with the clearance.
- Mandatory position reports should be accomplished via HF or SATVOICE until directed by ATC.
- Flights equipped with DLC should communicate using HF or SATVOICE while attempting to reestablish CPDLC connection in airspace where ATC services are suspended.
- Flights may request their flight dispatch offices to provide traffic information and/or forward position reports, to the relevant OCA.

D. Oceanic Checks: Due to the unpredictable nature of a loss of ATC services, crews should plan their operations anticipating a loss of ATC services at any point in the flight. Crews should exercise extra vigilance with course verification procedures (e.g., plotting) to track their progress and assist in identifying deviations from their cleared track. The following procedures are especially important:
1. Verify and adhere to the current effective clearance received from ATS facilities.

   Note: Mach (if assigned) or airspeed may need to be adjusted based on proximate traffic.
2. Utilize applicable course verification procedures (e.g., plotting).
3. Conduct navigation accuracy checks.
4. Conduct waypoint and 10-minute post-position checks.
5. Utilize SLOP (up to 2NM right of course).
6. Prior to departure, ensure that TCAS, if installed, is operative.
7. Applicable contingency plans should be available in the aircraft.

E. Additional recommendations:
- Consistent with the applicable AIP, if crews encounter situations that are not covered by regulation, they are expected to exercise good judgment in whatever actions they elect to take.
- Additionally, crews should:
  1. Monitor for traffic visually and by using TCAS or ADS-B In, if equipped.

2. Ensure all appropriate exterior lights are operable and turned on.
3. Monitor and use, as appropriate, relevant communication channels (e.g., 121.5/123.45 or 126.9 MHz in oceanic airspace) to include HF frequencies for traffic and situational awareness, and SATVOICE and/or DLC.

- It is recommended that a copy of ICAO NAT Doc #006 be available for reference for detailed ATC closure contingencies in the NAT. It can be downloaded from the URL below:

  https://www.icao.int/eurnat/pages/eur-and-nat-document.aspx

3.7.1 Evacuation / Closure of Gander ATC

The Gander Air Control Center has provided a detailed list of waypoints to be used by flights that have already been cleared for entrance into the Gander OCA, in the unexpected event that Gander ACC is evacuated or otherwise closed. The list can be found in NavCanada AIP, Section ENR 7.4.2:

https://www.navcanada.ca/en/aeronautical-information/aip-canada.aspx

3.8.0 Inflight Emergencies

A. Crews should review the emergency procedures and checklists contained in the AFM for type-specific procedures for the inflight emergencies in the following subsections.

B. Due to the remoteness of some routes, crews must be prepared to make prompt decisions with respect to altitude and route for diversion. Per the preflight planning procedures described in Section 2, pilots shall review the weather at altitudes expected to be flown after an engine failure or cabin depressurization. A careful analysis of potential diversion airports and Equal Time Point (ETP) planning is essential.

3.8.1 Engine Failure En Route

After the aircraft emergency checklists are completed, pilots will divert to the nearest suitable airport. This will be based on the reported and forecast winds at the drift down altitude, weather at the potential diversion airport, type of ATC and CTAF facilities, and the number, length, and condition of the runways.

3.8.2 Cabin Depressurization

A. After the aircraft emergency checklists are completed, pilots will divert to the nearest suitable airport. Because fuel flow increases significantly at lower altitudes, preflight planning should include required fuel at 10,000 – 15,000 ft. Pilots should note that supplemental cabin oxygen is not designed to allow passengers to breathe normally above 15,000 ft.

B. Flights over Greenland:

- Due to frequent inclement weather over Greenland and the high elevation of the terrain, additional attention should be paid to contingencies in the event of pressurization or emergency descent situations.
- The elevation of the highest point in Greenland is 13,120 ft MSL, and the general elevation of the icecap is 9,000 ft MSL. Due to the low temperatures and high wind speeds, the lowest useable FL under certain conditions may be FL235 near the highest point and FL190 near the icecap.
- High-capacity cabin heating systems are necessary due to the very low inflight temperatures usually encountered, even in summer. Rapidly changing weather situations involving severe icing, severe turbulence, and heavy precipitation are common and require extra vigilance.

- The following map provides an overview of the topography of Greenland:

Source: Maps.com

3.8.3 Volcanic Ash

A. Flying into a volcanic ash cloud is exceedingly dangerous. Pilots should avoid any encounter with volcanic ash.

B. The ash plume may not be visible, and, even if visible, it is difficult to distinguish between an ash cloud and an ordinary weather cloud. Volcanic ash clouds are not displayed on airborne or ATC radar.

C. Detection: The following have been reported by flight crews:

- Smoke or dust appearing in the cockpit;
- An acrid odor similar to electrical smoke;
- Multiple engine malfunctions;
- Sudden and unexpected outside darkness;
- Airspeed fluctuations;
- Landing lights casting a sharp, distinctly visible beam; and
- At night, St. Elmo's fire or other static discharges accompanied by a bright orange glow in the engine inlets.

D. Volcanic Gases: Volcanic activity can be detectable by the smell of sulfurous gases (H_2S and SO_2) in the aircraft cabin. The detection of gases in the cabin will be handled and disseminated in pilot reports (PIREPs).

- H_2S, also known as "sewer gas," has the odor of rotten eggs. SO_2 is identifiable as the sharp, acrid odor of a freshly-struck match.
- The METAR code "*VA*" is used for volcanic ash in PIREPs, including the detection of H_2S and SO_2. The PIREP Remarks will include the terms "*H_2S*," "*SO_2*," or "*SULFUR SMELL*."

- If a pilot reports the smell of gases but confirms that no volcanic ash clouds are present, it will be classified as a "*ROUTINE PIREP*." The Remarks will include the words "*NO ASH*" if volcanic ash clouds have not been confirmed (e.g., "*SULFUR SMELL NO ASH*").

E. If volcanic ash is encountered, the following procedures should be followed:

1. Flight crews will reference the AFM for aircraft-specific procedures if encountering volcanic ash. General escape procedures are as follows:
   a. Every attempt should be made to remain on the upwind side of the volcano.
   b. Turn on ignition and use supplemental oxygen.
   c. Disengage autothrottle, reduce thrust to idle (if possible), and reverse course.

      Note: Ash clouds may extend for hundreds of miles and pilots should not attempt to fly through or climb out of the cloud.
   d. Prepare to land with little or no forward visibility. Use of autoland, if available, is recommended.

      Note: Ash on runways dramatically reduces braking effectiveness. Plan on a longer rollout. Use of reverse thrust should be limited due to possible ash ingestion and reduced visibility.
2. Volcanic ash may block the pitot system and result in unreliable airspeed indications.
3. If a volcanic eruption is observed, the pilot will notify ATC immediately. If possible, flight crews should complete the Volcanic Activity Reporting (VAR) Form (Appendix I).

   Note: Additional information concerning volcanic eruptions in Alaska and the North Pacific Region can also be found in Appendix I.
4. On takeoff, pilots should avoid operating in visible airborne ash. Flap extension should be delayed until initiating the before takeoff checklist. A rolling takeoff should be executed to avoid blowing ash back into the air.

3.8.4 Suspected Contagions or Communicable Diseases

A. If there is an onboard death or suspected contagious illness on the flight, it must be reported to ATC as soon as possible. ATC will immediately forward the message to any applicable organizations for further handling, such as the ATC units serving the destination airport.

B. Additional instructions may be relayed to the PIC regarding any additional procedures or precautions to be taken.

C. For flights with a US destination that report a suspected contagion, ATC will notify the US Domestic Events Network (DEN) of the report, using the code "*…requests a CDC consult*." The DEN will send the report to the CDC, who will in turn notify the CDC Quarantine Station with jurisdiction for the arrival airport.

Note: The CDC Quarantine Station will contact a designated point of contact to obtain necessary details of the death or illness. Also, the quarantine station will provide an update to the DEN about the response.

D. Symptoms of a suspected communicable disease include:

1. Fever (warm to the touch, history of feeling feverish, or measured temperature of 100°F/37.8°C or greater) reported to have lasted more than 48 hours; or
2. Fever of any duration, and one or more of these conditions:

Skin rash	Persistent cough	Headache with stiff neck
Swollen glands (visible)	Persistent vomiting	Decreased consciousness
Jaundice	Difficulty breathing	Unexplained bleeding

E. Information to include in the report should include:
   - Aircraft identification;
   - Departure airport;
   - Destination airport;
   - Estimated time of arrival;
   - Number of persons on board;
   - Number of suspected cases(s) on board; and
   - Nature of the public health risk, if known.

F. After landing, the aircraft should not be used for any further operations until appropriate cleaning / disinfection has been completed, as recommended by health authorities, and only after consulting with a qualified health responder regarding the suspected contagion.

3.8.5 Inflight Medical Emergencies

A. Crews should consider a diversion in the event of an inflight medical situation, depending on the practicality of the diversion and the urgency of the situation. Crews should consider and discuss their options immediately upon being informed of any medical issue on board in order to provide a timely response.

B. Crews will make every effort to use available inflight medical services (i.e., MedAire or equivalent) to more accurately diagnose the condition of the affected individual, as well as to determine whether an in-flight deviation is necessary, and if so, to locate the closest, most suitable deviation destination.

C. Crews should consider the following factors when choosing a diversion airfield:
   1. Medical:
      - Services required based on the diagnosis of the affected passenger / crewmember;
      - Availability of medical staff at the airfield;
      - Availability and proximity of ambulances, hospital(s), and specialist facilities.
   2. Operational:
      - Aircraft weight;
      - Aerodrome facilities;
      - Weather at and in the vicinity of deviation destination;
      - Availability of ground support;
      - Availability of customs;
      - Availability of fuel services.

D. If ATC priority is required, crews should declare an emergency using the appropriate emergency communications protocols.

3.9.0 Survival and Rescue

If a forced landing occurs at sea, survival chances are governed by the crew's proficiency in emergency procedures and the effectiveness of water survival equipment on board the aircraft. The crew must demonstrate total confidence that rescue is simply a matter of time. The right attitude also reinforces the will to live even when physical condition is at its lowest point.

3.9.1 Airborne Emergency Management

A. The PIC should declare an emergency when any abnormal situations affect the safety of flight. Management of the emergency will be in accordance with the aircraft Standard Operating Procedures (SOPs) and well defined as to who will:

- Fly the aircraft;
- Accomplish the checklist; and
- Navigate and communicate with ATC.

B. The PIC has the option for cancelling the emergency if later developments so dictate.

Note: The aircraft emergency checklists will be followed, as applicable.

3.9.2 Ditching

A. The pilot should initiate the distress call to the appropriate agency per ATC instructions.

B. When contacting Oceanic Control, the following information will be given:

- Aircraft identification;
- Timed position;
- Altitude;
- Ground speed;
- True course;
- Hours of fuel remaining;
- Description of the emergency;
- Pilot’s intention; and
- Assistance desired.

C. The crew should request Automated Merchant Vessel Report (AMVER) system information (www.amver.com). This action can be accomplished by Oceanic Control.

1. Ditching should be planned close to the nearest vessel.
2. Surface winds, recommended ditching heading, and sea conditions will be provided by that vessel.

3.9.3 Survival Equipment

A. When flying over water and at a distance of 50 NM or more from shore, the aircraft must carry:

- One lifejacket or equivalent flotation device for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.

B. When flying over water and at a distance of 30 minutes or 100 NM or more from a suitable emergency landing site, the aircraft must carry:

- A life preserver, equipped with an approved survivor locator light for each occupant of the airplane;
- Enough liferafts (each equipped with an approved survival locator light) of a rated capacity and buoyancy to accommodate the occupants of the airplane;

  Note: If the aircraft is certified for ditching, there must be enough liferafts so that if one raft is lost, the remaining liferaft(s) have sufficient (overload) capacity to provide for the maximum occupancy of the aircraft.
- At least one pyrotechnic signaling device for each liferaft; and
- One self-buoyant, water-resistant, portable emergency radio signaling device that is capable of transmission on the appropriate emergency frequency(ies) and not dependent upon the airplane power supply.

C. Any required liferafts, life preservers, and signaling devices must be installed in conspicuously marked locations and easily accessible in the event of a ditching without appreciable time required for preparatory procedures.

3.10.0 Reporting of Incidents and Serious Incidents

A. ICAO Annex 13 defines “incidents” and “serious incidents” as the following:

- Incident: An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.
- Serious Incident: An incident involving circumstances indicating that there was a high probability of an accident and associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down.

B. Annex 13 outlines several incidents of primary interest that must be reported in the country in which the event occurs:

- Engine Failure;
- Fires;
- Terrain and obstacle clearing incidents;
- Takeoff and landing incidents;
- Flight crew incapacitation;
- Decompression; and
- Near collision.

C. Further references on reporting can be found in ICAO Annex 13 and at the URL below:

https://www.skybrary.aero/index.php/Reportable_Incidents

D. ADREP Reporting Forms (Accident/Incident Data Reporting) have been established for the States to report any incidents/serious incidents. References to these forms and the reporting system can be found at the URLs below:

https://www.icao.int/safety/AIA/Pages/default.aspx

https://www.skybrary.aero/index.php/ICAO_ADREP

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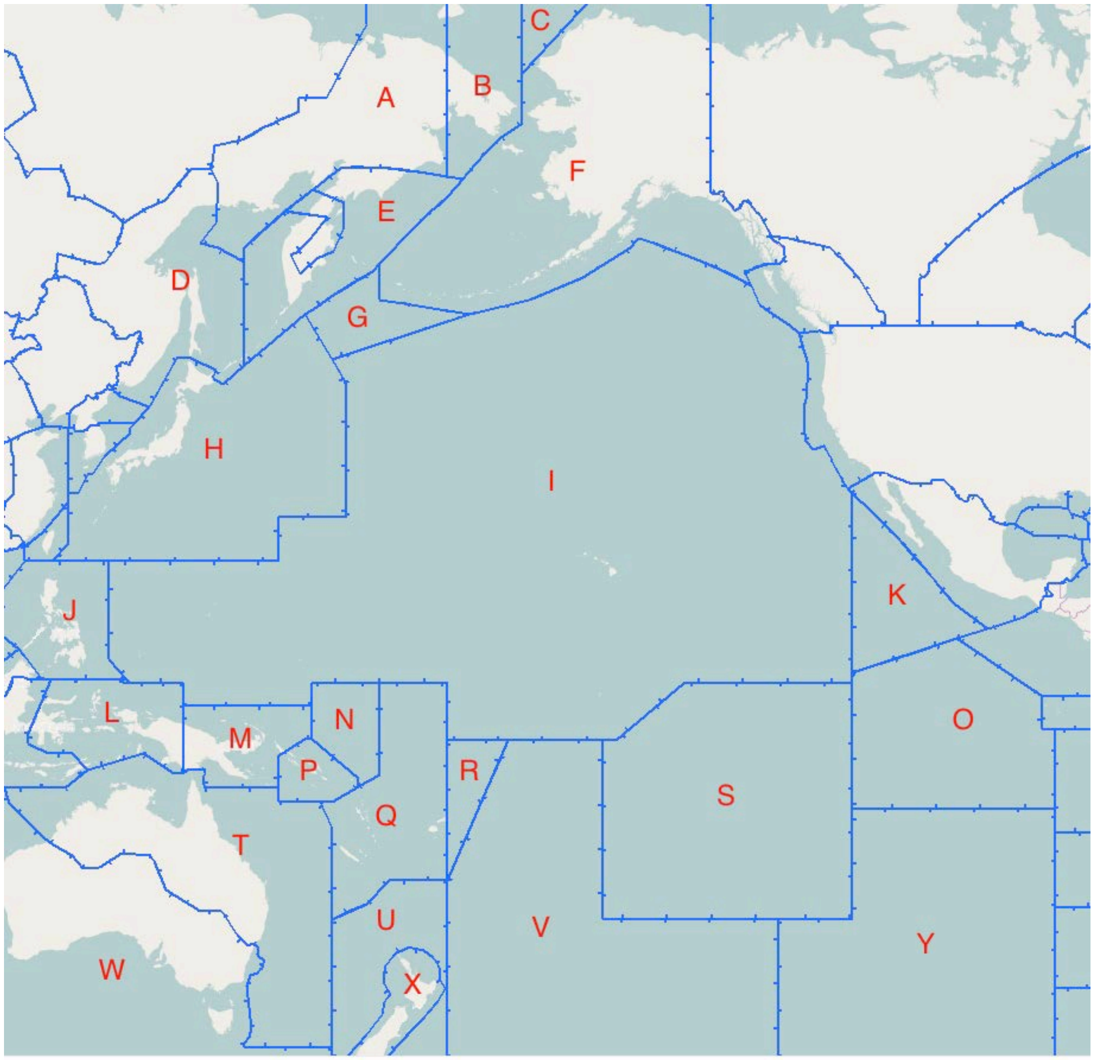
Section 4: Pacific Region

4.1.0 Overview

4.1.1 Flight Information Regions



Source: Gilbert Lasnier & Magda Morawski via ESRI

A	Magadan Sokol East (UHMM)	N	Nauru (ANAU)
B	Magadan West (UHPP)	O	[Uncontrolled]
C	Anchorage Arctic (PAZA)	P	Honiara (AGGG)
D	Khabarovsk (UHHH)	Q	Nadi East (NFFF)
E	Petropavlovsk-Kamchatsky (UHPP)	R	Nadi West (NFFF)
F	Anchorage Continental (PAZA)	S	Tahiti (NTTT)
G	Anchorage Oceanic (PAZA)	T	Brisbane (YBBB)
H	Fukuoka (RJJJ)	U	Auckland Oceanic East (NZZO)
I	Oakland Oceanic East (KZAK)	V	Auckland Oceanic West (NZZO)
J	Manila (RPHI)	W	Melbourne (YMMM)
K	Mazatlan Oceanic (MMFO)	X	New Zealand (NZZC)

L	Ujung Pandang (WAAF)	Y	Isla de Pascua (SCIZ)
M	Port Moresby (AYPM)		

4.1.2 Implementation of Special Areas of Operation (SAOs)

A. RVSM Airspace: RVSM has been implemented in the Pacific Oceanic FIRs between FL290 and FL410 (inclusive). NOTAMs and state AIPs should be consulted for additional special procedures in the relevant FIRs.

B. RNP-10 Airspace and / or Routes

- RNP-10 standards have been implemented in the Central East Pacific (CEP) Route System and North Pacific (NOPAC) Route Structure from FL290 to FL410 inclusive. This includes all fixed or flexible tracks, which join, cross or diverge from the NOPAC.
- Aircraft utilizing the Pacific Organized Track System (PACOTS) must be capable of and authorized for RVSM and oceanic RNP-10, RNP-4, or RNP-2.
- Australia and New Zealand have also implemented RNP-10 in the Tasman Sea airspace.

4.1.3 General Considerations

A. Oceanic Error Reports

- Pacific oceanic airspace is continuously monitored by ATC for navigational errors. Errors of the following magnitude will be reported by ATC in an Oceanic Error Report:
  1. Gross Navigation Errors (GNEs) – 10 NM laterally;
  2. Height Errors – 300 ft or more from cleared altitude;
  3. Time (longitudinal) errors – More than 2 minutes difference between the Actual Time of Arrival and the Estimated Time of Arrival.
- Flight crews will be queried about any observed errors and advised that an Oceanic Error Report is being filed. Pilots should understand that these reports are instrumental in providing data for detecting significant changes in the navigational environment, which may require corrective action.

B. Basic Oceanic Long Range Navigation and Communication Requirements

1. If a flight inadvertently deviates from an ATC cleared route, immediate action should be taken to rejoin the track as soon as possible. When a deviation from track is discovered, ATC must be informed so that appropriate actions may be taken to resolve any potential hazards to other aircraft that may have been created by the deviation.

   Note: Crews should be aware that any navigation error that results in an aircraft straying from the centerline of its cleared route and beyond its protected airspace could create a significant hazard, since the error could not normally be observed by ATC.

2. Pacific Area Communication
   a. High Frequency (HF) radio is required in every Pacific Oceanic FIR and must be operative for departure to remote and oceanic areas.
   b. Frequency 123.45 MHz has been designated for use in the air-to-air communications between aircraft operating in the Pacific area out of range of VHF ground stations to exchange operational information and facilitate resolution of operational problems.
   c. Use of satellite telephones does not provide a continuous air / ground communication watch and therefore does not meet minimum ICAO requirements. However, satellite phones may be used as a backup to HF communications in the event that the aircraft is unable to contact ARINC on HF.

C. Mandatory RVSM Pilot Procedures: Except when under radar, Pacific Air Traffic Service Providers (ATSP) require pilots to report leveling at an assigned FL.

D. Mach Speed

1. For turbojet aircraft intending to operate within the Anchorage Oceanic and Oakland Oceanic FIRs, the planned true Mach number shall be specified in Item 15 of the flight plan.
2. Per ICAO Doc 7030 (Pacific Supplement): If for any reason, the Mach number/true airspeed at cruising level varies by plus or minus 0.02 Mach/10 knots or more from the first filed speed entry in flight plan form Item 15, ATC must be so informed immediately.

   Note: The NAT uses the "MACH number assigned" methodology with its implementation of 10-minute longitudinal separation, however, in the PAC regions, ZOA and ZAN ATC use 10-minute longitudinal separation without MACH number assigned.

4.1.4 Flight Hazards

A. Electromagnetic Radiation: International flight crewmembers should review the entire route of flight so as to avoid flight into areas of possible electromagnetic radiation.

B. Pilots should be aware of a greater risk of volcanic ash when flying over the Pacific Ocean. The information in Section 3.8.3 should be referenced prior to flights over the Pacific.

4.2.0 Oakland Oceanic Control Area (Oakland Oceanic FIR)

A. Central East Pacific (CEP)

1. The Central East Pacific (CEP) system is the organized route system between Hawaii and California. Seven ATS routes, R463, R464, R465, R585, R576, R577, and R578, and associated transition waypoints are within the CEP. RVSM and RNP-10 are required for aircraft operating within the CEP at FL290 through FL410. Non-approved aircraft can expect FL280 and below or FL430 and above, traffic permitting.
2. R464, R465, R585, R576 and R577 are one-way routes and any odd or even cardinal FL may be flight planned.
3. Applicable ATC procedures can be found in Order JO 7110.65 and ICAO Doc 7030.

B. Composite Separation: Composite separation is achieved by using a combination of at least 50 NM lateral separation and 1,000 ft vertical separation. Composite separation may be applied to aircraft established within the CEP and/or aircraft leaving/joining the CEP.

C. Lateral Separation

1. 23 NM lateral separation will be applied in the Oakland OCA between aircraft equipped with and authorized for RNP-4, CPDLC (FANS), and PBCS (RCP 240 and RSP 180). Crews must ensure the flight plan is appropriately coded for these capabilities to receive this separation standard.

   Note: Crews of such flights must ensure they are aware of special considerations for operating in a reduced lateral separation environment (Section 2.2.2.6).
2. 30 NM lateral separation will be applied within the Oakland Oceanic FIR between RNP-4 approved aircraft with CPDLC equipment, but without PBCS capability.
3. 50 NM lateral separation will be applied within the Oakland Oceanic FIR between aircraft approved only for RNP-10.
4. RNP-10 / RNP-4 lateral separation is based on the equipment qualifier filed by the aircraft. Flight crews will confirm that the aircraft has been authorized for and will meet the RNP-10 / RNP-4 requirements for the filed route of flight and any planned alternate routes.

D. RVSM Separation

1. RVSM (1,000 ft vertical separation between RVSM approved aircraft) may be applied within the Oakland Oceanic FIR between FL290 and FL410. Aircraft operating within this airspace require RVSM approval.
2. RVSM vertical separation will be based on the equipment qualifier filed by the aircraft. Flight crews will confirm that the aircraft has been authorized for and will meet the RVSM requirements for the filed route of flight and any planned alternate routes. The letter “W” in Item 10a (equipment) of the ICAO standard flight plan indicates RVSM approved aircraft.

E. Procedures for Suspension of RVSM: ATC will consider suspending RVSM procedures within affected areas of the Oakland FIR or Anchorage FIR when there are pilot reports of greater than moderate turbulence. Within areas where RVSM procedures are suspended, the vertical separation minimum between all aircraft will be 2,000 ft.

F. Direct SATVOICE Capability: Direct SATVOICE contact between the pilot and Oakland Center shall be limited to distress and urgency situations or other exceptional circumstances.

4.2.1 Requirement for Flight Plan Filing

A. It is strongly recommended that ICAO flight plan messages be filed and transmitted to the appropriate Control Center not less than one (1) hour before estimated time of departure. Flight crews should review each state’s requirements for any additional restrictions.

B. For oceanic departures, Mach speed and FL should be specified in the flight plan. Mach number and FL should immediately precede the initial domestic portion of the route of flight.

C. In accordance with ICAO Doc 4444, flight plans with routes entering the Oakland OCA must contain the EET in Field 18, an entry point for KZAK, and an estimated time. It is not mandatory to file the boundary crossing point in Field 15 of the route of flight, but it is permitted.

4.2.2 Altimetry Procedures

Pilots operating an aircraft shall maintain the cruising altitude or FL of the aircraft by reference to an altimeter that is set:

- Within the Hawaiian Islands domestic area, within 100 NM of the Nimitz VORTAC, and within 35 NM of Saipan NDB:
  1. At FL180 and above, to standard altimeter setting 29.92” Hg (QNE).
  2. Below FL180, to current altimeter setting (QNH).
- Within all other areas of the Oakland Oceanic FIR, at or above 5,500 ft MSL, to standard altimeter setting 29.92” Hg.

4.2.3 Transponder Codes

A. Flights assigned to a particular code by ATC are expected to remain on that code until further advised by ATC.

B. Upon entering the Oakland OCA, and after radar service is terminated, the pilot should adjust the transponder to display Code 2000 on the display. Aircraft should maintain Code 2000, thereafter, until otherwise instructed by ATC.

Note: For flights departing the Hawaiian Islands, remain on the last assigned discrete beacon code until crossing one of the following fixes: ZOULU, AUNTI, CEBEN, ELOYI, FAPIS, SAYTO, BARKR, MCFLY, AJINK, BRIUN, CRESP, DOGIF, ECEDO, FLYHM, GENCO, or the common boundary between PHZH and KZAK. Do not change to Code 2000 until the aircraft is past one of these fixes and within KZAK airspace.

C. Should the pilot experience a loss of two-way radio capability, the pilot should adjust the transponder to reply on Mode A/C, Code 7600.

4.2.4 Oceanic Position Reporting Procedures

A. General

1. "Any" waypoint filed in the route of flight (Item 15) must be reported as a position report whether the filed waypoint is compulsory or not. This applies to non ADS-C equipped aircraft.
2. If a non-compulsory waypoint is not filed in Item 15, it does not need to be reported.

   Note: Aircraft with an active ADS connection should make one CPDLC position report over the FIR boundary and discontinue CPDLC waypoint reporting after the FIR report.

B. Position Reports

1. When operating on a published ATS route or a temporary route established by a NOTAM, report and estimate the designated reporting points using the specified names of such points or geographical coordinates as specified in the NOTAM.
2. When operating on a random route:
   a. Flights whose tracks are predominantly east and west shall report over each 5° or 10° (10° if the speed of the aircraft is such that 10° will be traversed within 80 minutes or less) meridian longitude extending east and west from 180°.
   b. Flights whose tracks are predominantly north and south shall report over each 5° or 10° (10° if the speed of the aircraft is such that 10° will be traversed within 80 minutes or less) parallel of latitude extending north and south of the equator.
3. ATC may require specific flights to report more frequently than each 5° for aircraft with slow ground speeds.
4. Position reports shall be transmitted at the time of crossing the designated reporting point or as soon thereafter as possible.

C. Contents of Position Reports: Position reports shall comprise information on present position, estimated next position, and ensuing position in sequence as indicated below.

1. Present Position: Information shall include:
   a. The word "position";
   b. Aircraft identification;
   c. Reporting point name, or if not named:
      1) Latitude (2 digits or more); and
      2) Longitude (3 digits or more).
   d. Time over reporting point (4 digits UTC);
   e. Altitude (Flight Level): When forwarding an altitude report within the Oakland FIR, pilots should report their present altitude and their assigned altitude exactly as cleared if the present and assigned altitudes differ. A restriction to cross a point at an altitude is not a block altitude assignment and should not be reported as a block of altitudes.
2. Estimated Next Position
   a. Reporting point name, or if not named, latitude and longitude, as described above; and
   b. Estimated time over next position (4 digits UTC).
3. Ensuing Fix: Name only of the next succeeding fix whether compulsory or not, or if not named, latitude and longitude as described above.

D. Weather Reports: Weather reports shall be included as provided in Section 3 of the Standard AIREP Form by all flights unless exempted from weather reporting by the Weather Service and / or ATC.

E. Adherence to ATC Approved Routes: If an aircraft inadvertently deviates from its route, action shall be taken to regain it as soon as possible and not further ahead than 200 NM from the DR position at which the heading was altered to regain the route specified in the ATC clearance. Action to regain this route shall not be delayed in anticipation of obtaining a requested reclearance.

F. Exceptions to Oceanic Position Reports

1. Within Oakland FIR, no 5° report needs to be made that would fall within 100 NM of Guam. Aircraft cleared via terminal area routes report compulsory reporting fixes. Other aircraft report 100 NM from Nimitz VORTAC. Where other island destinations within the Oakland FIR are not more than one (1) degree latitude-longitude from a 5° fixed line reporting point, the ETA and arrival report may be substituted in lieu of the adjacent fixed line report.
2. To the east of the Hawaiian Islands, it will not be necessary to report the 155°W position if position will be reported at the entry / exit fixes on the Honolulu Domestic / Oceanic boundary. To the west of the Hawaiian Islands, 160°W need not be reported.

G. Position Reports over Oakland OCA / FIR Boundary

1. Aircraft entering the Oakland OCA over 120 degrees West longitude without a KZAK ADS-C connection are requested to forward boundary position reports via San Francisco Radio or CPDLC.

   Note: Aircraft filed on the PACOTS within Oakland OCA airspace must make position reports using latitude / longitude coordinates or named fixes as specified in the Track Definition Messages (TDM). Position reports must comprise information on present position, estimated next position, and ensuing position. Reporting points of reference not specified in the TDM and/or rounding off geographical coordinates is prohibited.
2. Aircraft leaving the lateral limits of the Oakland FIR and entering uncontrolled airspace shall forward the time over the boundary outbound.

4.2.5 Climb Times / Change of Flight Level

A. Climb Times: A distinction should be made between the flight time at which the higher FL is requested and the time at which the next higher FL can be accepted.

B. Change of Flight Level

- Pilots are advised that when an aircraft is proceeding from one OCA to another at the time that a change of FL is desired, coordination must be accomplished between the Control Centers concerned before an ATC clearance can be issued.
- An FL request shown on a flight plan does not constitute authority for an aircraft to change FL; a specific ATC clearance for the FL change is required.

4.2.6 True Airspeed / Mach Number Reporting

A. Change of Speed: Pilots must inform ATC prior to making a planned en route speed change, as indicated in Item 15 of a filed flight plan. Such changes are not authorized when a specific ATC clearance assigning a Mach number to maintain has been issued.

B. Crews must inform ATC via voice or CPDLC each time the cruising Mach number varies or is expected to vary by a value equal to or greater than 0.02 Mach from:

1. The Mach number at FIR entry; or
2. Any subsequent speed change notified to ATC in flight.

4.2.7 DLC Procedures

A. Oakland ARTCC has full CPDLC capability and normal service in the entire Oakland OCA/FIR for capable aircraft. The Oakland OCA/FIR log-on address is “KZAK” and the facility is “OAKODYA.”

B. HF Communications Requirement: Prior to entering the Oakland OCA/FIR, contact ARINC (San Francisco) on HF and identify the flight as CPDLC equipped. Provide SELCAL, departure and destination, aircraft registration number, and advise whether SATVOICE equipped. Expect to receive primary and secondary HF frequency assignments from ARINC for the entire route of the flight within the Oakland OCA/FIR. Pilots must maintain HF communications capability with ARINC at all times within the Oakland OCA/FIR.

C. Log-On

1. For aircraft departing from airports along the west coast of North America, Guam, and Hawaii, Oakland OCA requires that aircraft not logon to Oakland Oceanic (KZAK) until after leaving 10,000 ft MSL. This request is made to eliminate ADS periodic reports for aircraft that are still on the ground.
2. Aircraft entering the Oakland OCA/FIR CPDLC service area from non–CPDLC airspace: Log on at least 15 but not more than 45 minutes prior to entering the Oakland CPDLC service area. Contact ARINC on HF and inform them you are a CPDLC flight. Send a position report when CPDLC is established.
3. Aircraft entering the Oakland OCA/FIR CPDLC service area from adjacent CPDLC airspace: Pilots should determine the status of the CPDLC connection. If KZAK is the active center, the pilot shall contact ARINC on HF, identify the flight as a CPDLC flight, and send a position report via CPDLC. If KZAK is not the active center the pilot shall, within 5 minutes after the boundary is crossed:
   - Terminate the CPDLC connection;
   - Log on to KZAK;
   - Contact ARINC on HF and inform them that it is a CPDLC flight; and
   - Send a position report when CPDLC ATC COMM is established.

D. CPDLC Position Report Message Format: KZAK cannot accept position reports containing latitude and longitude in the ARINC 424 format, which is limited to five characters. Position reports in the KZAK CPDLC service area containing lat/long waypoints will be accepted in complete lat/long format only. Flights unable to send position reports in the complete format must accomplish position reporting via HF voice communications.

E. Aircraft Over-Flying Honolulu Control Facility (HCF) Airspace: Prior to entering HCF airspace, aircraft will receive an END SERVICE message that will result in termination of CPDLC. Aircraft shall re-log on prior to reentering Oakland OCA/FIR airspace when HCF advises to contact en route communications or ARINC.

F. Aircraft Entering Guam CERAP Airspace: Contact Guam CERAP 250 miles out on 118.7, squawk 2100.

G. Aircraft Over-Flying Guam CERAP Airspace: The CPDLC and ADS connection with Oakland ARTCC may be terminated within the GUAM CTA. If the connection with KZAK is not terminated, do not use CPDLC for ATC COM until Guam CERAP advises contact en route communications or ARINC. It may be necessary to log back on with KZAK 10-15 minutes prior to exiting the Guam CTA if the connection was terminated.

4.2.7.1 Oceanic Tailored Arrival (OTA) Guidelines

A. OTAs are currently being provided to properly equipped eastbound aircraft arriving into San Francisco and Los Angeles. An OTA allows for these aircraft to begin an earlier and more gradual descent while over the ocean rather than flying level segments, thus reducing fuel costs.

B. Only aircraft fitted for DLC may utilize an OTA.

C. The Director of Aviation will ensure that flight crews have completed the necessary training (e.g., CPDLC) prior to utilizing an OTA.

D. Aircraft must downlink a free-text message “RQST TA” at least 45 minutes prior to exiting the oceanic boundary.

E. KSFO Pacific TA: This TA is only available during west plan operation (RWY28). KSFO arrivals on PACOTS Track 2 that desire a TA may request a reroute (DARP) over the following fixes after entering Oakland OCA:

FATMO	DACEM	CEPAS	BUTEN	ALLBE

F. KLAX Pacific TA: This TA is only available during west plan operation (RWY25) and to aircraft routed over FICKY. Aircraft filed over other fixes may request a reroute (DARP) to FICKY.

4.2.8 Guam Area Preferential Routing

A. Due to traffic congestion within the Oakland OCA, preferential routings have been established for turbojet aircraft flying at or above FL280 north, south, and west of the airspace delegated to Guam CERAP (A 250 NM radius of 13°32'N/144°55'E). These routings must be indicated in item 15 of the ICAO flight plan to be used.

B. Southbound Aircraft En Route from Fukuoka OCA and Terminating Within Guam CERAP Airspace:

- OVER KEITH – KEITH R584 OTTRE FPRD (Flight Plan Route to Destination);
- OVER PAKDO – PAKDO G339 RIDLL FPRD;
- OVER MONPI – MONPI A597 REEDE FPRD MONPI A216 RIDLL FPRD;
- OVER OMLET – OMLET B586 WINZR FPRD;
- OVER TEGOD – TEGOD G205 GUYES FPRD TEGOD A337 SNAPP W21 HIRCH FPRD.

C. Northbound Aircraft Originating in Guam CERAP Airspace En Route to Fukuoka OCA:

- OVER MIKYY – MIKYY R584 KEITH FPRD;
- OVER NATSS – NATSS G339 PAKDO FPRD;
- OVER OATSS – OATSS A216 MONPI FPRD;
- OVER RICHH – RICHH A597 MONPI FPRD;
- OVER TOESS – TOESS B586 OMLET FPRD;
- OVER TERYY – TERYY G205 TEGOD FPRD;
- OVER TEEDE – TEEDE A337 TEGOD FPRD.

D. Aircraft within the Oakland OCA and transiting Guam CERAP airspace must flight plan to enter/exit Guam airspace on an appropriate route or other established compulsory reporting point (e.g., FATUM or JOBSS).

Note: With the exception of aircraft flight planned via Oceania UPR procedures, crews flight planning at or above FL310 with filed routes other than those described above should expect to be rerouted to the preferential route. Requests for alternate routes will be considered on a real-time basis as traffic permits. However, aircraft should file for and be prepared to fly the entire preferential route. Aircraft operating east of 150E longitude will not be affected.

4.2.9 Contingency Procedures in Oakland OCA

4.2.9.1 Special Procedures for Inflight Contingencies

A. Introduction

1. The following procedures are intended for guidance only. Although all possible contingencies cannot be covered, the information provided is for more frequent cases such as:
   - Inability to maintain assigned FL due to meteorological conditions, aircraft performance or pressurization failure;
   - En route diversion across the prevailing traffic flow;

- Loss of or significant reduction in the required navigation capability when operating in airspace where the navigation performance accuracy is prerequisite to the safe conduct of flight operations.

2. The procedures are applicable primarily when rapid descent and / or turnback or diversion to an alternate airport is necessary. The pilot's judgment shall ultimately determine the sequence of actions taken, and ATC will render all possible assistance.

B. General Procedures

1. If an aircraft is unable to continue flight according to its ATC clearance, and / or the aircraft is unable to maintain the navigation performance accuracy specified for the airspace, a revised clearance shall, whenever possible, be obtained before initiating any action. The appropriate distress or urgency signal should be used.
2. Special procedures for aircraft requiring rapid descent and / or turnback or diversion to an alternate airport due to aircraft system malfunction or other contingencies are stated in ICAO Doc. 4444. Reference Section 3 of this manual.

4.2.9.2 Emergency Procedures

A. In general, unlawful interference, communications failure, interception, and search and rescue procedures are in conformity with ICAO SARPs. International flight crews should reference Jeppesen Airway Manual Services, *Emergency - ICAO Differences and / or Special Procedures*, including, but not limited to, the following emergency procedures:

1. Communications failure;
2. Search and rescue;
3. Special procedures for inflight contingencies;
4. Interception;
5. Unlawful interference.

Note 1: If circumstances do not permit the pilot to transmit details of the pilot's situation and intentions, the pilot should select Mode A/C, Code 7500. ATC will ask the pilot to confirm this code. The absence of a reply from the pilot will be taken by ATC as an indication that the use of Code 7500 is not due to an inadvertent false code selection.

Note 2: Many states recommend that the pilot insert in any RTF transmission the words *"CHANNEL SEVEN FIVE HUNDRED"* after the aircraft's *callsign* to indicate specifically that it is being subjected to unlawful interference.

B. A pilot in any emergency phase (uncertainty, alert, or distress) should do three (3) things to obtain assistance:

1. Squawk Mode A/C 7700.
2. Contact controlling agency and give nature of distress and pilot's intentions; if unable to contact controlling agencies, attempt to contact any agency on assigned frequency or any of the following frequencies (transmit and receive): 121.5 MHz / 2182 kHz.
3. Transmit the following:
   a. *"MAYDAY"* (three times);
   b. Station addressed (if time permits);
   c. Aircraft identification;
   d. Nature of distress;
   e. Pilot's intentions (ditch, crash landing, etc.);
   f. Present position, altitude (height), and heading.

   Note: Any other information is complementary to the message.

4. Comply with instructions received: Pilots should accept the “communications control” offered to them by the ground radio station, silence interfering radio stations, and not shift frequency or shift to another ground station unless absolutely necessary.

4.3.0 Pacific Organized Track System Guidelines

A. Geographical Boundary: PACOTS tracks may be established within the Oakland Oceanic, Fukuoka, and Anchorage FIRs.

B. Track Definition Message (TDM): Oakland ARTCC is using the TDM format for PACOTS tracks. Questions regarding published PACOTS tracks should be directed to Oakland ARTCC Traffic Management Unit (TMU) (510) 745-3771.

C. PACOT Track Designators

Track	Route	TDM Publication Time	Required / UPR?
1	Japan to N. America W. Coast	Daily at 22:00 UTC by RJJJ	Available for eastbound aircraft crossing 160E between 11:00 and 12:30 UTC. Operators may file a UPR at least 50 NM north or south of Track 2.
2	Japan to N. America W. Coast	Daily at 22:00 UTC by RJJJ	Required for eastbound aircraft crossing 160E between 11:00 and 12:30 UTC. Operators may file a UPR at least 50 NM north or south of Track 2.
3	Japan to N. America W. Coast	Daily at 22:00 UTC by RJJJ	Available for eastbound aircraft crossing 160E between 11:00 and 12:30 UTC. Operators may file a UPR at least 50 NM north or south of Track 2.
4	Japan to N. America W. Coast	Optional at 22:00 UTC by RJJJ	Available for eastbound aircraft crossing 160E between 11:00 and 12:30 UTC. Operators may file a UPR at least 50 NM north or south of Track 2.
11	Japan to Hawaii	Daily at 22:00 UTC by RJJJ	Optional; operators may plan a UPR.
12	Japan to Hawaii	Optional at 22:00 UTC by RJJJ	Optional; operators may plan a UPR.
14	Asia to N. America W. Coast	Daily at 22:00 UTC by RJJJ	Available for eastbound aircraft crossing 160E between 11:00 and 12:30 UTC. Operators may file a UPR at least 50 NM north or south of Track 2.
15	Asia to N. America W. Coast	Optional at 22:00 UTC by RJJJ	Available for eastbound aircraft crossing 160E between 11:00 and 12:30 UTC. Operators may file a UPR at least 50 NM north or south of Track 2.
A	Hawaii to Japan	Daily at 11:00 UTC by KZAK	Optional; operators may plan a UPR.
B	Hawaii to Japan	Optional at 11:00 UTC by KZAK	Optional; operators may plan a UPR.

Track	Route	TDM Publication Time	Required / UPR?
C	N. America W. Coast to Japan	Daily at 11:00 UTC by KZAK	Required for westbound aircraft crossing 160E between 02:30 and 06:00 UTC. Operators may file a UPR at least 50 NM north or south of Track C.
D	N. America W. Coast to Japan	Optional at 11:00 UTC by KZAK	Available for westbound aircraft crossing 160E between 02:30 and 06:00 UTC. Operators may file a UPR at least 50 NM north or south of Track C.
E	N. America W. Coast to Japan	Daily at 11:00 UTC by KZAK	Available for westbound aircraft crossing 160E between 02:30 and 06:00 UTC. Operators may file a UPR at least 50 NM north or south of Track C.
F	N. America W. Coast to Japan	Daily at 11:00 UTC by KZAK	Available for westbound aircraft crossing 160E between 02:30 and 06:00 UTC. Operators may file a UPR at least 50 NM north or south of Track C.
H	N. America W. Coast to Asia	Daily at 11:00 UTC by KZAK	Available for westbound aircraft crossing 160E between 02:30 and 06:00 UTC. Operators may file a UPR at least 50 NM north or south of Track C.
J	N. America W. Coast to Asia	Daily at 00:00 UTC by KZAK	Required for westbound aircraft crossing 160E between 15:00 and 18:00 UTC. Operators may file a UPR at least 50 NM north or south of Track J.

Note: Oakland ARTCC or Fukuoka ATMC may develop more or fewer tracks according to the specific needs or limitations of that day.

D. Usable Flight Levels: All IFR FLs at or above FL290 except the Westbound North America-Japan PACOTS (Tracks C, D, E, and F), which also includes FL280 in the Oakland FIR. Certain restrictions may apply for non-PACOTS traffic operating in the opposite direction to the published PACOTS system.

E. Lateral Spacing of Tracks: Tracks are established at least 50 NM apart. Tracks are defined using latitude / longitude expressed in whole degrees or named waypoints with the exception of FIR crossing points.

F. Flight Planning: The following flight planning restrictions and rules apply only within the OCAs of the respective FIRs. These restrictions do not affect aircraft flying on ATS routes in the Central East Pacific Route System or the NOPAC Composite Route System unless individual routes within these systems are specifically identified as unusable in NOTAMs.

   a. Participating Aircraft

      1) Aircraft requesting altitudes at or above FL280 may file via route notified in the daily NOTAM or Track Message.

      2) Operators must file appropriate SIDs and STARs associated with the departure / arrival airports.

      3) Operators must flight plan to avoid active military airspace.

   b. Nonparticipating Aircraft: Random routes under PACOTS at FL270 and below are permitted unless prohibited by NOTAM. Higher altitudes may be approved, if traffic permits.

G. In addition to the PACOTS, User Preferred Routes (UPRs) allow crews to choose random routes based on individual airframes, flight time, weather forecast, etc. Availability of UPRs is provided with each specific category of the PACOTS below, with further guidance in Section 4.3.1.

H. ATC Procedures

1. Aircraft flight planning via a UPR have the same priority for altitude assignment as aircraft flight planning via the PACOTS.
2. The minimum longitudinal separation between aircraft crossing the Fukuoka FIR boundary on the same track at the same FL will be ten minutes using MNT (Section 2.3.10.1) or ADS-C.

I. Position Reporting

1. Within the Oakland and Anchorage OCA, position reports shall be made using latitude / longitude coordinates or named fixes as specified in the TDM.
2. Position reports shall include information on:
   - Present position;
   - Estimated next position; and
   - The ensuing position (ICAO Doc. 7030).
3. Rounding off geographical coordinates is prohibited.

4.3.1 User Preferred Route (UPR) Guidelines

A. UPRs may be utilized within the specified FIRs as detailed on the Oakland ARTCC website: https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/air_traffic_services/artcc/oakland/

Note: Guidelines for filing UPRs associated with specific PACOTS Tracks or between city pairs can be found on this website. Click on “KZAK Oceanic ATC Operations,” then navigate to the UPR Flight Planning Guidelines PDF file.

B. The UPR must be planned to avoid military special use airspace when active.

C. The UPR must be utilizing a published STAR where appropriate.

D. Operators will be informed whenever a condition exists that does not allow the use of UPRs within a particular FIR. These conditions could include large-scale military operations and typhoons. Contact the Oakland OCA Supervisor at (510) 745-3342 for more information.

E. North America – Asia PACOTS UPR Guidelines: These guidelines are applicable to the Oakland, Fukuoka and Anchorage Oceanic FIRs.

- The UPR route must enter or exit the Oakland Oceanic FIR over a published waypoint on the FIR boundary offshore of North America.
- The UPR must comply with the procedures published by Japan and Anchorage ARTCC.
- The UPR must follow the guidelines published above in Section 4.3.0.
- Eastbound Aircraft (Asia to North America)
  a) The UPR must remain in the Fukuoka FIR and Oakland FIR.
  b) Flights must be capable of climbing to 160E at FL390 or above.
  c) Rules of operation:
     1. Crews must plan appropriate routes and connect to one of the following Oceanic Transition Routes (OTRs) when entering domestic Japanese airspace.
        - ADNAP OTR5 KALNA
        - ADNAP OTR7 EMRON

- AVBET OTR9 EMRON
- AVBET OTR11 LEPKI
- LAPIL OTR13 SEALS
- POVAL OTR15 MORAY

Note: QNH is used in domestic Japanese airspace except for the area within a 55 NM radius of IWOTO TACAN.

2. When entering the oceanic airspace from the Kobe ACC airspace, flights must start on one of the following routes and be scheduled within the airspace to the south of DOVAG-UKATA-33N150E.
   - BORDO Y74 AZAMA Y57 TAMAK V73 DOVAG
   - BORDO Y74 TOPAT V75 CANAI
   - SEDKU R595 MJC V91 NHC A582 ONC V73 DOVAG
   - SEDKU R595 MJC V91 NHC V75 CANAI

- Westbound (North America to Asia)
  a) The UPR must remain in the Fukuoka FIR and Oakland FIR.
  b) Flights must be capable of climbing to 180E at FL380 or above.
  c) Flights must cross 160E between 02:30 UTC and 06:00 UTC.
  d) Crews must plan one of the following OTRs and connect to appropriate ATS routes:
     - KALNA OTR5 ADNAP
     - EMRON OTR7 ADNAP
     - EMRON OTR9 AVBET
     - LEPKI OTR11 AVBET
     - SEALS OTR13 LAPIL
     - MORAY OTR15 POVAL
     - FERAR OTR17 PIPIK
     - TONIK G223 DAGDA
  e) The UPR must be flight planned via the appropriate SID/ STAR.
- UPRs must be planned to avoid NOTAM- and/or state-restricted airspace including active military airspace and/or estimated rocket impact areas.
- UPR aircraft do not have priority for altitude assignment over aircraft on an existing PACOTS or CEP traffic.

F. Hawaii – Asia PACOTS UPR Guidelines: These guidelines are applicable to the Oakland and Fukuoka Oceanic FIRs.
- The UPR must incorporate a published waypoint on the Honolulu CTA boundary.
- The UPR must comply with the procedures published by Japan.
- The UPR must follow the guidelines published above in Section 4.3.0.
- The UPR route must begin or end over one of the following Hawaiian Gateway waypoints:
  - THOMA;
  - DANNO;
  - CANON;
  - LILIA;
  - PUPPI;

- SYVAD; or
- HOOPA.

  Note: Operators may contact Oakland ARTCC to be added to the daily publication of available Hawaiian Gateway waypoints due to Hawaii Warning Area Activity.

G. Japan – Oceania UPR Procedures: These guidelines are applicable to operations between Japan (RJAA, RJTT, RJBB and RJGG) and Oceania (YSSY, YBBN, YBCS, YBCG, NZAA and NWWW).

- The northbound and southbound UPRs must remain in the Fukuoka, Oakland, Guam, Port Moresby, Honiara, Auckland and Brisbane FIRs.
- The UPR must include filed reporting points on the Control Center boundary crossings.
- Within the Guam CTA, aircraft may use UPRs at or above FL310. Aircraft at FL300 and below must flight plan via ATS Routes in the Guam CTA.
- The UPR must comply with the published procedures for the Fukuoka, Port Moresby, Brisbane and Auckland CTAs.

H. Asia -- Koror UPR Procedures: These guidelines are applicable to operations between Asia and Koror (PTRO).

- The UPR must remain in the Fukuoka FIR, Oakland FIR and Guam CTA.
- Aircraft must flight plan via existing ATS routes within the Guam CTA or remain clear of the Guam CTA by 50 NM or more.
- The UPR must remain at least 50 NM clear of the Manila FIR.
- The UPR must comply with the published procedures in the Japan AIP for the Fukuoka FIR.

I. Central East Pacific (CEP) UPR Procedures (Reference Section 4.2.0.A):

- A single CEP UPR flight can negatively impact multiple flights planned on a CEP airway. To preserve the overall efficiency of CEP airspace, UPRs will likely be subject to vertical restrictions below or above the traffic established on the CEP routes.
- CEP UPR General restrictions.
  - Aircraft on UPR routes in the CEP have a lower priority for altitude assignment than aircraft on a CEP route. UPRs should expect to be at FL300 or below or FL430 and above until established on a CEP route. A higher altitude may be available, traffic permitting.
  - Aircraft that cross multiple tracks will encounter more traffic and will be held to a lower altitude while crossing CEP routes.
  - UPR aircraft must enter / depart the Honolulu CTA on a CEP route.
  - Aircraft should cross CEP airways as expeditiously as possible.
  - UPRs may cross a CEP route to join a CEP route in the direction the route is published to be flown.
- UPRs between Hawaii and California:
  - Plan the UPR utilizing the waypoints of the CEP routes. Do not file points in between CEP airways.
  - Aircraft entering KZAK airspace north of R585 may plan a UPR route east of 142 West longitude. Aircraft must be established on a CEP route west of 142 West longitude.
- UPRs from the South Pacific to California within CEP airspace:
  - Northbound UPRs that cross the CEP must be capable of climbing to FL390 by the time they cross R578.

- Northbound UPRs that cannot cross R578 at FL390 or above should expect to be restricted to cross below CEP traffic.

- UPRs California to the South Pacific within the CEP airspace
  - California departures to the South Pacific are typically heavy and requesting initial oceanic altitudes below the CEP traffic established on routes.
  - California departures will be held below CEP Traffic until they are clear of CEP airspace or join a CEP route.
- UPRs between the Pacific Northwest and the South Pacific
  - UPRs that cross the CEP must be capable of climbing to FL390 by the time they reach CEP airspace.
  - UPRs that cannot cross CEP airspace at FL390 or above should expect to be restricted to cross below CEP traffic established on routes.

J. UPRs between Hawaii and Alaska: These UPRs typically cross heavy Eastbound or Westbound traffic flows.

- When in conflict with traffic flows, these UPRs will likely experience vertical restrictions below or above PACOTS / UPR traffic.
- These UPRs must exit / enter the Honolulu CTA over one of the following route segments:
  - ZIGIE ZOULU or ZOULU ZIGIE;
  - APACK AUNTI or AUNTI APACK; or
  - ZIGIE to a point north ZOULU or point north ZOULU to ZIGIE.

4.4.0 NOPAC Route System

A. The NOPAC Route System is comprised of four routes that transit the North Pacific between Alaska and Japan with traffic directed as follow:

R220	One-Way	Southwest Bound	Even Altitudes FL180 to FL400, also FL330, FL350, FL370, FL390, FL410, and FL430 CPDLC, PBCS (RCP 240 / RSP 180), and RNP-4 are required at FL340-FL400. Note 1
M523	One-Way	Southwest Bound	Only available at FL340-FL400. CPDLC, PBCS (RCP 240 / RSP 180), and RNP-4 are required. Note 2
R580	One-Way	Northeast Bound	FL180-FL330 or FL410 and above CPDLC, PBCS (RCP 240 / RSP 180), and RNP-4 are required at FL340-FL400. Note 1
A590	One-Way	Northeast Bound	Odd Altitudes FL190 to FL410, also FL300, FL320, FL340, and FL450
N507	n/a	n/a	n/a Note 3

Note 1: The NOPAC routes are undergoing a redesign throughout 2024 to become amenable to (and to promote) reduced lateral separation below 25 NM. Upon completion of this redesign, operators should expect FL340-FL400 to be reserved only for aircraft fitted with and authorized for CPDLC, PBCS (RCP 240 / RSP 180), and RNP-4 throughout the entirety of the NOPAC. Aircraft without such capabilities or authorizations may continue to fly these routes at FL300 and below or at FL410 and above.

Note 2: Currently the route structure does not provide any option for non-capable aircraft to fly above or below the range of FL340-FL400 on route M523.

Note 3: Route N507 does not exist yet, but is expected to be established sometime in 2024. Once implemented, it is expected that N507 will be an eastbound route 25 NM south of (and with the same equipage requirements as) M523.

B. Transition Routes: Within the Fukuoka FIR, Oceanic Transition Routes (OTRs) have been established for aircraft transitioning to or from the NOPAC Route System. Within the Anchorage FIR, certain routes are used for the same purpose, including G583, B757, R341, G469, A342, G215, R330, R336, R338, and G349 (Westbound only).

C. NOPAC Reroutes

1. Aircraft cannot always be accommodated on their flight planned NOPAC route. In an effort to reduce coordination time and errors between ATC and flight crews, Fukuoka ATMC and Anchorage ARTCC have agreed on a common procedure to accommodate most reroutes.
2. Aircraft rerouted from one NOPAC ATC route to another NOPAC ATC route will be given short-range clearances into the adjoining FIR's RADAR coverage airspace. The receiving ATC facility will then issue further routing to the aircraft prior to the aircraft reaching the clearance limit.

   Example: Aircraft is routed via M523 to RJTT but cannot be accommodated on M523. The aircraft may be re-cleared as follows: "[aircraft ID] *CLEARED TO NANAC VIA R523, EXPECT FURTHER CLEARANCE FROM ATMC AFTER NANAC*."

D. Separation Standards

1. Vertical: RVSM is applied from FL290 to FL410 inclusive.
2. Lateral: Except as described above in areas where reduced lateral separation will be applied, the primary form of lateral separation within the NOPAC Route system is 25 NM lateral either side of centerline based on RNP-10. Non-RNP-10 aircraft and any aircraft below FL180 will be provided with standard 50 NM lateral separation.
3. Longitudinal:
   - Aircraft equipped with ADS-C will be separated longitudinally at 50 NM (27 minute aircraft reporting rate) or 30 NM (10 minutes aircraft reporting rate).
   - All other aircraft will be provided standard oceanic longitudinal separation, e.g., 15 minutes "in trail." This standard separation may be reduced to five (5) minutes when MNT (Section 2.3.10.1) is utilized.
   - Additionally, Anchorage ARTCC has been authorized to conduct a trial of the "10 minute longitudinal standard" within its Oceanic FIR. This standard is applied regardless of the application of MNT.
   - Anchorage ARTCC has also been authorized to utilize reduced DME/RNAV longitudinal separation for brief periods when aircraft are beyond normal VHF coverage.

E. Flight Planning

- All operators planning IFR flight operations in Anchorage Oceanic and Domestic FIRs west of 165°W and south of 63°N must file flight plans with both PAZAZQZX and PAZNZQZX. Failure to file with both systems may result in delay of ATC services.
- All aircraft flight planned to cross the Anchorage / Tokyo FIR on or north of PASRO shall be established on a NOPAC route prior to the FIR. Aircraft operating beneath the NOPAC (at or below 17,000 ft MSL) may flight plan via random routes.
- ICAO flight plans must be filed in accordance with ICAO procedures and formats.

  Note: Flights originating outside of Anchorage or Tokyo regions and entering oceanic airspace without intermediate stops should submit flight plans as soon as possible.
- When flight planning via transition tracks and / or ATS routes, list the point of entry, followed by the route designator, and finally the point of exit (e.g., KATCH - B327 - NULUK - R220 – NANAC).

- To minimize flight crew and controller workload, information should be carried for routes other than the one being flown. This material should include route data, reporting points, fuel burn, winds aloft, time en route, etc., for those routes compatible with the direction of flight.

F. Preferred Routes: Anchorage ARTCC will periodically issue international NOTAMs specifying the preferential routes to be flown within the Anchorage FIR. Each NOTAM will individually denote, during specified time periods, either the westbound or eastbound tracks. Flights filed contrary to these NOTAMs or preferred routes may expect reroutes, sequencing delays, and / or severe altitude restrictions for same direction, crossing, or opposite direction traffic.

G. Non-PBN Aircraft: Aircraft not approved for RNP-10 are restricted to the following NOPAC routings:

- Southwest bound at least 75 NM south of A590 at all times; and
- Northeast bound on A590 at all times.

Note 1: Non-PBN aircraft will also be restricted to FL280 or below, or FL430 or above.

Note 2: ATC may provide alternate reroutes for non-PBN aircraft due to traffic.

4.4.1 PBN and PBCS Requirements in NOPAC Routes

A. Aircraft must be authorized for oceanic PBN at a minimum of RNP-10 to operate in the NOPAC from FL290 to FL410 inclusive.

B. Aircraft must be capable and authorized for RNP-4 to operate from FL340 to FL400 on routes R220, M523, and R580.

C. Aircraft must be capable and authorized for PBCS (RCP240 and RSP180) to operate from FL340 to FL400 on routes R220, M523, and R580.

4.4.2 Communications and Position Reporting

A. High Frequency (HF) Communications

1. Most North Pacific area communications are conducted on HF single sideband. Flight crews should take possible delays into consideration when requesting step climbs, reroutes, or other routine request requiring ATC action. Delays can be reduced through advanced planning of such requests.
2. The crew should complete a SELCAL check as described in Section 2.2.6.1.

B. Guard Station

1. Continuous guarding of the VHF emergency frequency 121.5 MHz is required on long overwater flights. This is critical when operating in proximity to FIR boundaries (Route R220 between Anchorage and Tokyo, for example), since it serves to facilitate communications with regard to aircraft that may experience inflight emergencies, communications, or navigation difficulties.
2. The oceanic radio station guarding for flight operations will normally be the station associated with the ATCC. Flight crews must ensure that they have established communications with the new guard facility on HF.
3. Each oceanic radio station continuously monitors all assigned frequencies. If en route HF communications fail, every effort should be made by the flight crew to relay progress reports through other aircraft.

C. VHF Communications

1. Air-to-Ground: Oceanic radio stations will normally have VHF capability within 200 NM of their geographic locations.

2. Air-to-Air: Frequency 123.45 MHz has been designated for use in air-to-air communications between aircraft operating in the Pacific area out of range of VHF ground stations to exchange operational information and facilitate resolution of operational problems.
3. The normal VHF (119.1 MHz) initial contact points with Anchorage ARTCC for eastbound flights established in the NOPAC are 150 NM west of PINSO on A590.

   Note: Initial contact may be attempted on 128.2 MHz, as a backup to 119.1.
4. Westbound PACOTS flights will be advised of the appropriate Anchorage ARTCC VHF frequency by San Francisco ARINC.

D. Satellite Voice System: SATCOM Voice is available at Anchorage Center (Appendix S). Direct SATCOM Voice (or SAT/AFIS relay) contact between the crew and Anchorage shall be limited to distress / urgency situations or other exceptional circumstances. All routine communications should be conducted via VHF or through ARINC via either HF or SATCOM Voice.

E. CPDLC service is operational throughout all Anchorage FIRs (Oceanic, Domestic, and Arctic). Anchorage ARTCC utilizes two (2) separate en route automation systems, each having a different CPDLC logon address. The following guidelines apply:

- Use logon address PAZN for all CPDLC communications in:
  - The entirety of the Oceanic FIR;
  - The portion of the Arctic FIR between the North Pole and 73°N; and
  - The portion of the Domestic FIR west of 165°W and south of 63°N.

  Note: Although CPDLC is supported in the Anchorage Arctic FIR, HF position reports are mandatory. See Section 4.6.0 for more information.
- Use logon address PAZA for all CPDLC communications in the Domestic and Arctic FIRs south of 73°N and east of 165°W.
- Aircraft entering the Anchorage FIR from Magadan, Edmonton, Vancouver, Oakland, or Fukuoka FIRs will be provided automatic FANS addressing.
- Aircraft departing Alaskan airports are requested to logon after departure, but before leaving FL180.
- Aircraft within VHF coverage may make position reports via CPDLC. West of 165°W, requests to ATC may be made via CPDLC. East of 165°W, requests to ATC should be made via VHF if within VHF coverage. After logon, Anchorage ARTCC automation will provide automatic FANS address forwarding for flights entering the Magadan, Edmonton, Vancouver, Oakland, and Fukuoka FIRs.

F. Time and Place of Position Reports

- When operating on a fixed route with designated compulsory reporting points, flight crews shall make standard position reports for those points.
- When operating on a flexible route without designated reporting points:
  - Flight crews navigating a generally east / west routing shall report over 5° or 10° (10° will be used if the speed of the aircraft is such that 10° will be traversed within 80 minutes or less).
  - Flight crews navigating a generally north / south routing shall report over each 5° or 10° of latitude.
- For flights operating in the Anchorage Oceanic and / or Anchorage Domestic FIR west of 165°W:
  - All waypoints filed in Item 15 of the ICAO flight plan must be reported as a standard position report.

    Note: Within this airspace, position reports are to be made via CPDLC / ADS-C or voice communication in that order of preference.

- In addition, aircraft with active ADS connections must make a CPDLC position report when crossing the Anchorage FIR boundary inbound to ensure correct CPDLC connectivity.
- In the event of VHF / HF or CPDLC position reporting, position reports are to be transmitted at the time of crossing the designated reporting point or as soon thereafter as possible.

  Note: Anchorage **cannot** accept position reports containing coordinates in the five-character ARINC 424 format. Position reports in the PAZN CPDLC service area must be in the complete latitude and longitude format only. If crews are unable to send position reports in the complete format, they must accomplish position reporting via HF.

G. Position Report Prefix: When reporting to oceanic radio stations, the prefix “Position” should be used on initial callup or prior to the text of the message. It is imperative that the person transmitting the report speak slowly and distinctly so that the message can be correctly copied on the first attempt.

H. Altitude Reports: Flight crews will report reaching any assigned altitude within RVSM airspace unless radar identified.

I. Weather Reporting Procedures: To minimize radio frequency congestion, routine weather reports such as winds and temperatures, and fuel remaining information should not be included in position reports made directly to Anchorage ARTCC unless specifically requested.

4.4.3 Inflight Contingencies

A. General

1. The procedures below for inflight contingencies in the NOPAC Route System are intended for guidance only. Not all contingencies can be covered, but these procedures provide for cases such as inability to maintain assigned FL, aircraft performance, or pressurization failure. They are applicable primarily when rapid descent or turnback, or both, are necessary. The pilot’s judgment shall determine the sequence of actions taken with regard to the specific circumstances.
2. In contrast to operations in the domestic radar environment, operations in most oceanic areas are based on “strategic” clearance procedures, wherein separation depends on each aircraft navigating accurately.

B. Basic Procedures

1. If an aircraft experiences navigational difficulties, it is essential that the pilot inform ATC as soon as the condition is apparent so that appropriate action can be taken, as necessary, to prevent conflict with other aircraft.
2. If an aircraft is unable to continue flight in accordance with its ATC clearance, a revised clearance shall, whenever possible, be obtained prior to initiating any action, using the radio telephone distress or urgent signals as appropriate (see Notes 1 and 2 below).

   Note 1: Distress call (*“MAYDAY”* three times) alerts all listening parties of an emergency requiring priority handling and possible assistance from other sources.

   Note 2: Urgency call (*“PAN PAN”* three times) alerts all listening parties of a special handling condition that will receive ATC priority for issuance of a clearance or assistance.
3. If prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time and, in the meantime, the aircraft shall broadcast its position (including the ATS route designator) and intentions on 121.5 at suitable intervals until an ATC clearance is received.

Note: In such circumstances, communication with certain stations on VHF may be practical, e.g., Anchorage Center on 118.5 at Cold Bay, 121.4 at Dutch Harbor, 119.1 or 128.2 at St. Paul Island, 119.1 or 128.2 at Shemya, or 126.4 at Adak.

4. If unable to comply with the provisions of the above procedures, the aircraft should follow the Inflight Contingency Procedures for oceanic airspace as published in ICAO Document 4444 (Reference Section 3).

C. Navigation Warning

1. U.S. aircraft flying between Alaska and Japan are cautioned of the absolute necessity of remaining over international waters at all times in order to avoid possibly dangerous consequences which could result from unauthorized overflight of Russian territory.

2. Aircraft operating on ATS Route R220 under these circumstances should, if possible, avoid turning northward to leave the route due to its proximity to the boundary between Anchorage / Fukuoka and the Russian FIRs.

D. Emergency procedures for operations in RNP-10 airspace or on RNP-10 routes are the same as normal oceanic emergency procedures with one exception – crews must be able to recognize (and ATC must be advised accordingly) when the aircraft is no longer capable of navigation in accordance with its RNP-10 approval requirements.

4.4.4 Altimeter Settings

A. Low Temperature Error

1. Extreme low temperatures will cause serious errors in indicated altitude. It is suggested that the next higher altitude than normal, appropriate to direction of flight, be requested on routes with minimum en route altitudes equal to or greater than 5,000 ft.

2. Pilots operating in environments where cold temperatures deviate from ISA conditions will reference “Values to be Added to Published Altitudes” from Table 3-2 and amend their altitudes (Jeppesen Airway Manual Services, *Air Traffic Control*).

B. High Barometric Pressure

1. Cold, dry air masses may produce barometric pressures in excess of 31.00 inches of mercury. Most altimeters do not have an accurate means of being adjusted for altimeter settings of these levels.

2. The altimeter setting announced by ATC will be 31.00 Hg (Three One Zero Zero) when the barometric pressure equals or exceeds that value.

3. The altimeter error caused by the high pressure will be in the opposite direction to the error caused by the cold temperature (higher than altitude displayed).

4.4.5 Transponder Codes

A. For eastbound flights, Anchorage ATC will assign a discrete code upon initial direct communications. The normal contact points are 150 NM west of PINSO, 150 NM west of SHEMYA (SYA) and 150 NM west of CHIPT, depending on the route of flight (Section 4.4.2, Paragraph C).

Note: If no discrete code is assigned, transponders should be set to Code 2000.

B. For westbound flights, Anchorage ATC will normally assign the Mode 3/A Code 2000 at the Anchorage/Fukuoka FIR boundary. If the crew has not been given a position at which to squawk 2000, the transponder should be changed to 2000 when crossing 164°E longitude.

C. In general, transponders should be set to Mode 3/A Code 2000 when operating between 145°E and 170°E when eastbound, and between 164°E and 145°E when westbound. This requirement is to prevent target swapping, upon entry into the new FIR's radar coverage, of discrete beacon codes with aircraft assigned the same codes.

4.5.0 Auckland Oceanic FIR

A. The Auckland Oceanic FIR is fully FANS compliant. The Logon address is "NZZO." Auckland Oceanic Control will accept ADS-C and CPDLC position reports.

B. SELCAL checks are not required for CPDLC-equipped aircraft when entering NZZO FIR. Such aircraft filing a SELCAL code in item 18 of their flight plan will be assumed to have a serviceable SELCAL and to be maintaining a SELCAL watch on HF primary frequency.

C. Aircraft en route within the Auckland Oceanic FIR shall maintain a continuous air / ground communication watch on the frequency assigned by the Air / Ground control station. The requirement to maintain a continuous air / ground communication watch may be met by the use of approved automatic signaling devices such as SELCAL.

D. If not using CPDLC (and if not logged into NZZO), aircraft inbound to Auckland Oceanic FIR shall establish RTF contact with ATC on Auckland Oceanic frequencies at the Auckland boundary. Outbound aircraft shall transfer to route frequency when instructed by ATC.

E. Aircraft entering the Samoa, Tonga, Cook or New Zealand domestic sectors will be instructed when to change from route frequency to the frequency of the appropriate ATC unit. Aircraft leaving these sectors will be instructed by ATC when to change to the route frequency.

F. Airways Corporation, the ATC service provider in the upper airspace of Auckland Oceanic FIR, levies charges for en route navigation services. Crews should be aware that they may be obligated to pay charges for services provided.

4.6.0 Anchorage FIRs

A. Anchorage airspace includes Oceanic, Domestic, and Arctic FIRs. Anchorage ARTCC controls all three FIRs.

B. More detailed procedures for operations to, over, or within Alaska can be found in the US "Chart Supplement: Alaska" publication, which is available through the following website under the "CS AK" link:

https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/

4.6.1 Anchorage Oceanic OCA

Lateral separation of 23 NM is applied in the Anchorage Oceanic OCA between aircraft equipped with and authorized for RNP-4, CPDLC (FANS), and PBCS (RCP 240 and RSP 180). Crews must ensure the flight plan is appropriately coded for these capabilities to receive this separation standard.

Note: Crews of such flights must ensure they are aware of special considerations for operating in a reduced lateral separation environment (Section 2.2.2.6).

4.6.2 Anchorage Arctic FIR

A. The following guidance also applies to that portion of the Anchorage Domestic FIR that overlies the north coast of the Alaskan land mass.

B. 50 NM lateral separation will be applied to PBN authorized aircraft (RNP-10/4), and 90 NM lateral separation will be applied to non-PBN aircraft. Aircraft without an oceanic PBN authorization or with a discrepancy preventing PBN operations must ensure Item 18 of the flight plan includes the notation "RMK/NONRNP10."

Note: 50 NM lateral separation is not provided on Northern Control Area tracks and laterals, nor on UPRs, unless restricted by NOTAM.

C. SLOP should be used in the course of regular operations in the Anchorage Arctic FIR.

D. Position Reporting: All flights, regardless of CDPLC status, shall make mandatory position reports upon entering or exiting the FIR via the appropriate HF en route radio.

E. CPDLC: Usability is dependent upon transmission medium. Inmarsat coverage exists approximately below 80° North and Iridium coverage exists globally. Due to the high latitude and satellite coverage, flight crews are required to maintain a continuous air / ground communication watch on HF en route frequencies. Refer to the CPDLC procedures in Section 4.4.2, Paragraph E, for additional logon information.

F. HF Voice: HF communication capability exists within the following services:

1. *GANDER RADIO* – Used for all ATC communications within the Anchorage Arctic FIR and any eastbound position reports over the Anchorage boundary with Murmansk or Magadan. Frequencies of the North Atlantic NAT D network, 2971, 4675, 8891, and 11279 kHz.
2. *MURMANSK CONTROL* – Used for all westbound position reports over the Anchorage boundary with Murmansk. Frequencies 11390, 8950, 5694, or 4672 kHz.
3. *MAGADAN CONTROL* – Used for all westbound position reports over the Anchorage boundary with Magadan. Frequencies 15030, 13265, 11390, 8837, 6585, or 4712 kHz.
4. *SAN FRANCISCO RADIO* – Used for long distance operational control (LDOC). Frequencies 21964, 17925, 13348, 11342, 6640, and 3013.

   Note: The San Francisco LDOC site does not provide routine ATC communications, but may be used for relays when other methods fail.

G. Satellite Voice: SATCOM voice contact may be possible with aircraft in the Arctic FIR depending on satellite and service provider availability. Direct SATCOM Voice shall be limited to distress and urgency situations or other exceptional circumstances, such as HF blackout.

H. Flight Plans and Preferred Routes: All crews planning IFR operations in the Anchorage Arctic and Domestic FIRs north of 70°N must file flight plans with both PAZAZQZX and PAZNZQZX. Failure to file with both system addresses may result in delay of services.

- Cross Polar: All flight planned routes must conform to the requirements of the current Anchorage Arctic FIR NOTAM.
- Trans Polar:
  1. Operators shall flight plan through the Anchorage Arctic and Domestic FIRs via the following: KARLL-COALL, ARBEZ-JESRU, or HARVZ-TAYTA. This requirement applies to both westbound and eastbound flights.
  2. Flights filing between FYU and 141° W longitude shall flight plan via ADREW J160 or POTAT J167.
  3. Preferred routes connecting with the PANC terminal area are as follows:
     a. Northbound:
        - TED J115 FAI direct KARLL direct COALL;
        - TED J115 FAI direct ARBEZ direct JESRU;
        - TED J115 FAI direct HARVZ direct TAYTA;
        - TED J115 FAI J120 FYU J160 ADREW; or
        - TED J115 FAI J120 FYU J167 POTAT.
     b. Southbound:
        - COALL direct KARLL direct TKA J125 TED;
        - JESRU direct ARBEZ direct ENN J125 TED;
        - TAYTA direct HARVZ direct ENN J125 TED;
        - ADREW J160 FYU J120 FAI direct ENN J125 TED; or
        - POTAT J167 FYU J120 FAI direct ENN J125 TED.

4.7.0 Honolulu CTA / Hawaii

A. Use of Strategic Lateral Offset Procedure

- Oceanic flights departing Hawaii may apply SLOP upon reaching initial cruise FL and within 70 NM from the OEP.
- Oceanic flights arriving in Hawaii should terminate SLOP no later than 70 NM after the oceanic exit point or when receiving radar vectors, whichever occurs first.
- Oceanic overflights should remain on SLOP offset throughout the Honolulu CTA.
- Hawaiian inter-island flights must not use SLOP.

B. Flights departing Hawaii to a non-US territory or arriving in Hawaii from a non-US territory must comply with the eAPIS requirements described in Appendix M.

C. More detailed procedures for operations to, over, or within Hawaii can be found in the US “Chart Supplement: Pacific” publication, which is available through the following website under the “CS PAC” link:

https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/

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Section 5: Regional Supplementary Information

5.1.0 Introduction

A. In general, most procedures of ICAO member states are in conformity with ICAO SARPs and Annexes. As part of the preflight planning process, international flight crews are required to reference **current publications** for flight procedures, area restrictions, special requirements, and any differences from ICAO for the states in which they intend to land or overfly.

B. The information in this section is included to provide only a general overview of some of those differences. **<u>The reproduction of this data does not relieve the PIC from the responsibility of reviewing all relevant international information</u>**.

<u>Note:</u> The Jeppesen Airway Manual and/or state AIPs may be consulted. Hyperlinks to many AIPs can be found in Appendix U of this manual.

C. Unless otherwise noted, the countries listed are assumed to be generally WGS-84 compliant. However, some specific airports may not yet be WGS-84 compliant. Flight crews should check the specific airport information in the relevant state AIP prior to operations.

5.2.0 North America

5.2.1 Canada

A. <u>RVSM</u> has been implemented in Canadian Airspace Area between FL290 - FL410 inclusive North of 57°N.

B. <u>RNPC</u> (Required Navigation Performance Capability) Airspace is the controlled airspace within Canada that has been established to accommodate RNAV operations in the Southern and Northern Control Areas. LRNSs must be RNP-4 certified and authorization for the requested RNAV level (e.g., RNP-4, RNP-10, etc.) must be obtained to operate in RNPC airspace.

<u>Note:</u> This airspace is defined and depicted in the Jeppesen Airway Manual, *Canada - ATC Special Procedures*.

C. DLC has been implemented throughout Canada. Refer to the detailed guidance later in this section.

D. ADS-B has been partially implemented. Refer to the detailed guidance later in this section.

E. Canadian MNPS (CMNPS) airspace is implemented between FL330 and FL410 inclusive, and is primarily contained in the Arctic and Northern Control Area. A CMNPS Transition Area also exists from FL270 to below FL330 underlying the lateral limits of CMNPS airspace. Prior approval is required to operate in CMNPS airspace.

<u>Note</u>: Operators currently authorized to operate in NAT HLA are not required to hold an additional authorization to operate in CMNPS airspace.

F. Visa-exempt foreign nationals who fly to or transit through Canada are required to obtain an Electronic Travel Authorization (eTA) via the following URL:

http://www.cic.gc.ca/english/visit/visas.asp

<u>Note</u>: US citizens and foreign nationals with a valid visa are exempt from this requirement.

G. Some area charts for airways that traverse the Canada / US boundary depict Computer Navigation Fixes (CNFs) that begin with the letters "CF" followed by three constants (e.g., CFZDK), and this information may subsequently appear in FMS navigation databases. These CNFs are superfluous for crew operations and should not be used by crews for flight planning purposes or in communications with ATC (i.e., crews should not request a clearance to these points even if they are described on the FMS).

5.2.1.1 RVSM Procedures

A. Air Traffic Control Procedures:

1. ATC will, within non-radar airspace, endeavor to establish 2,000 ft separation or applicable lateral or longitudinal separation minimum if an aircraft reports greater than moderate turbulence and / or mountain wave activity of sufficient magnitude to significantly affect altitude-keeping, and is within 5 minutes of another aircraft at 1,000 ft separation;
2. ATC will, within radar airspace, vector aircraft to establish radar separation or establish 2,000 ft separation if an aircraft reports greater than moderate turbulence or encounters mountain wave activity of sufficient magnitude to significantly affect altitude-keeping, if 1,000 ft vertical separation exists between two aircraft and targets appear likely to merge;
3. ATC may structure portions of the airspace for specific periods of time for one-way traffic in which inappropriate FLs to the direction of flight may be assigned; and
4. ATC may, within non-radar airspace, temporarily suspend RVSM within selected areas and / or altitudes due to adverse weather conditions, e.g., pilot reports greater than moderate turbulence. When RVSM is suspended, the vertical separation minimum between all aircraft will be 2,000 ft.

   Note: Pilots may be requested by ATC to confirm that they are approved for RVSM operations. The phraseology is as follows: *"AFFIRM RVSM"* or *"NEGATIVE RVSM."*

B. Guidance for contingencies in Canadian RVSM airspace has been harmonized with published FAA guidance for RVSM (Appendix M).

5.2.1.2 DLC Procedures

A. CPDLC services are provided at FL290 and above in the Edmonton, Montreal, Moncton, Gander, Winnipeg, Vancouver, and Toronto FIRs.

   Note: CPDLC is to be used as a backup (supplement) to VHF or HF communications.

B. Supported Downlink Messages: Not all CPDLC messages are yet supported in all Canadian FIRs. Those that are supported will be published via NOTAM. Any downlink message other than indicated in the NOTAM will generate a "*MESSAGE NOT SUPPORTED BY THIS FACILITY*" response from the ground system.

   Note: Gander OCA has fully implemented CPDLC.

C. Montreal, Edmonton, and Moncton FIRs support route requests and clearances via CPDLC, including push-to-load messages.

D. AFN Logon Addresses

Facility Name	Facility Identifier
Montreal Area Control Center	CZUL
Edmonton Area Control Center	CZEG
Moncton Area Control Center	CZQM
Gander Area Control Center (Domestic)	CDQX
Gander Area Control Center (Oceanic)	CZQX

Facility Name	Facility Identifier
Winnipeg Area Control Center	CZWG
Vancouver Area Control Center	CZVR
Toronto Area Control Center	CZYZ

Note: Under normal circumstances, the current and next ATS units automatically transfer CPDLC and ADS-C services. Flight crews exiting the CDA CPDLC service areas into adjacent airspace where DLC is offered should not need to perform another AFN logon.

E. Route Clearance Messages: As of July 2023, ATC will provide route clearance messages in the Montreal FIR via CPDLC using one of the uplink messages described in Section 2.3.10.4. As with the use of these messages in oceanic airspace in association with push-to-load clearances, crews should take care to load the clearance into the FMS and review it first before responding with *WILCO* or *UNABLE*.

Note: As with the use of CPDLC elsewhere, ATC may prompt crews with a *CONFIRM ASSIGNED ROUTE* message to mitigate potential errors with the loading or execution of new / revised route clearances. Reference Section 2.3.3.1 for more information.

5.2.1.3 Application of ADS-B

A. ADS-B is currently available at FL290 and above throughout Canada, as well as below FL290 in the Montreal, Edmonton, Winnipeg, Moncton, Gander, and Vancouver FIRs.

B. ADS-B service over Southern Greenland is primarily being used to aid in providing optimum vertical profiles and permitting climb or descent through the FLs of other ADS-B aircraft. Gander ACC is able to consider FL requests that would result in eligible aircraft operating with in-trail spacing of 10 NM.

C. Where it is determined, following a request from the flight crew, that an FL change can be attained because of the availability of ADS-B, the following steps can be expected:

1. A VHF control frequency will be assigned to the required flights by ATC, either directly via DLC or via HF voice through Gander Radio.
2. The flights involved will be informed by ATC that identification has been established.
3. The requested climb or descent clearance will be issued by ATC either via DLC or VHF.

D. Flight crews are advised that aircraft will not normally be informed of ADS-B identification unless a specific operational advantage, such as an FL change, can be attained.

E. An ADS-B Out mandate will go into effect throughout the entirety of Canada according to the following schedule:

- Currently: Class A airspace;
- May 16, 2024: Class B airspace;
- No earlier than 2026: Class C, D, and E airspace.

Note: Class F and Class G airspace will not be subject to the mandate.

F. To comply with the ADS-B Out mandate, aircraft must be fitted with a DO-260B compliant 1090ES system, including antenna capability for broadcast toward both space-based ADS-B receivers / satellites (i.e., the Aerion network) as well as ground-based receivers. This may be accomplished either by multiple antennae or a single antenna with both capabilities.

G. Crews flying aircraft fitted in compliance with the Canadian ADS-B mandate should include the code “SUR/CANMANDATE” in Item 18 of their flight plan before operating in or to Canada.

5.2.1.4 Entry Requirements (Customs / CANPASS)

A. Visa-exempt foreign nationals who fly to or through Canada are expected to have an Electronic Travel Authorization (eTA). More information, including an online application form, can be found at https://www.canada.ca/en/immigration-refugees-citizenship/services/visit-canada/eta.html.

Note: US citizens and travellers with a valid Canadian visa are exempt from this requirement.

B. Travelers on a Canadian or US-registered private-owned, company-owned, or small charter aircraft carrying no more than 15 passengers, arriving directly from the US, may use the CANPASS program to enter Canada. **The pilot is responsible** for contacting the Canada Border Services Agency (CBSA) before flying into Canada. Refer to the procedures at http://www.cbsa-asfc.gc.ca/prog/canpass/privateair-eng.html.

- Pilots must contact 1-888-CANPASS at least two hours, but not more than 48 hours, before entering Canada.
- If the aircraft lands at a site not designated as a customs AOE due to weather conditions or other emergency, the pilot shall call 1-888-226-7277 or the nearest RCMP office as soon as possible.
- All aircraft must arrive during regular office hours at a designated airport. The AOE list is available at: https://www.cbsa-asfc.gc.ca/do-rb/services/aoe-eng.html
- If there are any changes to the information, the pilot must contact the CBSA with the revised information before the aircraft arrives in Canada.
- All travelers on the CANPASS Private flights must be program participants.
- CANPASS for private aircraft offers expedited border clearance for members who can:
  - Land at any AOE in Canada;
  - Arrive at an AOE any time the runways are open for landings, regardless of the hours of service of the local CBSA office;
  - Land at any designated CANPASS-only airport. These are unique AOEs, that can only be used by persons enrolled in the CANPASS aircraft programs; and
  - Proceed to the destination if no officer is waiting to meet the aircraft at the reported time of arrival without making a second phone call after landing.
- The pilot is required to provide the following information:
  - The aircraft tail number / registration mark;
  - Estimated Time of Arrival (ETA);
  - Destination;
  - Full name, DOB, citizenship for all on board;
  - Purpose of trip, length of stay in Canada for each non-resident;
  - Length of absence for passenger returning to Canada;
  - Passport and visa details for non-residents.
- In addition, the pilot must:
  - Ensure all passengers have photo ID and proof of citizenship.
  - Declare all imported goods, firearms and weapons.
  - Report all currency and monetary instruments of value equal to or greater than $10,000 CDN.
  - Declare repairs or modifications to goods or aircraft made outside Canada.

C. **Warning**: Alcohol-related driving offenses are criminal offenses in Canada and are grounds for Canadian Customs to deny entry. Contact a Canadian embassy or consulate in the US to discuss immigration admissibility and legislative requirements:

http://www.cic.gc.ca/english/information/inadmissibility/who.asp

5.2.1.5 Leaving / Entering Controlled Airspace

A. ATC will use the phrase "*WHILE IN CONTROLLED AIRSPACE*" in conjunction with altitude if an aircraft will be entering or leaving controlled airspace. In addition, ATC will specify the point at which an aircraft is to leave or enter controlled airspace laterally if the instruction is required for separation purposes.

Example: "*LEAVE / ENTER CONTROLLED AIRSPACE* (number) *MILES* (direct) *OF* (fix) *AT* (altitude)."

B. Aircraft destined to airports that underlie controlled low-level airspace and for which there is a published Instrument Approach Procedure will be cleared out of controlled airspace (vertically) via the published Instrument Approach Procedures.

C. Aircraft destined to airports that underlie controlled low-level airspace and for which there is not a published en route altitude will be asked to advise of its intentions.

D. Pilots may elect to cancel IFR, depart controlled airspace laterally, or request clearance to another destination.

E. Aircraft destined to airports that underlie controlled high-level airspace, and where there is no minimum IFR altitude established that would prohibit such a maneuver, will be cleared out of controlled high-level airspace.

5.2.1.6 Alerting Service IFR Departures from Uncontrolled Airports

A. At locations where communication with ATS is difficult, pilots may elect to depart VFR and obtain their IFR clearance once airborne. If the IFR clearance is not received prior to departure, the SAR alerting service is activated based on the ETD filed in the flight plan.

B. However, if departing from a Canadian airport that underlies airspace delegated to FAA control then responsibility for SAR alerting service is transferred to the FAA and FAA procedures apply. In such cases, alerting service is not activated until the aircraft contacts ATS for IFR clearance, alerting service is not provided until contact is established with ATS.

5.2.1.7 Phraseology

A. Canada has adopted the SID/STAR phraseology described by Amendment 7 to PANS-ATM (Section 2.2.3.1).

B. In addition, ATC may use one of the two following phrases when unable to issue clearances:

AT YOUR DISCRETION	Used to approve an aircraft movement on any surface not visible from the control tower due to a physical obstruction other than weather phenomena. ATC will provide information on known traffic or obstructions when possible.
UNABLE TO ISSUE CLEARANCE	Used when a controller is not authorized to issue an ATC clearance. A pilot who continues without a clearance in these circumstances may be subject to regulatory action by Transport Canada. ATC will provide pertinent taxi / takeoff / landing information and file an occurrence report.

5.2.1.8 Customs Declaration Reporting (ArriveCAN)

A. Individuals may use ArriveCAN (either via mobile app or the web) to provide customs information to the CBSA prior to traveling to Canada. The ArriveCAN website can be consulted for comprehensive information:

https://www.canada.ca/en/border-services-agency/services/arrivecan.html

Note: Prior to October 1, 2022, it was mandatory to provide health and travel information via ArriveCAN. That requirement is no longer in effect. However, ArriveCAN does provide a means to provide some information prior to flight, which may help to expedite arrival procedures that are still required.

B. If ArriveCAN will be used, information must be submitted via ArriveCAN within 72 hours before arriving to Canada.

C. ArriveCAN will eventually be enhanced with additional border-related features.

5.2.2 United States

Refer to Appendix M for supplementary information on operations in the US.

5.2.3 Mexico

A. Advanced Passenger Information System: Passenger, crew, and flight data must be submitted electronically to the Mexico National Institute of Immigration at apis_cna@inami.gob.mx 24 hours prior to departure and resubmitted 30 minutes prior to takeoff. The APIS spreadsheet and instructions for completion can be found online at:

https://www.aopa.org/travel/international-travel/mexico

B. Security Manual: Air charter operators (passengers, air ambulances, and cargo) are required to submit a “Security Manual Against Acts of Unlawful Interference” (in Spanish) to the Mexican authorities.

C. Speed Restrictions

1. Aircraft operating under IFR within 10 NM of an airport, below 3,000 ft AGL of that airport’s elevation, are restricted to 200 Kts.
2. Maximum holding speeds are as follows:
   - Turbojet aircraft up to 6,000 ft: 200 Kts;
   - Turbojet aircraft from 6,000 to 14,000 ft: 210 Kts; and
   - Turbojet aircraft above 14,000 ft: 230 Kts.

D. Altimeter Setting Procedures

- Corrected QNH altimeter settings, provided by ATC or communications stations of the mobile aeronautical service, will be used for en route operations at or below 18,000 ft. when operating over continental areas and/or over oceanic areas within 100 NM of the coast.
- A QNE altimeter setting will be used for operations at and above FL200 and above 2,000 ft over oceanic areas more than 100 NM from the coast.
- During climb, the QNH altimeter setting will be changed to QNE when passing 18,500 ft.
- During descent, the QNE altimeter setting will be changed to QNH when passing 19,500 ft.
- The altimeter Transition Layer can be used in level flight with previous clearance from ATC or when climbing or descending. ATC may assign aircraft operating above 19,000 ft QNH altitudes as long as a vertical separation of 2,000 ft is given between aircraft operating on QNE altimeter rules.

5.3.0 European Union

A. Implementation of Special Areas of Operation

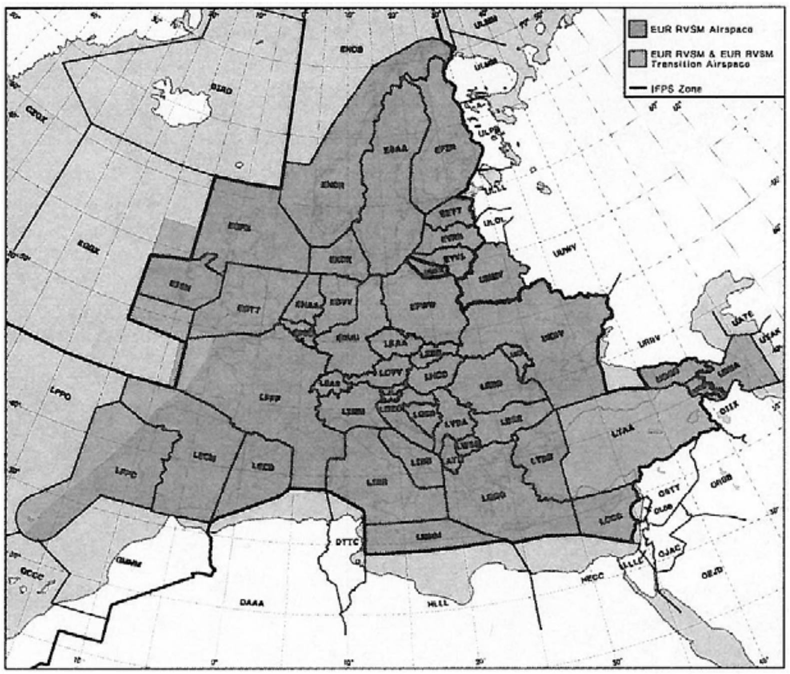
1. RVSM
   - RVSM is applicable between FL290 and FL410 (inclusive) as follows:

EBBU	Brussels	ESAA	Sweden	LIMM	Milan	LWSS	Skopje
EDUU	Rhein	EVRR	Riga	LIRR	Rome	LYBA	Belgrade

EDVV	Hannover	EYVL	Vilnius	LJLA	Ljubljana	LZBB	Bratislava
EETT	Tallinn	LATI	Tirana	LKAA	Prague	UBBA	Baku
EFIN	Finland	LBSR	Sofia	LMMM	Malta	UDDD	Yerevan
EGPX	Scottish	LCCC	Nicosia	LOVV	Vienna	UGGG	Tbilisi
EHAA	Amsterdam	LDZO	Zagreb	LQSB	Sarajevo	UKBV	Kyiv
EISN	Shannon	LECB	Barcelona	LRBB	Bucharest	UMKK	Kaliningrad
EKDK	Copenhagen	LGGG	Hellas	LSAS	Switzerland	UMMV	Minsk
ENOR	Norway	LHCC	Budapest	LTBB	Istanbul		
EPWW	Warsaw	LIBB	Brindisi	LUKK	Chisinau		

- The following are designated as RVSM Transition Airspace:

EGTT	London	LFFF	France	LTAA	Ankara		
LECM	Madrid	LPPC	Lisbon				



Note: RVSM is also partially applied in the Canaries UIR (AFI Region).

- The Director of Aviation will ensure that any change to the RVSM approval status of a flight resulting from a change of aircraft or flight crew will be addressed to the EUROCONTROL Central Flow Management Unit (CFMU) in the form of a modification (CHG) or a Cancellation (CNL) message, as appropriate.
- Aircraft must have completed an RVSM height-monitoring flight within the last two years or 1,000 flight hours in order to operate in European RVSM airspace. The results of these flights are tracked by the European Follow-On Monitoring Program.

  Note: The results of any flights monitored by the US Aircraft Geometric Height Measurement Element (AGHME) system are automatically provided to this Program.

2. PBN: EASA recognizes and follows the PBN implementation design described by ICAO (Doc 9613) and requires operational authorization for any PBN operation.
3. RNP APCH: RNAV (GPS) Approaches (Appendix Q) are supported in much of Europe. However, as RNP APCH falls under the category of "PBN" operations, operators must comply with the operational authorization requirements set forth in EU 965/2012, even if the country of aircraft registration does not require such an authorization.
4. DLC: Aircraft must be fitted and approved for CPDLC and capable of interoperating on the ATN network to operate above FL285 in the core European ANSPs, with the following additional considerations in mind:
    - Although ATN (VDL M2) is the preferred network for DLC operations in Europe, aircraft that have been fitted with a FANS-compliant system prior to January 1, 2018 meet the equipage mandate.
    - Aircraft with a certified maximum seating capacity of 19 passengers or less, a maximum takeoff mass of 100,000 lbs or less, and with an initial airworthiness certificate issued prior to February 5, 2020 are exempt from the CPDLC equipage mandate in Europe.
    - Aircraft with an airworthiness certificate issued prior to 1995 are exempt from the equipage mandate.

      Note: If the aircraft is exempt from the European DLC mandate, the entry "*Z*" must be included in Item 10a and "*DAT/CPDLCX*" must be included in Item 18 of the flight plan.
5. ADS-B: ADS-B Out equipage (DO-260B) is mandatory.

B. Emissions Trading System (ETS): Any flights within or between the 31 countries involved in the European Union ETS are required to participate according to the European legislation, regardless of the state in which the aircraft is registered. Non-European-registered operators are only exempt from the ETS requirements for flights to or from the participating countries.

C. Value Added Tax (VAT) and Exemptions

- Aircraft not registered in the European Union may be subject to a duty of 20% or more of the aircraft value when operating within Europe. To be eligible for exemption from the VAT, operators of non-EU-registered aircraft must meet the following conditions:
    - The aircraft must not remain in the EU for more than six (6) months in a twelve (12) month period;
    - The aircraft must be owned outside of the EU and not made available for use within its boundaries by EU residents; and
    - The aircraft must be flown for private, not commercial, use.
- Aircraft are automatically granted temporary admission and conditional relief from the VAT upon entry to the EU. This relief will continue as long as the conditions described above remain in effect.
- Most business and personal flight operations, including chartered flights, meet the definition of "private" as noted above. However, if there is any confusion, flight crews can reference the website below for further clarification:

  https://nbaa.org/flight-department-administration/tax-issues/international-taxes/european-union-aircraft-importation/
- Aircraft may also be subject to ETS taxes. Operators can reference the following URL for more information:

  https://ec.europa.eu/clima/policies/ets_en

D. Transition Level: Transition Levels will be at least 300 m (1,000 ft) above the Transition Altitude to permit the Transition Altitude and Transition Level to be used concurrently in cruising flights with vertical separation ensured.

E. Intersection Takeoffs: Aircraft may be cleared to depart from published intersection takeoff positions upon request by the pilot, or if initiated by ATC, provided that the TORA, TODA, and ASDA for each intersection takeoff position are published in the relevant AIP and clearly distinguishable from full runway declared distances.

F. Operating Minimums

1. Airport Operating Minimums (AOM) for takeoff and landing are shown on Jeppesen Instrument Approach or Airport Charts or separate minimums listings.
2. Landing minimums will be shown as RVR, but values above 2,000 m will be designated as Converted Meteorological Visibility, prefixed "CMV." Takeoff minimums are shown without a prefix because they are either RVR or VIS.
3. Circling minimums are always visibilities, which are indicated in the circling minimums box. For the separate minimums listings RVR, CMV, and VIS are abbreviated as R, C, and V. To convert a reported VIS to RVR/CMV, refer to the conversion chart in Appendix T.

G. Free Route Airspace: This is airspace within which users may freely plan a route between a defined entry point and a defined exit point with the possibility to route via intermediate way points without reference to the ATC route network (subject to airspace availability). Flights remain subject to ATC while flying in Free Route Airspace. The following European ACCs have currently implemented Free Route Airspace to some extent:

H. Security Programs: Air carriers operating into the EU are required to have and maintain security procedures. Generally these procedures are not required to be approved, but must be available on the flight deck should an authority request to review them. There is no prescribed format for a security program, but procedures must comply with Regulation (EC) No 300/2008.

Note: Operators of aircraft exceeding 5.7 tons maximum weight must submit their security procedures to the Luftfahrt-Bundesamt (LBA) four weeks in advance of any trip to Germany.

I. Submission of Noise Information: Operators of aircraft with an MTOW of 34,000 kg (74,900 lbs) or greater, or with 19 or more passenger seats, must provide detailed noise certificate / performance information to the EASA ANC Database. Details on how to set up an account with this database, as well as required information to submit, can be found through the following URL:

https://www.easa.europa.eu/document-library/application-forms/foapman00146

5.3.1 Electronic Passport Programs

A. eu-LISA, the agency responsible for software systems related to security in the European Union, has established two programs that will effectively replace the physical stamping of passports for entry / exit into EU states: EES (Entry / Exit System) and ETIAS (European Travel Information and Authorization System). Any carrier operating to the EU will be required to register with eu-LISA for mandatory participation in these programs.

Note: As used by eu-LISA, the term “carrier” includes any pilot / flight department that is compensated for their duties, regardless of whether or not their operations are broadly defined as “private” or “non-commercial.”

B. Operators must begin using EES to verify whether or not non-EU passengers have exceeded their allowed entries / exits for flights to EU states beginning in May 2023. Further participation in ETIAS (which will include verification that visa-exempt passengers have valid travel authorizations) will be required when ETIAS becomes operational, which is expected in November 2023.

C. Operators who have not registered with eu-LISA can do so by digitally completing their registration form and emailing it to carriers_onboarding@eulisa.europa.eu. A copy of the registration form and more information can be found on the following site:

https://www.eulisa.europa.eu/About-Us/Organisation/working-group-for-carriers

5.3.2 EU EVS Approach RVR / CMV Reduction

A. Prior to using an Enhanced Vision System (EVS) in Europe, crews must verify that they possess any applicable or required approvals (e.g., EASA Part TCO.300).

B. When using an EVS certificated for the purpose of reduced RVR / CMV and used in accordance with the procedures and limitations of the AFM, crews may:

1. Continue an approach below DH or MDH to 100 ft above the threshold elevation of the runway provided that at least one of the following visual references is displayed and identifiable on the EVS:
    - Elements of the approach lighting; or
    - Both of the following:
        a. The runway threshold, identified by at least one of the following:
            - The beginning of the runway landing surface;
            - The threshold lights; or
            - The threshold identification lights; and
        b. The runway touchdown zone identified by at least one of the following:
            - The touchdown zone landing surface;

- The touchdown zone lights; or
- The touchdown zone markings or the runway lights.

2. Reduce the calculated RVR/CMV for the approach from the value in Column 1 of the table below to the value in Column 2:

Column 1 (RVR/CMV Normally Required)	Column 2 (RVR/CMV for Approach with EVS)	Column 1 (RVR/CMV Normally Required)	Column 2 (RVR/CMV for Approach with EVS)	Column 1 (RVR/CMV Normally Required)	Column 2 (RVR/CMV for Approach with EVS)
550	350	1,900	1,300	3,500	2,300
600	400	2,000	1,300	3,600	2,400
650	450	2,100	1,400	3,700	2,400
700	450	2,200	1,500	3,800	2,500
750	500	2,300	1,500	3,900	2,600
800	550	2,400	1,600	4,000	2,600
900	600	2,500	1,700	4,100	2,700
1,000	650	2,600	1,700	4,200	2,800
1,100	750	2,700	1,800	4,300	2,800
1,200	800	2,800	1,900	4,400	2,900
1,300	900	2,900	1,900	4,500	3,000
1,400	900	3,000	2,000	4,600	3,000
1,500	100	3,100	2,000	4,700	3,100
1,600	1,100	3,200	2,100	4,800	3,200
1,700	1,100	3,300	2,200	4,900	3,200
1,800	1,200	3,400	2,200	5,000	3,300

C. Paragraph A above may only be used for ILS, MLS, PAR, GLS, and APV operations with a DH no lower than 200 ft or an approach flown using approved vertical flight path guidance to an MDH or DH no lower than 250 ft.

D. A pilot may not continue an approach below 100 ft above runway threshold elevation for the intended runway unless at least one of the visual references specified below is distinctly visible and identifiable to the pilot without reliance on the EVS:

- The lights or markings of the runway threshold; or
- The lights or markings of the runway touchdown zone.

5.3.3 Continuous Descent Final Approach (CDFA)

A. CDFA is a technique for flying the final approach segment of a Non-Precision Approach as a continuous descent. The technique is consistent with stabilized approach procedures and has no level-off. A CDFA starts from an altitude/height at or above the FAF and proceeds to an altitude/height approximately 50 ft (15 m) above the landing runway threshold or to a point where the flare maneuver should begin based on the type of aircraft being flown.

B. Per EASA AMC1.CAT.OP.MPA.115, all Non-Precision Approaches in Europe must be flown using the CDFA technique unless otherwise approved by the applicable Authority for a particular approach to a particular runway.

Note: When calculating the minima in accordance with EASA AMC1.CAT.OP.MPA.115, the applicable minimum RVR must be increased by 200 m for Category A/B airplanes and by 400 m for Category C/D airplanes for approaches not flown using the CDFA technique, providing that the resulting RVR/CMV value does not exceed 5,000 m.

C. Derived Decision Altitude (DDA) Considerations:

- The aircraft must not descend below the MDA when executing a Missed Approach. When using the CDFA technique, a DDA is used to account for the aircraft's tendency to drop below the altitude at which the Missed Approach is initiated. The DDA is typically determined by adding an increment to the MDA.
- Individual state AIPs should be consulted to determine if there is a specified method for calculating the DDA (e.g., increasing the RVR or visibility requirements for the approach).

  Note: State AIPs and/or the Jeppesen Airway Manual should also be consulted to determine if approach charts have already accounted for a DDA (i.e., the operational minima published on the charts assumes the approach will be flown using CDFA).
- In cases where there is no prescribed method to calculate the DDA, or the published charts do not account for a DDA, the AFM should be consulted for the correct increment to add to the MDA (e.g., 60 ft for a G450). The increment should be equal to or greater than the maximum demonstrated altitude loss for a go-around.

  Note: It is not necessary to "double add" by both adding the AFM-recommended increment and following the procedure described in the state AIP, if published.

5.3.4 Ramp Inspection Program

A. EASA manages the European Union Ramp Inspection Program (EU RIP) as a means to enforce safety standards. This program involves the execution of ramp inspections of aircraft landing at airports located in participating states, including the European Union as well as several other non-EU countries which have adopted the standards of the program.

B. There is no universal schedule for ramp inspections, and some countries may enforce checks randomly. Flight crews operating to Europe should familiarize themselves with the inspection criteria described in Appendix H.

Note: Not all items may necessarily be inspected; however, crews should be aware of the potential for any or all items to be checked. It is recommended that crews carry a pre-prepared "Ramp Inspection Binder" to expedite the inspection process.

C. If an inspection identifies significant irregularities that have an immediate impact on safety, **inspectors can demand corrective action before they allow the aircraft to leave**.

D. If rectification of the deficiencies requires more time or needs to be performed at another airport, the authority of the state of inspection may authorize a positioning flight (without passengers or cargo onboard) and also prescribe the conditions under which the positioning flight may be conducted.

E. All states participating in the EU RIP are required to exchange the reports with the other states. This exchange is done through a centralized database hosted by EASA. Operators can register online to that database, although access is limited to ramp inspection reports on their own aircraft.

5.3.5 Planning Considerations

A. The Integrated Initial Flight Plan Processing System (IFPS) is Eurocontrol's Network Manager system that manages reception, initial processing, and distribution of flight data related to IFR flights within the area covered by the participating states (or IFPZ),

B. Filing Lead Time: Flight plans must be submitted up to 3 hours before the EOBT where possible. Flight plans can be submitted up to 120 hours (5 days) in advance.

C. Flight Plan Addressing: All flight plans associated with IFR and general air traffic flights or parts thereof intending to operate within the IFPZ shall be addressed to the following addresses:

- AFTN: EUCHZMPF/ EUCBZMFP
- SITA: BRUEP7X / PAREP7X

D. Route Availability Document (RAD): The RAD is the sole source planning document that combines AIP Route Flow Restrictions with Air Traffic Flow and Capacity Management (ATCFM) routing requirements designed to make the most of the ATC capacity. Although all routing must be compliant with the restrictions outlined in the RAD, occasionally FMPs and ATSUs will authorize non-compliant routing for specific flights. Refer to the following site for more details: http://www.nm.eurocontrol.int/RAD/index.html

E. Runway Visual Range (RVR): All IFR flights intending to operate within the IFPZ are recommended to include RVR in their flight plan. It may be used by ATC during flow regulations when there are low visibility conditions. It is denoted in item 18 of the flight plan with the letters RVR/ and no more than three digits to express RVR in meters.

F. Composite Flight Plans: Flights wishing to operate under partial IFR rules will use the following:

- Y: For those flights commencing under IFR conditions and changing to VFR
- Z: For those flights commencing under VFR conditions and changing to IFR

  Note: The operator will indicate on the flight plan the waypoint, speed and level at which the conditions will change.

G. Airways: The national authorities may decide the maximum DCT length, in NM, that will be allowed within their airspace. They may also forbid any DCT regardless of length. Details of this can be found on Annex 4 of the RAD. Authorities may also decide whether the crossing of an international boundary is forbidden or allowed.

H. Checks shall be executed for the use of DCT between two points, and it is recommended to use a DCT only where a connection to a point is not possible via an ATS route or SID/STAR. Where a DCT is filed between 2 points, the IFPS shall check to see if there is an available airway with not more than a 0.1% deviation of a DCT route. Where such route is found, IFPS will automatically replace the DCT with the available airway.

I. Protected Flights

1. For those flights for which the details should only be available to a restricted audience (e.g., security sensitive flights), the indicator “EUR/PROTECTED” should be entered in item 18 of the flight plan. Those flights using this will not automatically qualify for exemption from flow regulations, unless one or more of the following special status (STS/) indicator(s) is present: FFR, MEDEVAC, ATFMX, SAR, HEAD.
2. Request Plan Messages (RQP) for flights that have been listed as EUR/PROTECTED will go through manual processing. The IFPS will only transmit a copy of the flight information to the originator.

J. En Route Stay Indicator

1. The stay function was enabled by IFPS to enable time delays associated with certain special en-route activities such as training flights, air-to-air refueling, maintenance flights, etc. The stay indicator may be used in association with any significant point on the route, including the first and last points, but no aerodrome SID or STAR.
2. Stay may only be used for flights that are completely planned in the IFPZ. The time given in the stay indicator may not be more than the total EET. More than one stay may be used in the flight plan.

   Example 1: WAL STAY1/0100 DCS

   Example 2: WAL STAY1/0100 DCS DCT TLA STAY2/0045 FOYLE

3. It is also possible to change speed and level at the sentry point of the stay area or the exit point. The operator may also indicate the reason for the stay in Item 18 as STAYINFO1/.

K. IFPS Monitoring Flight Evolution: IFPS will monitor flight evolution from the moment that it is filed to the moment that it is closed. IFPS will reject cancellations, EOBT updates, and route updates (CHG) that are received for a flight that has been activated by the Network Manager systems. This activation occurs when:

- The flight is reported airborne;
- The flight is reported off-blocks;
- The flight has generated a departure message (DEP).

5.3.6 Fuel Requirements (Differences From ICAO)

A. Effective since October 2022, EASA has implemented fuel requirements and permissions that slightly differ from ICAO. Operators should consider the following when planning a flight to any EASA member state.

B. Isolated Airports: Only if flying to an isolated airport, EASA requires that crews adhere to a standard set by ICAO for commercial operators for destination alternate fuel regardless of whether or not the flight is commercial (e.g., a US Part 91 operator would be required to follow the US Part 135 or Part 121 guidance for an isolated destination).

- More specifically, when considering destination alternate fuel, ICAO states the following requirement for commercial operations:

  Where the airport of intended landing is an isolated airport… for a reciprocating engine airplane, the amount of fuel required to fly for 45 minutes plus 15 percent of the flight time planned to be spent at cruising level, including final reserve fuel, or two hours, whichever is less

- Typically the portion of the above requirement that is indicated in green font is not applicable to non-commercial operators. However, the EASA fuel policy makes the full text applicable to all operators.

C. Optional Fuel Schemes: Commercial operators (i.e., EASA Part-CAT) have the option of submitting a request for an individualized fuel scheme to their FAA that would provide some flexibility and potential fuel savings by allowing a lower contingency fuel requirement than what ICAO requires. Operators who wish to receive this benefit should remember that such a fuel scheme can only be applied when operating wholly within EASA member states. Further information can be found through the following URL:

https://www.easa.europa.eu/en/document-library/agency-decisions/ed-decision-2022005r

Note: Individualized EASA fuel schemes are **not** available to non-commercial operators (e.g., US Part 91).

D. "*MINIMUM FUEL*" Declaration: In the event that the crew determines that the aircraft has sufficient fuel to land at their destination or a planned alternate, but has insufficient fuel to land at any other airport (i.e., the crew has only one viable destination), they should advise ATC using the phraseology "*MINIMUM FUEL*." This is intended to alert ATC to the possibility that an emergency situation would result if the crew is not cleared to fly to their destination.

5.3.7 United Kingdom

A. LPV approaches are no longer available in the UK as a result of the UK's suspension of the EGNOS Safety of Life service (SoL), around which these approaches are designed. Any published charts and aerodrome data containing LPV minima have been or will be de-notified in the UK AIP and withdrawn from RNP IAPs.

B. Speed Restrictions

1. Within London TMA the maximum holding speed up to and including FL140 is 220 KIAS.
2. Maximum Rates of Climb and Descent: Under normal, non-emergency circumstances, all non-military aircraft operating inside controlled airspace within the London and Scottish FIRs / UIRs should not operate with a climb or descent rate exceeding 8,000 fpm.
   - It is considered that, with about 1,500 ft to go to a cleared Level, vertical speed should be reduced to a maximum of 1,500 fpm and ideally to between 1,000 fpm and 500 fpm.
   - Pilots should ensure that the airplane neither undershoots nor overshoots the cleared level by more than 150 ft, manually overriding if necessary.
3. Minimum Rates of Climb and Descent: Pilots cleared for a climb or descent should inform ATC if their rate of climb or descent during the level change is or will be less than 500 fpm.

   Note: This requirement applies to both the en route phase of flight and to terminal holding above the Transition Altitude.
4. Instrument approaches and missed approach turns are restricted to a maximum airspeed of 185 kts.

C. Approach Ban: An aircraft, when making a descent to an airport, shall not:

1. Descend from a height of 1,000 ft or more above the airport to a height less than 1,000 ft above the airport if the relevant RVR at the airport is at the time less than the specified minimum for landing; or
2. Continue an "approach to landing" at any airport by flying below the specified DH; or
3. Descend below the specified MDH unless, in either case, from such height the specified visual reference for landing is established and is maintained.

D. Continuous Descent Approach (CDA)

- CDA is a noise abatement technique for arriving aircraft in which the pilot, when given a descent clearance below the TA by ATC, will descend at the rate the pilot judges will be best suited to the achievement of continuous descent while meeting the ATC speed control requirements.
- The objective is to join the glide path at the appropriate height for the distance without recourse to level flight.

ICAO Phraseology Differences in the UK

ICAO	UK
Cleared ILS Approach	Report established on the localizer
FL100: Flight Level One Zero Zero	FL100: Flight Level One Hundred
Go Ahead	Pass your message
Line up behind (Conditional clearance)	After the preceding (aircraft type) line up (Conditional clearance)

E. Standard Phraseology: When an "Expect" level clearance is passed it shall be used in the following standardized form: *"EXPECT FL200 LEVEL BY XXXXX, DESCEND (NOW) FL280."* The word "now" is optional. Pilots are requested to read back the clearance in the order in which it is passed and to seek confirmation from ATC if any doubt exists about the cleared level.

F. Position Reporting Procedures

1. Pilots are to make position reports within London and Scottish FIR/UIR in the following circumstances:
    - After transfer of communication;
    - On reaching the limit of ATS clearance;
    - When instructed by ATC;
    - When operating helicopters in the North Sea Low Level Radar Advisory and Flight Information areas of responsibility and on Helicopter Routes within the London Control Zone and London City Control Zone; or
    - When operating across the English Channel.
2. The initial call changing radio frequency shall contain only the aircraft identification and FL. Any subsequent report shall contain aircraft identification, position and time except as provided for in respect of helicopter operations in the areas specified above.
3. When changing frequency between the London or Scottish Control Centers, pilots are required to state their callsign and FL / altitudes only (plus any other details when specifically instructed by ATC).
    - When the aircraft is in level flight but cleared to another FL/ALT, both FL/ALT should be passed.
    - Similarly, when the aircraft is not in level flight, the pilot should state the aircraft identification followed by the FL/ALT to which it is cleared only; it is not necessary to state passing FL/ALT in these circumstances.

G. Deconfliction Service: The controller provides specific surveillance derived traffic information and deconfliction advice. Deconfliction Service is available under IFR or VFR and in any meteorological conditions.

- The controller will expect the pilot to accept headings and / or levels that may require flight in IMC.
- High controller workload or RTF loading may reduce the ability of the controller to pass such deconfliction advice. Controllers cannot guarantee to achieve these deconfliction minima; however, they shall apply all reasonable endeavors.

  Note: The avoidance of traffic is ultimately the pilot's responsibility.
- The pilot shall inform the controller if the pilot elects not to act on the controller's deconfliction advice, and therefore accepts responsibility for initiating any subsequent collision avoidance against that particular conflicting aircraft. Unless safety is likely to be compromised, a pilot shall not change heading or level without first obtaining approval from the controller.

H. Distress & Diversion Cell

- The RAF Distress & Diversion (D&D) Cell at Swanwick can provide assistance to civil aircraft in an emergency, if needed, via 121.5 MHz.
- For aircraft experiencing lost communication systems / radio transmission failure, the D&D Cell can be contacted by satellite phone at 011-44-1489-612406. The D&D Cell can then alert the appropriate ATC unit to confirm the communication failure.

  Note 1: ATC's inability to contact an aircraft experiencing a communication failure could lead to that aircraft's interception by the Ministry of Defense.

Note 2: This is for use only when all other means of communication with ATC have failed.

I. Mode S Transponder Operation: Unless otherwise instructed by ATC, Mode S transponder-equipped aircraft on the airport surface should select Mode A code 2000 when under tow; or parked and prior to selecting OFF or STDBY.

J. Mode S Barometric Pressure Setting Data: London Terminal Control has the ability to downlink Mode S Barometric Pressure Setting (BPS) data. Therefore, if the downlinked pressure data is at variance with the BPS expected by ATC, pilots can expect to be queried. When ATC passes a reminder of the appropriate BPS, it is anticipated that the aircrew will crosscheck the altimeter settings and confirm set.

K. Air Passenger Duty (APD): Operators of private aircraft over 5.7 tons may be required to register for APD within seven days of the flight occurring. Refer to the site below for details:

https://www.gov.uk/air-passenger-duty

L. Standard Routing (SRD): Operators wishing to flight plan into, out of, and within the United Kingdom and Irish airspace may utilize the standard route document which is a compilation of preferred routings. UK NATS makes the SRD available and updates it every 28 days for the AIRAC cycle: http://www.nats-uk.ead-it.com

5.4.0 Pacific Region

5.4.1 American Samoa

A. About 30 miles from Pago Pago International Airport, inbound aircraft should monitor 118.3 for broadcasts from other aircraft. At 15 miles from the airport, crews must broadcast their position, altitude, and intentions, followed by their position on downwind, base leg, and final approach.

B. Outbound aircraft should monitor 118.3 for broadcasts from other aircraft before taxiing. Crews must broadcast their position on the airport and intentions, followed by an announcement before taxiing onto the runway for takeoff.

C. Power Lines Caution: There are unlighted and marked permanently installed power lines between the island of Ofu and Olosega at 400 feet ASL.

5.4.2 Australia

A. Implementation of Special Areas of Operation

1. RVSM has been implemented in the Australian FIRs on a non-exclusionary basis from FL290 - FL410.

2. ADS-B: Equipage and operation of approved ADS-B avionics equipment is mandatory for all aircraft operations in Australian airspace at or above FL290.

3. PBN: RNAV specifications, other than oceanic/remote RNAV-10 (RNP-10), are not used or implemented in Australian airspace. Aircraft must be capable of terminal and en route RNP operations using appropriate GNSS equipment.

4. CPDLC is supported in Australian airspace, and the use of the “*SET MAX UPLINK DELAY VALUE*” prompt should be expected in the Brisbane (YBBB) and Melbourne (YMMM) FIRs.

   Note: Refer to Appendix C.10.2 for more information on this procedure. A delay value of 300 seconds, the same used in the NAT HLA, will be requested in YBBB and YMMM. Pilots should reset the latency timer value, as appropriate, when exiting Australian airspace.

B. GNSS Mandate: All aircraft operating under IFR must be equipped with GNSS systems and carry authorizations (e.g., LOAs) for terminal RNP-1 operations (SIDs and STARs) and en route continental RNP-2 operations.

Note 1: A transition period will be in effect until May 26, 2018 to provide flexibility for operators of foreign aircraft who are unable to obtain such authorizations, but who are fitted with GNSS equipment. Such operators should complete and submit the form located at: https://www.casa.gov.au/files/form667pdf

Note 2: Operators who fly in accordance with the exemption are required to enter "*RMK/CASA RNP1&2 AMC*" in Item 18 of the ICAO flight plan.

C. Speed Restrictions: When leaving an en route holding pattern, jet aircraft must maintain 250 kts unless otherwise advised by ATC. Aircraft should maintain a constant IAS and any sustained speed variation of more than 10 kts must be advised to ATC.

D. Land and Hold Short Operations (LAHSO): AirServices of Australia cautions that pilots of foreign registered civil aircraft are not qualified to participate and must not accept a requirement to "*HOLD SHORT*."

Note: ATC will not intentionally issue, and a pilot must not accept, a clearance for a hold short landing unless the pilot is LAHSO approved.

E. Fuel Requirements: Weather holding fuel requirements are mandatory. All other published fuel requirements are advisory only. Weather values (criteria) can be found in the Jeppesen Airway Manual Services.

F. An approved Transport Security Program is required for air service providers in Australia. The Office of Transport Security at the Australian Department of Infrastructure and Transport (transport.security@infrastructure.gov.au) should be contacted for more information.

G. Fumigation with insecticide is mandatory and enforced in all Australian ports. Follow the instructions on the insecticide packaging and be prepared to present the remaining contents of the insecticide bottle to an Inspector prior to de-planing.

H. Airport Curfews: A curfew applies between 11pm and 6am at Sydney, Adelaide, Coolangatta, and Essendon Airports. While most aircraft operations are prohibited during this period, exceptions are made for emergency aircraft, some small jets, propeller-driven aircraft, and freight movements. More information can be found on the following website:

http://www.infrastructure.gov.au/aviation/environmental/curfews/index.aspx

5.4.3 New Zealand

A. Implementation of Special Areas of Operation

- RVSM is applied from FL290 to FL410 inclusive in the New Zealand FIR. The single alternate Flight Level Allocation Scheme shall be used, except that track allocation shall be 270 to 089 degrees (north), in lieu of 000 to 179 degrees (east), and shall be 090 to 269 degrees (south), in lieu of 180 to 359 degrees (west).
- PBN, requiring authorization, has been implemented as follows:
  - Q, Y, Z, and T routes are designated as RNAV-2.
  - RNAV-1 and RNP-1 SIDs and STARs are available at locations with 24/7 surveillance.
  - RNP APCH approaches are provided at ATC-controlled locations.
- ADS-B: Within Auckland Oceanic FIR (West of 180º) and the New Zealand Domestic FIR, aircraft equipped with 1090ES ADS-B must disable ADS-B transmissions unless:
  - The aircraft emits position information of an accuracy and integrity consistent with the transmitted value of the position quality indicator; or
  - The aircraft always transmits a value of 0 for one or more of the position quality indicators (NUC, NIC, NAC, or SIL); or
  - The operator has received special approval from the Director of Civil Aviation.

B. Altimetry: Aircraft entering the New Zealand FIR are required to remain on 1013.2 hPa. Aircraft entering the Auckland Oceanic FIR from the New Zealand FIR, must, if on QNH, change to 1013.2 hPa at the FIR boundary.

C. Revision of Estimates: Except when reporting position via ADS-C, pilots must report immediately to ATC a corrected estimate for the next significant point at any time it becomes apparent that an estimate previously submitted is in error in excess of two (2) minutes.

D. Non-RVSM Fuel Requirements: Vertical transit through RVSM airspace for non-RVSM aircraft may not be available. Adequate fuel should be carried for flight at FL280 or below.

5.5.0 Eurasia / Eastern Europe

A. RVSM Implementation: Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan have implemented RVSM between FL290 and FL410 inclusive.

B. The same Flight Level Allocation Scheme used in the US will apply in this region. (Odd altitude assignment for 000-179 degrees and even altitude for 180-359 degrees.)

Note: The direction of the track shall be determined by true north for Kazakhstan, Kyrgyzstan and Russia and by magnetic north for Tajikistan, Turkmenistan, and Uzbekistan.

5.5.1 Russia

Due to ongoing sanctions, the aircraft and pilots of many nations (including the US) are prohibited from operating in Russian airspace, as well as from operating within 160 NM of the boundaries with Ukraine.

5.5.2 Ukraine

Due to the ongoing invasion of Ukraine by the Russian Federation, Ukraine airspace is entirely closed to all civil aviation operations.

5.6.0 Asia

A. The Monitoring Agency for Asia Region (MAAR) serves as the Regional Monitoring Agency (RMA) for Asia. MAAR accepts monitoring results from other approved Regional Monitoring Agencies, e.g., Eurocontrol, AGHME, etc.

Note: Unlike other Monitoring Agencies, MAAR does not have any Reporting Form for the pilot of a civil aircraft to report a Height Deviation of 300 ft or greater. It is the obligation of the ATC center to file the report.

B. No-PDC Procedures: In the Asia / Pacific region, specifically in the Western Pacific / South China Sea area, the term “No-PDC” may be used by ATC. This refers to “No Pre-Departure Coordination.” Using No-PDC means that the initial FL for departing flights is allocated in accordance with the pre-agreed FLAS without real-time FL coordination being undertaken between adjacent Control Centers. After departure, other FLs may be available subject to prior coordination between Control Centers.

Note: Refer to the Jeppesen Airway Manual to confirm which airports apply No-PDC procedures, as well as the applicable Flight Levels / FLAS.

C. Asia to/from Europe/Middle East South of the Himalayas (EMARSSH) Route Structure

- RNP-10 has been established in EMARSSH. RNP-10 approved aircraft will be separated laterally by 50 NM.
- Longitudinal Separation: 80 NM RNAV or ten (10) minutes (or less) MNT separation minimum (Section 2.3.10.1) may be applied between aircraft.
- Vertical Separation: Vertical separation minimum of 2,000 ft, including the use of non-standard levels, will be applied between aircraft operating at FL290 or above.

- Monitoring of Aircraft Navigation Performance: The direction and reporting of non-conformance with the navigation requirements against the following parameters will rely primarily on radar monitoring by ATC units:
  1. Lateral Deviations: A deviation of 5 NM or more from track centerline based on radar observations; and
  2. Longitudinal Deviations
     a. Where time separation is being applied by ATC – when the reported separation based on ATC verified pilot estimates varies by three (3) minutes or more from the expected separation at the reporting point; or
     b. Where a distance-based standard is being applied by ATC based on ADS, radar observation, or RNAV distance reports – when the distance varies by 10 NM or more from the expected distance.
  3. ATC will advise the PIC when such deviations are observed and implement the required investigation procedures.
  4. The ATC authority will investigate the causes of such deviations in conjunction with the flight department and the FAA.

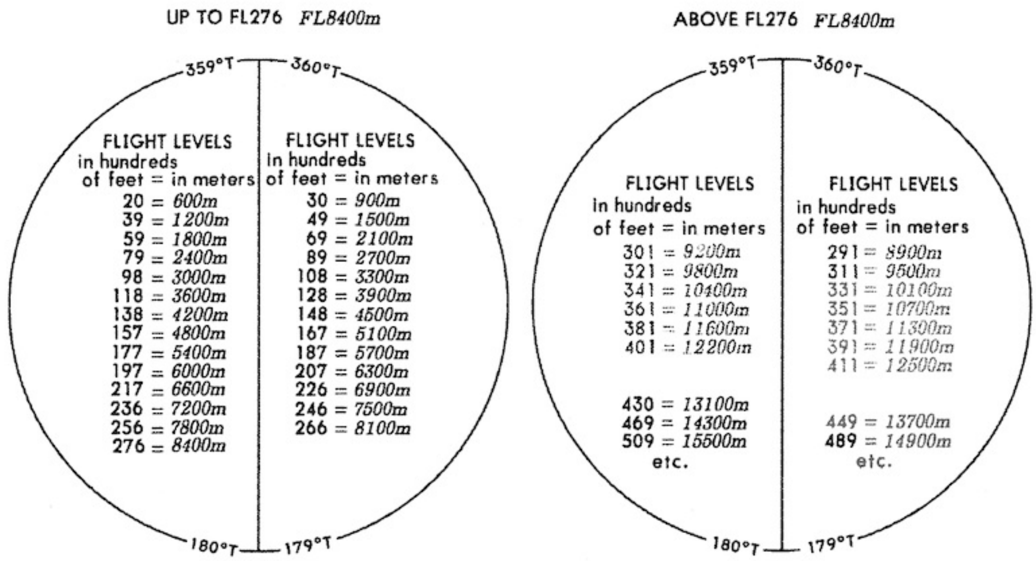
5.6.1 China

A. Implementation of Special Areas of Operation

1. Metric RVSM Implementation
   - Metric RVSM has been implemented in the Beijing, Guangzhou, Kunming, Lanzhou, Shanghai, Shenyang, Urumqi, Wuhan FIRs and Sector AR01 (island airspace) of the Sanya CTA between FL291 (8900 m) and FL411 (12,500 m) inclusive. The airspace between FL291 (8,900 m) and FL411 (12,500 m) is defined as RVSM airspace.
   - Flight Level Allocation Scheme
     - The FLAS in China is based on the metric FL. ATC will issue the FL clearance in *meters* and the aircraft shall be flown using the FL in *feet*. There will be no change in FL allocations and operations at FL276 (8400 m) or below in non-RVSM airspace.
     - Pilots should be aware that due to the rounding differences, the metric readout of the onboard avionics will not necessarily correspond to the cleared FL in meters; however, the difference will never be more than 100 ft (30 m).

       Note: Aircraft equipped with metric and feet altimeters shall use the feet altimeter within the RVSM FL band.
     - FL transition procedures into and out of China may involve different FLASs.

- FL allocation is shown in the following graphic:



2. <u>RNP</u>: RNP-10 has been implemented in the South China Sea area (Sanya FIR) above FL290. In addition, RNP-4 and B-RNAV (RNAV-5) are required on some routes within other FIRs.
3. <u>DLC</u>: CPDLC and ADS-C services are supported, but are not mandatory. CPDLC operations along Route L888 require a formal application to the ATM Bureau of China prior to the flight.
4. <u>ADS-B</u> is required above FL290 on some routes within the Taipei and Sanya FIRs.

B. <u>Position Reporting</u>: Within 15-20 minutes before entry or exit, crews must report to the relevant ATC unit and obtain a clearance to fly across the FIR's boundary.

C. <u>Altimetry</u>: It is recommended that QFE or QNH be used when operating in China according to the guidelines below:

1. <u>At Airports Where Transition *Altitudes* and Transition Levels Are Established</u>: Use QNH for takeoffs and landing. After takeoff, when reaching the Transition Altitude, set the altimeter to 1013.2 hPa.
2. <u>At Airports Where Transition *Heights* and Transition Levels Are Established</u>: Use QFE for takeoffs and landing. After takeoff, when reaching the Transition Height, set the altimeter to 1013.2 hPa.
3. At Airports Where Transition Altitudes / Heights and Transition Levels *Are Not* Established
   a. Before takeoff, set the altimeter to QFE. When reaching a height of 2,000 ft (600 m) set the altimeter to 1013.2 hPa.
   b. During approach, set the altimeter according to the instruction of ATC.
4. At Airports of High Elevation
   a. Use QFE. If unable, set the altimeter to 1013.2 hPa before takeoff, with the indicated altitude interpreted as zero altitude.
   b. Landing is to be made with the assumed zero altitude notified by ATC before landing.
5. Refer to the Jeppesen Airway Manual for detailed altimetry settings at the Zhuhai TMA.

D. <u>Speed Restrictions</u>

- All procedures for Category B aircraft are restricted to 140 kts (260 kmh).

- All procedures for Category C/D aircraft are restricted to 189 kts (350 kmh).
- All missed approach turns are restricted to 189 kts (350 kmh).

E. Rapid Descent Procedures

1. Notify ATC of aircraft location and request FL change as required.
2. Upon declaring an emergency, change their assigned FL. Notify ATC immediately and submit a report upon arrival at the destination.
3. If unable to contact ATC:
   i. Turn 30° right and track out 10 kilometers (i.e., deviate right of airway centerline by 10 km or 5 nm), then turn left to track parallel the original route, then climb or descend to the new level, and then return to the original one, when appropriate.

   Note: Be aware that there may be conflicting traffic on the original route.

   ii. Establish communications with and alert nearby aircraft by broadcasting, at suitable intervals, flight ID, FL, aircraft position, and intention on the frequency in use, as well as on frequency 121.5 MHz (or, as a backup, the VHF inter-pilot air-to-air frequency 123.45 MHz, or 5680 KHz).

   iii. Establish visual contact with conflicting traffic.

   iv. Turn on all aircraft exterior lights.

F. Strategic Lateral Offset Procedures (SLOP)

1. Flight crews may apply SLOP in non-radar airspace when the aircraft is equipped with automatic offset tracking capability. Pilots are not required to inform ATC.
2. Within radar airspace, SLOP requires approval by ATC. One (1) NM offsets are preferred.
3. Pilots applying SLOP in non-radar airspace may request approval from ATC to continue with the offset upon entering radar airspace.

5.6.1.1 Hong Kong

A. Implementation of Special Areas of Operation

1. RVSM: All airplanes operating within Hong Kong RVSM airspace must be equipped with TCAS II.
2. RNP-10: RNP-10 has been implemented for reduced lateral separation.
3. RNP-4: RNP-4 is required for operations at or above FL290 on routes L642 (CH to EPKAL) and M771 (DOSUT to CH).

   Note: DLC capability is not required for RNP-4 operation within the Hong Kong FIR.
4. ADS-B is required at or above FL290 in the Hong Kong FIR.

B. Altimetry

1. The Transition Altitude is 9,000 ft.
2. The Transition Level is according to the following QNH value at Hong Kong International airport:
   - 980 hPa or above: FL110;
   - 979 hPa or below: FL120.

C. Flight Procedures

1. Holding
   a. Due to proximity of the FIR boundary to the north, pilots carrying out holding procedures are advised to maintain a careful crosscheck of aircraft positions by the use of appropriate navigation aids to ensure that the aircraft remains within Hong Kong FIR.

b. Pilots not receiving a good instrument indication from a specific aid should inform approach control accordingly and should not descend below 4,500 ft until they have positively identified their exact location.

2. ATC will not refuse permission to land or takeoff at Hong Kong International Airport solely because of adverse weather conditions.
3. Pilots are to expect an ILS Cat I approach unless otherwise informed. The type of approach is not included in the ATIS Arrival broadcast, unless ILS is not available.

D. RNP Approaches: RNP-AR APCH procedures require authorization from the Hong Kong Civil Aviation Department at least 30 days prior to the proposed date of adopting the procedures.

E. Traffic Leaving Hong Kong Airspace: Aircraft leaving Hong Kong airspace are to remain on Hong Kong control frequency until instructed to change to en route frequencies.

F. SLOP has not been implemented in the Hong Kong FIR.

G. Disinsection Requirements: Aircraft inbound from Zika-affected areas (e.g., South/Central America, Africa, and Asia) are required to undergo either residual (routine internal spraying at an interval not less than eight weeks) or non-residual (non-routine / one-off) insecticide treatment. Acceptable insecticides include permethrin for residual treatments and d-phenothrin for non-residual treatments. Crews must send the health part of the aircraft general declaration and photos of the insecticide cans used during the treatment via email to sphi_ap@dh.gov.hk. Crews should also expect to carry out on-arrival disinsection under supervision of Hong Kong officials.

H. Hong Kong International Airport (HKIA) Runway Slots: Runway slots for General Aviation or Business Aviation operators is based on demand, and a confirmed slot assignment, parking assignment, and ground handing is required prior to conducting operations.

- Runway, Parking, and Ground Service Booking
  - Runway slot requests can be made via the Online Coordination System managed by the Civil Aviation Department of Hong Kong. The system shows slot availability up to 14 days in advance.
  - Parking and stand booking may be made through the Business Aviation Parking Management System managed by the Airport Authority Hong Kong.
  - Booking for ground handling services may be made through the Hong Kong Business Aviation Centre (HKBAC) at hkbac@hkbac.com.
- Slot Considerations
  - Reservations for runway slots may be made up to 14 days in advance.
  - Maximum parking stand booking is 14 calendar days.
  - Due to the limited number of available runway slots, it is recommended that crewmembers and passengers utilize commercial air carriers in the event immediate departure (such as for a typhoon) is required.
- Penalty scheme for slot misuse: Improper utilization of assigned runway slots will incur penalty points upon the aircraft operator.
  - Penalty points are kept on record for a period of 12 calendar months. Reaching 20 points or greater will lead to as shortening the booking window from 14 days to 10 days.
  - Penalty points are calculated for the following violations:

Misuse Criteria	Penalty Points
Operation without confirmed runway slot or parking stand booking.	10

Misuse Criteria	Penalty Points
Failure to operate without cancelling the confirmed runway slot or parking stand booking.	5
Operation at a time significantly different* from the confirmed runway slot	1
Cancellation of confirmed runway slot or parking stand booking less than 2 days in advance of the aircraft confirmed slot time.	1
Aircraft overstaying.	1
*Deviation of more than 2 hours between actual on-block / off-block time and the confirmed runway slot time is considered to be significantly different. The 2 hours allowance is subject to regular review	

5.6.1.2 Taiwan

A. Implementation of Special Areas of Operation

- RNP: Only RNP-10 authorized aircraft may operate above FL290. In addition, Route N892 within the Taipei FIR requires RNP-10 capability.
- ADS-B: Aircraft flying at or above FL290 on routes B576 or B591 within the Taipei FIR must be fitted for ADS-B Out. Aircraft must be fitted with ADS-B to operate at or above FL290 on any route in the Taipei FIR.

B. Speed Restrictions: Any aircraft while in Class B, C, D, E, and E Surface airspace and below 10,000 ft MSL shall not be operated at an indicated airspeed of more than 250 knots, unless:

- The minimum safe airspeed for the operation is greater than 250 knots, in which case the flight crew must advise ATC as soon as possible; or
- ATC cancels the airspeed restriction to separate or expedite the flow of traffic.

C. Mach Number Technique: Between Taipei FIR and Hong Kong FIR as well as Taipei FIR and Manila FIR, ten (10) minutes longitudinal separation with MNT procedures (Section 2.3.10.1) will be applied between aircraft that are not eligible for radar separation.

5.6.2 India

A. Implementation of Special Areas of Operation

- RNP: B-RNAV (RNAV-5) has been implemented on the Q routes in India, and RNP-10 is required on many other routes.
- 30 NM Separation (RNP-4): Aircraft capable of RNP-4 and utilizing CPDLC will be separated longitudinally by 30 NM on RNP-10 routes in the Chennai and Mumbai FIRs.
- DLC
  - CPDLC and ADS-C are operational within the Chennai, Kolkata, Delhi, and Mumbai FIRs to all FANS 1/A equipped aircraft.
  - Arriving aircraft shall logon 20 minutes prior to entering the Delhi FIR and 10 minutes prior to entering the Mumbai FIR.
  - Although DLC will generally serve as the primary form of position reporting when supported, it will be used as backup only in the Delhi FIR.
- ADS-B Out is required at or above FL290 on all L, M, N, P, Q, and T routes, as well as many A, B, G, R, and W routes. Indian operators must have operational approval and the aircraft must be fitted with a 1090ES system in accordance with AMC 20-24, EASA CS-ACNS, or AC 20-165.

- EFVS: All EFVS operations in India require operational approval from both the state of aircraft registry and the Indian DGCA. Prior to conducting EFVS in India, operators should submit an application request to the DGCA that includes a copy of the EFVS authorization document from their registry state, any applicable AFM pages, crew training records, and potentially further documentation (as required). For further information, crews should reach out to the following email address: v.chhabra@nic.in

B. Speed Restrictions

- All aircraft (including arrivals and departures) operating below 10,000 ft are to fly IAS not greater than 250 KT.
- All arriving aircraft below 10,000 ft within a 15 NM radius of the VOR/DME serving the airport are to fly IAS not greater than 220 KT. ATC may suspend speed control by using the phrase "*NO SPEED RESTRICTION*" when traffic conditions permit.

C. Operating Minimums

1. "Normal" Minimums published by India are for use by airlines or Indian operators only. Any other operator who is not approved by India must use the "Restricted" Airport Operating Minimums.
2. Minimums may be reported as VIS instead of RVR. Refer to the conversion chart in Appendix T.

D. Special Requirements and Regulations

1. Aircraft shall not join or cross ATS routes without prior approval from the appropriate ATS unit. This approval shall be obtained at least 10 minutes prior to entry into ATS route if in direct contact on VHF, and at least 20 minutes prior to such entry if contact is through en route radio frequency. ATS routes shall be joined or crossed at or close to a designated reporting point. Aircraft crossing the route shall do so at an angle of 90º.
2. Aircraft overflying from a foreign FIR into an Indian FIR shall forward an FIR boundary arrival estimate to the ATS unit providing Flight Information Service at least 10 minutes prior to entry.
3. Aircraft may be separated longitudinally by 10 or 15 minutes using MNT (Section 2.3.10.1), or by 80 NM or 50 NM depending on the RNAV capability of the aircraft. Flight crews should reference the Jeppesen Airway Manual for the specific RNAV requirements of each route and confirm that the aircraft is capable.
4. Approach Ban procedures are applicable when conducting operations in Indian airspace.
   - Approaches shall not be commenced when RVR is below minimums.
   - Should RVR fall below minimums after commencing an instrument approach, the approach shall not be continued below 1,000 ft. above the airport.

E. Strategic Lateral Offset Procedures (SLOP): The segments of ATS routes where strategic Lateral Offset Procedures are applicable are identified in the tables below. The offset may be cancelled by the appropriate ATC unit.

Chennai FIR		
L645	SAMAK	SULTO
N563	MEMAK	AKMIL
P574	NOPAK	MMV VOR
N571	IGOGU	GURAS
N877	LAGOG	ORARA
P628	IGREX	VATLA
L759	MIPAK	NISUN
P762	LULDA	DUGOS

Kolkata FIR		
N877	ORARA	VVZ VOR
L301	RINDA	VVZ VOR
P628	VATLA	LARIK
L759	LIBDI	LEMAX
M770	MEPEL	KAKID
M773	BUBKO	LEGOS
N895	SAGOD	BBS VOR
P646	IBITA	DOPID

Chennai FIR		
UL425	TVM VOR	ANODA
P570	TVM VOR	POMAN
M300	CLC VOR	IGAMA

Kolkata FIR		
L507	TEBOV	CEA VOR

Mumbai FIR					
UL425	ANODA	ASPUX	M638	NOBAT	SAPNA
P570	POMAN	KITAL	A451	BISET	ANGAL
M300	IGAMA	LOTAV	G450	DARMI	DOGOD
N563	KAKIB	REXOD	UM551	DONSA	ANGAL
P574	OKILA	TOTOX	B459	GUNDI	UBDOR
N571	Crossing 072º East	PARAR	A474	ERVIS	POPET
L505	EXOLU	NOBAT	R456	BIBGO	KITAL
L301	AKTIV	RASKI	P323	DONSA	GIDAS

F. En Route Operations

- Flying outside of ATS routes is prohibited within Indian airspace.
- All flights entering, leaving, or crossing the territory of India are required to follow the ATS routes established for international operations.
- Due to radar limitations, radar coverage may be periodically unavailable particularly near the border. Pilots should be aware that ATC services may request a next fix callout upon reaching a waypoint.

G. Departing Aircraft: Pilots shall report total number of persons on board, including crew, and confirm the completion of the security check to the airport's control tower when requesting start-up clearances.

5.6.3 Indonesia

A. RVSM has been implemented in the Jakarta and Ujung Pandang FIRs.

B. RNP-10 is required in the Jakarta FIR on routes L511, L764, L895, M300, N563, N646, N752, P570, and P574.

C. ADS-B is currently supported and is required for all operations at or above FL290.

D. ADS-C / CPDLC services are available in the Ujung Pandang FIR on international routes.

5.6.4 Japan

A. Implementation of Special Areas of Operation

- RNAV-5 is applied between FL290 and FL410 inclusive.

B. Approach Ban

1. An aircraft shall not takeoff or start an approach to land at any airport if the observed RVR is less than the meteorological minimums for that airport.
2. After commencing an instrument approach, if it is determined that the pilot can continue the approach beyond a prescribed point such as the FAF, OM, 1,000 ft. above airport elevation, or other points accepted by the authority, and if the reported weather conditions have worsened to below the published or the pilot's landing minimums, the pilot may continue the approach to DA or MDA. An approach to land may be continued if the pilot, upon reaching the DA/H or MDA/H, finds the actual weather conditions are at or above the lowest weather condition for landing.

   Note: ATC will issue values of ceiling and ground visibility (RVR when observed) when weather conditions are below the highest circling minimums.

C. Converted Meteorological Visibility (CMV): Where weather minima are concerned, if the reported RVR value is more than 1800 m, CMV should be applied instead. If only meteorological VIS is reported, then it can be converted to an RVR/CMV value for straight-in instrument approaches by referencing the table in Appendix T.

Note: The conversion shall not be applied when calculating takeoff, Category II/III minimums, or when a reported RVR is available.

D. Special Requirements and Regulations

1. The term “CRUISE” may be used in regard to an altitude specified in an ATC clearance. This gives the pilot an authorization to descend from the altitude assigned by ATC and to make an instrument approach procedure established at the airport.
2. Oceanic Position Reporting Procedures (Tokyo FIR)
   a. Flights whose tracks are predominately East or West shall report over each 5° or 10° meridians of longitude (10° will be used if the ground speed of the aircraft is such that 10° will be traversed in 80 minutes or less).
   b. Flights whose tracks are predominately North or South shall report over each 5° or 10° parallel of latitude (10° will be used if the ground speed of the aircraft is such that 10° will be traversed in 80 minutes or less).
   c. ATC may request flights with slower ground speeds to report more frequently than 5°.
3. Mach Number Technique (Section 2.3.10.1)
   a. The MNT with 10 minutes longitudinal separation may be applied to turbojet aircraft operating in the Fukuoka FIR on the same or the continuously diverging routes within the Oceanic Control Area.
   b. Aircraft with an ATC assigned Mach number shall report the Mach number in each position report made on the route.
   c. Position reports shall be amended to ATC if the original estimated time over a reporting point needs correction for an error in excess of two (2) minutes.
   d. If acceptable to the pilot, ATC may clear aircraft at a Mach number other than the one specified in the flight plan to ensure maintenance of the longitudinal separation.

5.6.5 Korea (South)

Speed Control: Unless otherwise authorized by ATC because of aircraft performance limitations, no person may operate an aircraft below 10,000 ft MSL, at an indicated airspeed of more than 250 kts and at or below 2,500 ft AGL within 4 NM of an airport designated as Class C or D airspace at a speed of more than 200 kts.

5.6.6 Malaysia

A. Implementation of Special Areas of Operations

1. RNP: RNP-10 is required on many RNAV routes within the Kuala Lumpur and Kota Kinabalu FIRs.
2. DLC: CPDLC and ADS-C services are available to FANS 1/A compliant aircraft on many airways in the Kuala Lumpur FIR. Use of CPDLC is not mandatory, but is preferred. Aircraft should logon at least 10 minutes prior to entry.

B. Altimetry: A QFE altimeter setting will be made available on request but reports to ATC shall be made in altitudes.

C. Descent Speed Within Kuala Lumpur and Kota Kinabalu FIRs: Unless a speed restriction is issued by ATC, flight crews shall plan their “top of descent” based on 270 Kts. Flight crews are expected to observe any subsequent speed restrictions that may apply. Should alternative speed instructions be imposed, ATC will, to the extent practicable, provide those instructions prior to “top of descent.”

Note: This may not be possible if the "top of descent" occurs when the aircraft is not within a Malaysian ATC unit's area of responsibility.

D. Special Requirements and Regulations

1. A flight plan submitted in flight on HF shall be submitted at least 20 minutes (on VHF at least 10 minutes) prior to the intended point of entry into a control zone, control area, advisory area or advisory route.
2. Cruise climb techniques are not permitted on all routes within Kuala Lumpur and Kota Kinabalu FIRs.

E. Emergency: Due to extensive ICAO differences, flight crews should review the communications failure procedures prior to flight into Malaysia (Jeppesen Airway Manual, *Emergency*).

5.6.7 Philippines

A. Implementation of Special Areas of Operations

- RNP-10 is required for operations on many routes in the Manila FIR and is required for operations above FL270 on N884.
- DLC: CPDLC is required for operations on routes M767 and N884.

B. Longitudinal Separation: 50 NM separation will be applied between aircraft that are capable of RNP-10 and CPDLC.

C. Speed Limitations: Unless otherwise authorized by ATC, arriving aircraft speed within the Manila TMA shall not exceed 250 Kts. If there is no need to apply the speed limitation, ATC shall inform the pilot "*NO SPEED RESTRICTION REQUIRED*."

D. Special Requirements and Regulations

1. Flight plans and approved exit clearances must be filed at least two (2) hours prior to estimated time of departure.
2. Terminal Delay: When requested by the pilot, an aircraft should, insofar as practicable, be authorized to absorb a specified period of notified terminal delay by cruising at a reduced speed for the latter portion of its flight. The specified period may be the whole or part of the notified terminal delay.
3. Tagbilaran Principal Airport: Simultaneous operation of category 3C aircraft is prohibited.

5.6.8 Singapore

A. Implementation of Special Areas of Operation

1. RNP-10 is required on many routes within Singapore FIR.
2. DLC: CPDLC services are available.
3. ADS-B: ADS-B is required for operations at or above FL290.
4. PBCS has been implemented as follows on routes L642, M635, M767, M771, M774 and N884 for RNP-10 authorized aircraft:
   - Aircraft authorized for RCP240 and RSP180 will be separated longitudinally by 50 NM;
   - Aircraft not authorized for RCP240 and RSP180 will be separated longitudinally by 80 NM or 10 minutes.

B. Speed Restrictions

1. The maximum holding speed for all low level holding areas is 230 kts.
2. The maximum holding speed for all high level holding areas is 265 kts.

C. Altimetry

- A common transition altitude of 11,000 ft (3,350 m) has been established in Singapore FIR.

- Reports to ATC will be made in altitudes. QFE settings will be made available on request.

D. Special Requirements and Regulations

1. Flight plans shall be submitted at least sixty (60) minutes before departure (the estimated off-block time), or if submitted in flight on HF RTF, twenty (20) minutes prior to the intended point of entry into a control zone, control area, advisory area, or advisory route.
2. The PIC or the pilot's representative is required to state the total number of persons on board (POB) in the flight plan.
3. Flights shall be conducted in accordance with IFR, even when not operating in IMC, when operating:
   - Above FL150;
   - During the hours between sunset and sunrise; or
   - More than 185 km (100 NM) from the shoreline within controlled airspace.

E. SLOP may only be applied in the oceanic airspace of the Singapore FIR.

F. Consult the Jeppesen Airway Manual for detailed instructions on the implementation of Quadrantal Cruising Levels below FL250 in Singapore FIR. FL250 in uncontrolled airspace will be held vacant to serve as a buffer.

5.7.0 Central America and Caribbean

5.7.1 Caribbean (CAR) Region

A. Flight Planning: For aircraft intending to operate within the Miami Oceanic, Houston Oceanic, and San Juan Control Areas at or above FL200 and west of 55°W, the Mach number planned to be used shall be specified in Item 15 of the flight plan.

B. APIS: Crews should submit an APIS report no more than fifteen minutes after departure to or from an airport in the CARICOM region. CARICOM publishes a guide that outlines message structure requirements and additional information, available at the following URL:

www.caricomeapis.org/portals/0/CARICOM_AVIATION_APIS_GUIDELINES_Nov_2011.pdf

C. Alerting and Search and Rescue Services: For all flights over mountainous or sparsely populated areas, including sea areas, aircraft equipped with suitable two-way communications shall report during the period 20 to 40 minutes following the time of last contact, whatever the purpose of such contact, merely to indicate that the flight is progressing according to plan.

Note: The above report will consist of aircraft identification and the words *"OPERATIONS NORMAL*."

D. ATS Route Designators for Oceanic, Bahamas, Atlantic, Gulf, and Puerto Rico

Bahamas Routes	"BR"
Puerto Rico Routes	"RTE"
Atlantic Routes	"AR"
Gulf Routes	"Gulf" (Total Name)

E. Communications Procedures – Nassau Grand Bahamas TCA Areas

1. All aircraft operating or about to operate (IFR, VFR, including military unless specifically exempted, etc.) within the Nassau and Grand Bahamas TMAs and within a 50 NM radius of Nassau and Freeport International airports shall report, as a minimum, to the respective Approach Control Unit, their identification, aircraft type, position, direction of flight, and cruising level.

2. These reports shall enable the respective approach control unit to provide a more effective advisory service to possible conflicting flights, controlled and uncontrolled within the TMAs.
3. Pilots shall contact the appropriate approach control unit as follows:
   - “Nassau Approach” on frequency 121.0 MHz.
   - “Freeport Approach” on frequency 126.5 MHz.

F. TCAS Advisories within the Bahamas: Pilots must notify the Director of Civil Aviation in writing within ten (10) days after deviating from an ATC clearance in response to a TCAS Advisory. Details of the deviation and circumstances leading to the event must be provided.

5.7.2 Central America

A. Flight Level Allocation: CENAMER, Havana, and Kingston Control Centers have agreed to use FLs in the Central America FIR according to the procedures below:

- *Flights Traveling Northeast*: Aircraft departing from airports in Central America heading northeast via PABEL, BISTO, PISIS, SELEK, NUBIS, ULISA, UMAKA, and PESTO will be assigned even FLs (e.g., FL280, FL300, FL320, etc.).
- *Flights Traveling Southwest*: Aircraft coming from Havana and Kingston airspace heading southwest toward CENAMER that enter Central America FIR via the fixes named above will be assigned odd FLs (e.g., FL310, FL330, FL350, etc.).

B. Belize

1. Special Requirements and Regulations
   - Aircraft landing in or departing from the territory of Belize must first land at or finally depart from Philip S.W. Goldson International Airport.
   - If a landing is made elsewhere, the PIC shall report the landing as soon as practicable to the health, customs, immigration, and Civil Aviation Authorities at Philip S.W. Goldson International Airport. The notification may be made through any available communication link.
2. The Transition Altitude within CENAMER FIR is 19,000 ft (FL200 Belize TMA).
3. VFR flight is not permitted above 19,000 ft.

C. Costa Rica

- All aircraft operating in areas where ATC services are not available must transmit in the blind on 123.0 for en route and position reports.
- Every aircraft which intends to perform flights across the international borders, whether on entrance or on departure should present obligatory flight plan and include alternate airports. The unique airports within domestic territory that can be used as alternates are as follows: Juan Santamaria, Tobias Bolanos, Daniel Oduber Quiros, and Limon.

D. Honduras: To minimize ATC delays, aircraft filing into Honduras and back out within 24 hours should file both the inbound and outbound flight plans at the base of departure outside Honduras.

5.8.0 South America

5.8.1 Argentina

A. Altimeter Settings: A QFE altimeter setting may be used for final approach; however, one altimeter must be set to QNH, and reports to ATC made in reference to altitudes.

B. Flight plans for controlled flights must be submitted at least 45 minutes prior to the estimated off-block time. IFR flight plans or clearances to cross or enter controlled airspace submitted in flight must be requested at least 10 minutes (for direct transmission) or 20 minutes (if the request requires retransmission) prior to the initiation of controlled flight or entering controlled airspace.

C. Fuel Requirements: The minimum fuel carried should be:

1. For flights not requiring an alternate – Sufficient for flight from the departure airport to the destination airport plus an additional reserve calculated at 30 percent of the flight time or 45 minutes, whichever is greater.
2. For flights with a flight planned alternate – Sufficient for flight from the departure airport to the destination airport and then to the most critical alternate plus an additional reserve for 45 minutes flight time at maximum endurance cruising speed.

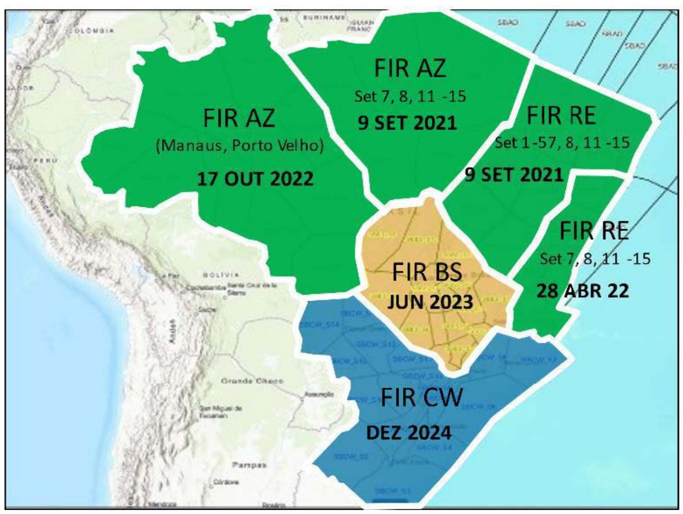
D. VFR is not permitted above FL195.

E. Departure clearances via CPDLC (CPDLC-DCL) are now available to flights equipped with FANS (VDL M2) departing from SAEZ and SABE.

5.8.2 Brazil

A. Implementation of CPDLC: CPDLC is not mandated in Brazil, but is / will be supported as described below. ADS-C is not necessary and may not be available.

- Currently CPDLC is employed in the Atlantico FIR (oceanic airspace).
- Continental CPDLC is supported via FANS (VDL M0/A, VDL M2, and SATCOM) at FL250 and above according to the timeframes below and as depicted on the following graphic:
  - Currently in the entirety of the Recife FIR.
  - Currently in the entirety of the Amazonica FIR.
  - As of June 2023, the entirety of the Brasilia FIR.
  - Beginning December 2024, in the Curitiba FIR.



Source: Brazil DECEA AIC #08/23

Note: In continental Brazilian airspace, CPDLC is only available via the SITA network. Aircraft who make use of another communication service provider (e.g., ARINC) should check with them about the interoperability / handoff to the SITA network prior to using CPDLC in Brazil.

B. ADS-B Out Implementation and Mandates: Beginning in July 2024, ADS-B Out (via 1090ES, DO 260B standards) will be supported and eventually mandated in Brazil according to the timeline below:

- *July 2024*: ADS-B will be supported in the Recife FIR at FL245 and above;
- *December 2024*: ADS-B will be supported in the Curitiba FIR at FL245 and above;
- *August 2025*: ADS-B will be supported in the Brazilia FIR at FL245 and above;
- *May 2026*: ADS-B will be supported in the Amazonica FIR at FL245 and above;

- *February 25, 2027*: ADS-B will be required for all aircraft operating in Brazilian airspace at FL245 and above.

C. Level changes in the holding pattern must be executed at a climb / descent rate within 500 ft and 1,000 ft per minute. Climb / descent rates greater or less than prescribed may be used with prior clearance from Approach or when necessary, requested by Approach.

D. Airport Operating Minimums: The execution of circling approach procedures is prohibited; however, a straight-in approach may be conducted to the MDA or DA.

E. Position Reporting shall be required at entry / exit gates, every 10° longitude, and any other position required by ATC.

F. Approved Passenger List: Flight plans departing from Brazilian airports to foreign locations will only be accepted if a GEDEC passenger list has been approved and stamped by local authorities and then filed at the AIS office. This information, "RMK/GEDEC CFM," shall be inserted in item 18 of the flight plan at the time of filling.

5.8.3 Chile

A. RVSM has been implemented between FL290 and FL410 inclusive. Chile has implemented a Flight Level Allocation Scheme in harmony with the US (Appendix M).

B. RNP-10 has been implemented in the upper airspace of Easter Island FIR and in the Oceanic ACC delegated airspace of Antofagasta, Santiago, Puerto Montt, and Punt Arenas FIRs.

C. SLOP is allowed in airway UL 302 between ELASA and IREMI fixes, AWY UL 780 between SULNA and SORTA fixes, and in AWY UL 401 between ANPUK and ESDIN fixes.

5.8.4 Ecuador

A. Cabotage rules apply to both commercial and non-commercial operations and are strictly enforced. Operators are not permitted to allow new passengers onto the aircraft at any stop in Ecuador.

B. Galapagos Islands

- Aircraft must operate to an Ecuador Airport of Entry prior to flights to the Galapagos Islands. Return Direct flights are not permitted.
- A landing permit is required prior to operations, and may take 5-7 working days to process.
- Ground services are reduced (no fuel and lavatory service) and aircraft parking may be limited. Repositioning to mainland Ecuador after passengers are unloaded is recommended.
- Disposal of garbage must be done so in transparent trash bags.
- A disinsectation spray must be conducted and disinsectation certification must be obtained prior to operations.

5.8.5 Paraguay

A. Visibility Takeoff Requirements: Jets with two (2) or more engines: RVR 700 m or 800 m visibility.

B. Flight crews intending to operate along RNAV routes must specify the Mach number planned to be used in Item 15 of the flight plan.

C. If the estimated time for the next position last reported to ATC is found to be in error in excess of two (2) minutes, a revised estimate shall be transmitted to the ATS unit concerned as soon as possible.

D. VFR is not permitted above FL200.

5.8.6 Peru

Flights shall be conducted in accordance with IFR (even when not operating in IMC) when operated more than 20 NM from the shoreline for a duration of more than one hour. Expect that compliance with IFR minimums levels is not required during the day in VMC.

5.8.7 Uruguay

A. When there are no available air traffic services on the landing airfield, a notice of arrival will be given to the office of operations at the airport or in its absence to the nearest dependency of ATC as rapidly as possible after landing and by the fastest medium that can be arranged.

B. When it is known that the communications at the landing field are inadequate and there are no other arrangements to contact the office of arrival, the aircraft will transmit immediately by radio a message of arrival to Montevideo ACC before landing.

C. When the pilot is aware that a notice of arrival (ARR) cannot be given at the landing airfield, prior to initiating a flight plan, indicate ARR / NIL in Item 18 of the flight plan.

Note: Placing ARR / NIL in Item 18 of the flight plan will avoid the unnecessary activation of Search and Rescue.

5.8.8 Venezuela

A. Speed Restrictions: Holding speed from 6,000 ft to FL140 is restricted to 210 Kts, and at and above FL140 is restricted to 230 Kts.

B. IFR flights at or above FL240 require operable DME.

C. Non-scheduled charter flights require a request for a National Institute of Aeronautical Civil authorization at least 3 days prior the planned landing.

5.9.0 Middle East

A. RVSM Implementation

1. RVSM has been implemented in the Middle East Region between FL290 and FL410 inclusive:

OAKX	Kabul	OLBB	Beirut	OSTT	Damascus	VGFR	Dhaka
OBBB	Bahrain	OMAE	Emirates	OYSC	Sanaa	VIDF	Delhi
OEJD	Jeddah	OOM M	Muscat	VABF	Mumbai	VNSM	Kathmandu
OIIX	Tehran	OPKR	Karachi	VCCC	Columbo	VOMF	Chennai
OJAC	Amman	OPLR	Lahore	VECF	Kolkata	VRMF	Male
OKAC	Kuwait	ORBB	Baghdad				

2. NOTAMs and state AIPs as reproduced in the Jeppesen Airway Manual should be consulted for additional special procedures and changes in the relevant FIRs / UIRs.

3. Exceptions to RVSM Entry / Exit Points: The requirement to insert the RVSM entry / exit points plus the RFL and speed for that portion of the route commencing immediately after the RVSM entry / exit point is still valid for flights in the departure phase or in cruising levels. However, for flights whose planned trajectory indicates that they will be established in the descent phase at the RVSM entry / exit points to an adjacent destination airport, the following conditions in Item 15 shall apply:

   a. The RVSM entry / exit point shall be included; and, where appropriate,

   b. The co-located Standard Terminal Arrival Route (STAR).

   Note: There is no requirement to indicate a RFL (or speed) associated with the RVSM entry/exit point.

4. Any changes from non-RVSM levels to RVSM FLs shall be initiated by the first Control Center providing ATC service to the aircraft within the ME RVSM airspace and shall be achieved before the aircraft passes the transfer of control point to the adjacent Control Center, unless otherwise specified in an inter-Center letter of agreement.
5. Aircraft entering a non-RVSM environment from the ME RVSM airspace shall be established with the applicable vertical separation minimum.

B. RNAV-5 Implementation: RNAV-5 (B-RNAV) is supported in the Middle East region for continental operations.

C. Red Sea: Uncoordinated flights over the Red Sea must comply with the following:

1. Squawk A2000 if no code was issued;
2. RVSM aircraft must maintain FL290 (southbound) or FL300 (northbound);
3. Non-RVSM aircraft must maintain FL250 (southbound) or FL260 (northbound);
4. Flight details (e.g., call sign, direction of flight, flight level, and estimated time of crossing FIR boundary) shall be broadcast on the appropriate ACC frequencies 10 minutes prior to crossing FIR boundaries and 5 minutes prior to passing compulsory reporting points; and
5. Maintain a continuous air / ground communication watch on appropriate ACC frequencies.

5.9.1 Kingdom of Saudi Arabia

A. Flight Procedures

1. Instrument approach procedures comply with US TERPS.
2. Circling areas and MDA(H) are in accordance with PANS-OPS, Document 8168, Volume II.

B. Special Requirements and Regulations

1. Flights outside the published lateral limits of ATS routes are permitted only when authorized by the Presidency of Civil Aviation or by ATC for a specified portion of flight.
2. Communications
   - Aircraft entering Saudi Arabian airspace are required to establish two-way communication with the appropriate ATC unit not less than 5 minutes before entering Jeddah FIR.
   - During flight, pilots shall continuously guard the emergency channel 121.5 MHz and/or 243.0 MHz, except for periods when they are carrying out communications on other channels.
3. Position Reporting Procedure
   - Aircraft intending to enter Jeddah FIR must transmit their last position report made before leaving the previous FIR to the appropriate Saudi Arabian ATC unit not less than 5 minutes before crossing the Jeddah FIR boundary.
   - If the last reporting point in the previous FIR is less than 5 minutes flying time from the FIR boundary, two-way communication must be established not less than 5 minutes before entering Jeddah FIR.
4. Reduced Longitudinal Separation: Within the Jeddah FIR longitudinal separation may be reduced to 5 minutes. Application of this reduced separation may require ATC to impose speed restrictions that will continue to apply in the Bahrain and Amman FIRs unless specifically canceled or amended. Pilots must notify ATC immediately if at any time they are unable to comply with these speed restrictions.

5. Speed Limitations: Aircraft operating below 10,000 ft shall not exceed the following values of indicated airspeed, except that the minimum safe operating speed for a particular aircraft shall always be the determining factor when it is greater than the maximum speed prescribed below:
   - Within an Aerodrome Traffic Circuit:
     - 200 kt for turbine-engined aircraft;
     - 156 kt for reciprocating-engined aircraft; unless otherwise authorized or required by ATC.
   - Other than listed above: 250 kt.
6. RNAV Parallel Offset Procedures: ATC may require RNAV equipped aircraft to perform a parallel offset form the assigned route. When requested to offset, or to regain the assigned route, the pilot should change heading by either 30 or 45 degrees and report when the offset or assigned route is reached.

C. Security Control of Air Traffic and Air Navigation Aids (SCATANA) for Saudi Arabia

1. A plan, called the Security Control of Air Traffic and Air Navigation Aids (SCATANA) has been developed to ensure that, should hostilities break out in Saudi Arabian airspace, all civilian aircraft in flight shall be quickly notified of the circumstances and given special instructions to immediately vacate or avoid those areas considered to be hazardous.
2. In cases where the safety of a flight may be in direct jeopardy, the aircraft shall be instructed to land as soon as possible at the nearest airport suitable to the pilot. Once the Jeddah Area Control Center (ACC) has been informed by the Air Defense Notification Center (ADNC) that the SCATANA rules have been activated, all ATS unites in the Kingdom shall broadcast on all available frequencies that “SCATANA rules are now active, all aircraft stand by for SCATANA instructions” and then under the direction of ADNC, the appropriate ATS unit shall relay specific SCATANA instructions to each aircraft.
3. While SCATANA rules are active, all proposed flight operations in Saudi Arabian airspace will require approval by ADNC and be assigned an appropriate wartime traffic priority number. ADNC shall determine which wartime air traffic priority numbers are permitted to fly based on the level of hostilities, existing or expected, along the aircraft’s intended route of flight.

5.9.2 United Arab Emirates

A. Implementation of Special Areas of Operation

1. RNAV-5 / B-RNAV is required at 10,500 feet and above in the Emirates FIR and at all altitudes in the Fujairah CTA.
2. RNAV-1 / P-RNAV is required at all altitudes in the Dubai CTA.

B. All operators must be authorized before conducting any Low Visibility Operations.

C. All aircraft overflying, departing from, or landing in the UAE must carry a valid insurance certificate.

D. Any aircraft carrying dangerous goods into, through, or from UAE airspace must have authorization from the Ministry of Foreign Affairs to do so.

5.10.0 Africa

A. RVSM has been implemented from FL290 - FL410 inclusive.

B. The Africa (AFI) Regional Monitoring Agency (ARMA) will act on behalf of ICAO in carrying out the Regional Monitoring Agency responsibilities for the AFI Region.

C. The IATA Inflight Broadcast Procedures (IFBP) in Appendix L should be reviewed prior to operating in Africa. The IFBP are applied in many regions in Africa.

D. User Preferred Routes: UPRs are being made available across the entire Arabian Sea and Indian Ocean area, which will include portions of African airspace. Operators who wish to utilize the UPRs should consult the relevant state AIPs to confirm specific waypoints required for entry/exit. In addition, UPRs will only be available to those aircraft and operators who are authorized for RNP-10 and DLC (ADS-C / CPDLC).

E. Ebola Screenings: Any flights to the US carrying individuals who have recently traveled to, from, or through an Ebola-stricken nation, including Guinea, Sierra Leone, and Liberia, are required to arrive at one of the following US airports where Customs and Border Patrol has implemented screening procedures:

- John F. Kennedy International (KJFK) in New York;
- Newark Liberty International (KEWR) in New Jersey;
- Washington Dulles International (KIAD) in Virginia;
- Chicago O'Hare International (KORD) in Illinois; or
- Hartsfield-Jackson Atlanta International (KATL) in Georgia.

Note: The list of affected countries that require arrival at these airports may be updated by way of an advisory posted at www.cbp.gov.

5.10.1 ASECNA States

A. The Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA) is an ATC agency based in Senegal that provides ATC management services for the following states:

Benin	Equatorial Guinea	Mauritania
Burkina Faso	Gabon	Niger
Cameroon	Guinea-Bissau	Republic of Congo
Central African Republic	Ivory Coast	Senegal
Chad	Madagascar	Togo
Comores	Mali	

B. Although each nation sets its own rules and guidance, procedures are often harmonized and can be found on ASECNA's digital AIP at the following URL:

https://aim.asecna.aero/

5.10.1.1 ADS-B Implementation in ASECNA States

As of May 19, 2022, space-based ADS-B service is provided at all flight levels throughout the entire lateral and longitudinal boundaries of the following FIRs, including a 50 NM buffer zone beyond:

- Accra (DGAC);
- Antananarivo (FMMM);
- Brazzaville (FCCC);
- Dakar (GOOO);
- Dakar Oceanic (GOOO);
- Kano (DNKK);
- Niamey (DRRR);
- N'Djamena (FTTT).

5.10.1.2 Direct Routing in ASECNA States

A. Direct route options have been implemented in the Antananarivo, Brazzaville, Dakar, Ndjamena, and Niamey FIRs above FL290 in the interest of providing reduced flight times and fuel savings. Full details of the available routes are published in the ASECNA AIP, Section ENR 4.1 and/or 4.4 (https://aim.asecna.aero).

B. Use of the routes is subject to their availability, traffic permitting, and may be restricted either to certain hours of operation or to certain altitudes. Specific details on any applicable restrictions will be published via NOTAM. In addition, only aircraft that are fitted with TCAS Version 7.1, ADS-B Out, and ADS-C / CPDLC may utilize these direct routes.

C. Direct route options do not supersede any airspace that is indicated as restricted (i.e., military) and are also restricted to a maximum of 200 NM for each segment. Operators who wish to fly further than 200 NM must utilize one or more intermediate waypoints.

5.10.2 South Africa

A. Implementation of Special Areas of Operation

1. RNAV-5 / B-RNAV is required on T122, EXOBI to ORNAD, and UT122, EXOBI to ORNAD.

2. DLC: ADS-C and CPDLC services are available.

B. Speed Restrictions: Unless otherwise advised by ATC, all aircraft inbound to Johannesburg (O R Tambo Intl), Lanseria, Port Elizabeth, Durban (Intl) and Cape Town (Intl) airports that are not on a STAR will comply with the following maximum KIAS:

1. Within 50 DME JSV / PEV / CTV / TGV / BLV / ELV: 250 KIAS.

2. Within 15 DME JSV / PEV / CTV / TGV / BLV / ELV: 210 KIAS.

C. Cloud Break Procedure (CBP)

- A Cloud Break Procedure may be approved when one or more of the following apply:
  - The runway and/or equipment does not comply with ICAO requirements for instrument approach procedures;
  - The final approach track is not aligned with the runway;
  - Local QNH may not be available.
- In the event that such runway and/or equipment does not comply with ICAO requirements the OCA/H will not be lower than that specified for circling minima as applicable to aircraft category.

D. Traffic Information Broadcast by Aircraft (TIBA): The following procedures are implemented for aircraft operating outside of controlled airspace to assist pilots in collision avoidance and to maintain an orderly flow of traffic in areas not serviced by ATC.

1. All aircraft operating at or below 1,500 ft AGL outside the lateral limits of the Johannesburg, Port Elizabeth, East London, and Hoedspruit Special Rules Area, and all promulgated General Flying Areas, should maintain a continuous air / ground communication watch and broadcast regular position reports on frequency 124.8 MHz.

2. Aircraft operating within 5 NM of an airport where an ATS unit is not in operation, and where no specific frequency has been allocated, should make regular position reports relative to the airport on frequency 124.8 MHz (excluding those airports situated within promulgated General Flying Areas).
   - Where a specific frequency has been allocated for such an airport, the position reports relative to the airport should be made on the appropriate frequency within 5 NM of the airport.

- En route position reports should be made at regular intervals containing information useful for collision avoidance (e.g., identification, route, position/time, level/altitude, next position and estimate). These position reports should be made with reference to prominent landmarks and/or navigational facilities.

3. Aircraft operating above 1,500 ft AGL outside of the areas mentioned above should maintain a continuous air / ground communication watch and make regular position reports on the appropriate FIS frequency allocated for that area. In the event that no contact can be established with the appropriate FIS unit due to location or range a continuous air / ground communication watch should be maintained and regular position reports / broadcasts should be made.

   Note: Refer to the Jeppesen Airway Manual for the appropriate frequencies to be used.

E. Radar Separation Assurance: Radar is the primary aid for separation assurance between Johannesburg TMA and Durban TMA at FL210 and above, and between Johannesburg TMA and Cape Town TMA above FL195. En route separation of 10 minutes is reduced to 10 NM demanding appropriate vigilance, RT discipline, and accuracy.

F. Lateral Offset Procedures

1. Lateral offset procedures will be in force in Johannesburg Oceanic FIR on fixed routes. Aircraft operating on the fixed route structure over the Atlantic Ocean inbound or outbound to/from either Namibian or South African continental airspace are to ensure a return to centerline immediately after passing the following significant points:
   - UBVER (S2755.4 E01417.7)
   - ILDIR (S1800.0 E01000.30)
   - OKDOG (S3305.0 E01500.0)
   - ITMEK (S3412.0 E01500.0)
   - ITLIK (S3516.0 E01500.0)
2. Position reports should be based on the current ATC route clearance and not the exact coordinates of the offset position.

G. Search and rescue operations (SAR) will be undertaken automatically no less than one hour after the ETA for all flights transiting or arriving in South Africa, with the following considerations / exceptions:

- Crews are responsible for ensuring ATC is notified of completion or cancellation of their flights to avoid unnecessary deployment of SAR. For flights landing at an aerodrome where an ATSU is in operation, ATC will close the flight plan upon arrival.
- Crews may also use the radio phraseology “*cancel my search and rescue*” if SAR is not needed and has otherwise not been cancelled. If acknowledgment of cancellation is not received from ATC, the crew must telephone notice of their arrival to the ATSU listed in Item 18 of their flight plan.
- In cases where the flight transits between controlled and uncontrolled airspace, the crew must inform ATC when the aircraft leaves or enters controlled airspace; otherwise, SAR will be deployed in no less than one hour after any missed position report in controlled airspace.

- Item 18 of the ICAO flight plan should contain one of the following entries to avoid any confusion:

When Flight Is Bound for an Aerodrome Where an ATSU Is in Operation

Type of SAR	Item 18 Code	Description
Standard (Automatic SAR in controlled airspace)	*RMK/SARNML*	Must be used when the whole flight will be in controlled airspace. Indicates standard, automatic SAR: - SAR will take place if the flight does not arrive at the destination, or if there is a missed position report in controlled airspace. - SAR <u>will not</u> be provided while the aircraft is in uncontrolled airspace, except in an emergency.
SAR required in both controlled and uncontrolled airspace	*RMK/SARNMLENROUTE*	May only be used if the whole or portion of the flight will be in uncontrolled airspace. Indicates standard SAR, except that SAR will also be undertaken in the event of a missed position report when the aircraft is in uncontrolled airspace. Crews should only request this type of SAR if they are certain of their ability to make required position reports for the duration of the flight.

When Flight Is Bound for an Aerodrome Where an ATSU Is Not in Operation

Type of SAR	Item 18 Code	Description
SAR required only after a specified time	*RMK/SARAAAA####*, where AAAA is an airport code and #### is the time, e.g.: *RMK/SARFABL0930*	Indicates that the airport listed in the message will be notified of the flight's arrival by the time listed in the message. If the notice of arrival is not made, standard SAR will occur.
No SAR required in uncontrolled airspace	*RMK/SARNIL*	Indicates that SAR is not required. (Note that SAR will still be provided automatically in the event of a missed position report in controlled airspace.)
SAR required only after a certain time past ETA	*RMK/SARAAAAETA#HR*, where AAAA is an airport code and # is a number of hours, e.g.: *RMK/SARFAORETA1HR*	Indicates that the airport listed in the message will be notified of the flight's arrival by no later than the specified time after the filed ETA. If the notice of arrival is not made, standard SAR will occur.

Type of SAR	Item 18 Code	Description
SAR required in both controlled and uncontrolled airspace	*RMK/SARAAAA####ENROUTE*, where AAAA is an airport code and #### is the time, e.g.: *RMK/SARFABL0930ENROUTE*	Indicates standard SAR, except that SAR will also be undertaken in the event of a missed position report when the aircraft is in uncontrolled airspace, or if the airport listed in the message is not notified of the flight's arrival by the time specified. Crews should only request this type of SAR if they are certain of their ability to make required position reports for the duration of the flight.

- Crews who fail to comply with the requirements listed above (e.g., failure to cancel service or file the flight plan correctly) will be responsible for any costs incurred by an ATSU that provides SAR.

5.11.0 Restricted Areas of Operation

A. Crews must always review any available health or safety advisories for their departure and destination to ensure there are no travel restrictions, whether they are set by the country of origin or country of destination.

B. It is recommended that the online Conflict Zone Information Repository on ICAO's webpage be checked for information on areas of ongoing conflict where there is an increased risk to civil aircraft: http://www.icao.int/czir/Pages/default.aspx

C. The WHO's website for international travel and health can be referenced for general information on health-related advisories (https://www.who.int/ith/en/). However, crews should also check for information from their local health authorities / departments, as they may have additional considerations or restrictions beyond those noted by the WHO.

5.11.1 Considerations for US Operators

A. The following sections describes some known areas where operations are prohibited, heavily restricted, or inadvisable. However, it is **not** a comprehensive description of **all** restricted operations. Crews must be careful to check all available resources (such as NOTAMs, state AIPs, state or regional safety/security bulletins, etc.) before flying into an unfamiliar region to ensure there are no active restrictions against the intended operations.

B. Operators of US-registered aircraft should consult the FAA's Prohibitions, Restrictions, and Notices website at https://www.faa.gov/air_traffic/publications/us_restrictions/ for a current listing of security NOTAMs.

5.11.1.1 Afghanistan

US operators (including private and commercial) are prohibited from operating below FL320 in the Kabul FIR (OAKX), except for operators of US-registered aircraft belonging to foreign air carriers. Overflight operations above FL320 are permitted and have been deemed to have minimal risks from ground-based militant activity.

5.11.1.2 Belarus

US operators (including private and commercial) are prohibited from operating at any altitudes in the entirety of the Minsk FIR (UMMV), except for operators of US-registered aircraft belonging to foreign air carriers.

5.11.1.3 Cuba

A. US citizens are permitted to fly to Cuba, either through private or commercial means, only if the purpose for travel meets one of the twelve categories of authorized activity listed under 31 CFR 515.560(a). More general information about these activities can be found on the US Office of Foreign Assets Control's FAQ online:

https://ofac.treasury.gov/faqs/topic/1541

B. Travelers and crews should take into account insurance and finance considerations due to ongoing sanctions against Cuba. Exports to Cuba of replacement parts and equipment to repair a civil aircraft (even on a temporary basis) is not authorized without a license from the BIS.

C. Transition Altitude and Level

- Transition Altitude: The standard transition altitude for Cuban airports is 3,000 feet with the exception of the following airports:

Airport	Transition Level
MUMZ	4,000 feet
MUTD	5,000 feet
MUBA, MUCU, MUGT, MUMO	6,000 feet

- Transition Level: The transition level for each individual airport is set at 1,000 feet above the corresponding transition altitude when the local QNH is equal or above 1013 mb. For local QNH below 1013 mb, the Transition Level must be set at 2,000 feet above the transition altitude.

5.11.1.4 Egypt

A. Operations in the Sinai area should proceed with caution due to ongoing security risks (e.g., extremist/militant activity, including anti-aircraft weaponry). To the maximum extent possible, crews should avoid flying operations in or over the Sinai Peninsula in the Cairo FIR (HECC) at altitudes below FL260 within the following lateral limits: 311855N 0321900E to 294443N 0322815E to 281650N 0331928E to 272900N 0341900E to 292920N 0345500E, then along the Egypt / Israel border to 311800N 0341300E to 311855N 0321900E.

B. US pilots or operators who encounter a security / safety incident in Egypt must report it to the FAA at 202-267-3333 or 202-267-3203. Crews should provide at least 72 hours advance notice of planned flights in the areas described above to the FAA at aeo-citewatch@faa.gov with specific flight details.

5.11.1.5 Haiti

As of March 2024, there are no formal restrictions or prohibitions against operations to Haiti. However, it is recommended that air operators avoid the area due to civil unrest and violence, which has directly affected Toussaint Louverture International Airport (MTPP).

5.11.1.6 Iran

A. Operations in the Tehran FIR (OIIX) are prohibited for US-registered aircraft, unless specifically authorized by the FAA or another agency of the US government. In an emergency that requires immediate action for the safety of the flight, the PIC may deviate from this prohibition only to the extent required by the emergency.

B. The US does not have an embassy in Iran. Crews who make an unanticipated landing in Iran should contact the foreign interests section at the Swiss embassy (+98-21-2279-3912 or +98-21-2279-3697) if assistance is needed. Pilots or operators who encounter a security / safety incident in Iran must report it to the FAA at 202-267-3333 or 844-267-3203.

5.11.1.7 Iraq

US operators (including private and commercial) are prohibited from operating below FL320 in the Baghdad FIR (ORBB), except for operators of US-registered aircraft belonging to foreign air carriers. Overflight operations above FL320 are permitted and have been deemed to have minimal risks from ground-based militant activity.

5.11.1.8 Israel, West Bank, and Gaza

Although the FAA does not currently have any explicit restrictions against flights to either the Tel Aviv FIR (LLLL) or the Amman FIR (OJAC), operators are advised not to travel to these regions due to ongoing militant activity throughout these regions.

5.11.1.9 Kenya

A. Operations should proceed with caution due to security risks (e.g., extremist/militant activity, including anti-aircraft weaponry), particularly on the ground and at low altitudes east of 40 degrees east longitude. To the maximum extent possible, any intended operations in Kenya should be restricted to altitudes at or above FL260.

B. US pilots or operators who encounter a security / safety incident in South Sudan must report it to the FAA at 202-267-3333 or 202-267-3203.

5.11.1.10 Korean Peninsula

A. US civil aviation operations are prohibited in the Pyongyang FIR (ZKKP).

B. Crews should exercise caution when flying in the Incheon FIR (RKRR), especially near Seoul, due to possible interference with or disruption of GNSS.

5.11.1.11 Libya

Operations in Libya are prohibited for US-registered aircraft, unless specifically authorized by the FAA or another agency of the US government. In an emergency that requires immediate action for the safety of the flight, the PIC may deviate from this prohibition only to the extent required by the emergency.

Note: Operations for US-registered aircraft are permitted within the portions of the Tripoli FIR (HLLL) that are outside the territory and airspace of Libya.

5.11.1.12 Mali

A. Operations should proceed with caution due to ongoing military operations and security risks (e.g., extremist/militant activity, including anti-aircraft weaponry), particularly on the ground and at low altitudes. To the maximum extent possible, any intended operations in Mali should be restricted to altitudes at or above FL260.

B. US pilots or operators who encounter a security / safety incident in Mali must report it to the FAA at 202-267-3333 or 202-267-3203. Crews should provide at least 72 hours advance notice of planned flights in the areas described above to the FAA at aeo-citewatch@faa.gov with specific flight details.

5.11.1.13 Oman and Persian Gulf

Although there are not currently any active FAA restrictions against flights to the Kuwait FIR (OKAC), Jeddah FIR (OEJD), Bahrain FIR (OBBB), Emirates FIR (OMAE), or Muscat FIR (OOMM), operators should proceed with caution due to ongoing security risks (e.g., militant activity, including anti-aircraft weaponry), particularly in the airspace closest to the Tehran FIR.

5.11.1.14 Pakistan

A. Operations should proceed with caution due to ongoing security risks (e.g., extremist/militant activity, including anti-aircraft weaponry), particularly on the ground and at low altitudes.

B. US pilots or operators who encounter a security / safety incident in Pakistan must report it to the FAA at 202-267-3333 or 844-412-1794.

5.11.1.15 Somalia

Operators of US-registered aircraft (except for foreign air carriers) are prohibited from operating within the territory or airspace of Somalia below FL260 unless previously authorized by the FAA.

5.11.1.16 Syria

Operators of US-registered aircraft (except for foreign air carriers) are prohibited from operating within the Damascus FIR (OSTT) unless previously authorized by the FAA.

5.11.1.17 Venezuela

Operations in Venezuela below FL260 are prohibited for US-registered aircraft, unless specifically authorized by the FAA or another agency of the US government. In an emergency that requires immediate action for the safety of the flight, the PIC may deviate from this prohibition only to the extent required by the emergency.

5.11.1.18 Yemen

Operations in the Sanaa FIR are prohibited for US-registered aircraft, unless specifically authorized by the FAA or another agency of the US government. In an emergency that requires immediate action for the safety of the flight, the PIC may deviate from this prohibition only to the extent required by the emergency.

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Appendix A: Preflight Planning Resources

International Flight Planning Checklists

Documentation Aircrew

Current in International Operations (Recurrent Training – 24 Months)

- ☐ Adequate rest (Flight Time Limitations)
- ☐ Trip Itinerary (including stops)
- ☐ Pax manifest: full names, citizenship, dates of birth, current addresses, next of kin, any drug properly labeled and documented
- ☐ List of embassy locations/tel. numbers
- ☐ Airman's Certificates (good copies) Pilot's license, current medical certificate
- ☐ Radiotelephone license
- ☐ Current passports – 2nd passport on file expiration dates / photocopies of 1st page
- ☐ Visa or tourist cards
- ☐ Immunization records (shot card)
- ☐ Traveler's Checks / U.S. currency
- ☐ Internationally accepted credit cards current / signed / check expiration dates
- ☐ Customs forms
  - ☐ General declaration
  - ☐ List of hours / inspections required
  - ☐ Customs declaration forms
  - ☐ Customs overflight (Southern Border)
- ☐ Current charts
- ☐ All luggage properly marked
- ☐ Aircrew identification cards
- ☐ List of emergency phone numbers
  - Local company office
  - Police, lawyers, next of kin
- ☐ Emergency Medical Service / International First Aid Kit (Confirm expiration date.)

Notes

Documentation Aircraft

- ☐ Airworthiness certificate
- ☐ Registration (Note: aircraft may not fly internationally with a temporary registration or a copy – must be an original)
- ☐ Radio license (Check expiration date)
- ☐ Current aircraft operations manual with weight and balance
- ☐ Minimum Equipment List (MEL)
- ☐ Metric conversion tables with pre-converted aircraft size and weights (QRH)
- ☐ S/N engine and nav equipment – date of last inspection
- ☐ Certificates proving insurance coverage (originals from insurance companies)
- ☐ Aircraft Maintenance Manuals / CMP
- ☐ Liquor sealing device(s)
- ☐ ETP / wet footprint calculations
- ☐ ICAO meteorology reference
- ☐ HF Voice Operating Handbook and documentation
- ☐ Copy of Jeppesen Manuals and/or AIP
- ☐ Noise certificates
- ☐ Checklists
- ☐ Flight Following
- ☐ Fuel sample kit
- ☐ Decal sticker / receipt

Notes

Documentation Passenger

- ☐ Pax list / any known illness
- ☐ Passports (photocopy of first page)
- ☐ Visas / tourist cards
- ☐ Immunization records
- ☐ Copy of trip itinerary
- ☐ Internationally accepted credit cards
- ☐ Traveler's checks
- ☐ Embassy locations and phone numbers
- ☐ List of emergency phone numbers
- ☐ Luggage / personal possessions properly labeled with U.S. Customs certificates of importation if foreign manufactured

Operations Permits

- ☐ Overflight and landing
- ☐ File ICAO flight plan (ADCUS in remarks)
- ☐ NAT HLA / RVSM / RNP-10 / RNP-4 / P-RNAV / B-RNAV / CPDLC / ADS-B Authorizations, as applicable
- ☐ Airspace authorization
- ☐ Specific airport training records (Katmandu)
- ☐ Curfews checked

Notes

Operations Services

- ☐ Ground
  - ☐ Security (hangar space / guard)
  - ☐ If hangar not available: arrange heat, covers, EPU, battery removal, heat storage for battery
  - ☐ Handling agent
- ☐ Fixed Base Operators
- ☐ Fuel
  - ☐ Sufficient fuel at each stop (ICAO Annex 6)
  - ☐ Credit cards accepted
  - ☐ Oxygen, hydraulic fluid, other fluids
- ☐ Maintenance
  - ☐ Availability of airframe, powerplant and electronics technicians (list of approved service locations from a/c manufacturer)
  - ☐ Acquisition of parts (source)
- ☐ Aircraft Equipment
  - ☐ Tow bar and tow bar heading
- ☐ Financial
  - ☐ Credit cards accepted
  - ☐ Currency
  - ☐ Letter of credit
  - ☐ Bank, handlers, fuelers
- ☐ Deicing capability

Communications Equipment

- ☐ Preflight equipment check
- ☐ VHF
- ☐ HF check operation
- ☐ Headphones / check operation (spare headset)
- ☐ Microphones / check operation
- ☐ SELCAL check / frequency
- ☐ Agreements (ARINC contacts), if applicable
- ☐ SATCOM / DLC (if applicable)

Notes

Navigation Equipment

- ☐ Preflight equipment check / database currency
- ☐ GNSSU (check status of satellites)
- ☐ FMS (current database, date and time)

Publications / EFB Flight Deck

- ☐ International Operations Procedures Manual
- ☐ Oceanic Ops Checklist (Appendix G)
- ☐ Jeppesen Orientation Charts
- ☐ Airport Qualification Charts
- ☐ Jeppesen High Altitude En Route Charts
- ☐ Plotting Charts / Software
- ☐ Jeppesen Approach Charts (current)
- ☐ Track Messages
- ☐ AIP for selected countries (Jeppesen)
- ☐ NOTAMs
- ☐ GNSSU NOTAMs
- ☐ Volcanic Advisories
- ☐ Solar Flare Advisories
- ☐ Information from tourist agency(re: facilities)

Notes

Survival Equipment

- ☐ Review International Operations Procedures – Survival and Rescue
- ☐ Review International Operations Procedures – Ditching Procedures
- ☐ Emergency Equipment including life vests, life rafts, and ELT (if applicable)

Other Considerations

- ☐ ICAO flight plan
  - ☐ Accuracy verified (Items 10 and 18)
  - ☐ Filed
- ☐ Aircraft locks / check operations
- ☐ Spare keys (3 sets)
- ☐ Ground transportation / hotel reservations
- ☐ Secure-a-seal, per threat assessment
- ☐ Flyaway kit (maintenance) consideration
- ☐ Survival / Safety Briefing Cards for pax
- ☐ List of international service providers
- ☐ Tourist information crew briefings
- ☐ Catering (Ensure food safety)
- ☐ SMS reporting forms
- ☐ DR kit (dead reckoning)
- ☐ City maps, local maps
- ☐ Heat packs
- ☐ Defibrillator
- ☐ Risk assessment has been conducted
- ☐ EU ramp inspection preparation (Ramp Inspection Binder)
- ☐ Safety / health advisories that may restrict travel

Notes

Preflight Planning Links

General

Accident Investigation Authorities List	https://www.icao.int/safety/AIA/Pages/default.aspx
ADS-B Out Service Availability Prediction Tool (SAPT)	http://sapt.faa.gov
Aircraft Registration Database (FAA)	http://registry.faa.gov/aircraftinquiry/
Aircraft Registration Database (Global)	http://www.airframes.org/
Airports with Noise or Emissions Restrictions	https://www.boeing.com/commercial/noise/list.page
AIPs / AISs by State	http://www.eurocontrol.int/articles/ais-online
AIREPs	https://www.aviationweather.gov/airep
Airport Facility Directory (FAA)	http://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/
ATC System Command Center (FAA)	http://www.fly.faa.gov/flyfaa/usmap.jsp
Aviation Weather Center	http://www.aviationweather.gov/
Carbon Monitoring Tool (CORSIA)	https://www.icao.int/environmental-protection/CORSIA/Pages/CERT.aspx
Centers for Disease Control – Travelers' Health	http://wwwnc.cdc.gov/travel/default.aspx
Conflict Zone Information Repository	http://www.icao.int/czir/Pages/default.aspx
Cosmic Radiation Calculation	https://www.omnicalculator.com/everyday-life/flight-radiation
Department of State International Traveler Information (US)	https://travel.state.gov/content/travel/en/international-travel.html
eAPIS	https://eapis.cbp.dhs.gov/
Flight Information Regions Map	http://www.arcgis.com/home/webmap/viewer.html?webmap=724dfc8916604483a0ab06b4f3cbe57f
Flight Standards District Offices (FAA)	https://www.faa.gov/about/office_org/field_offices/fsdo/
GNSS Predictive RAIM	https://augur.eurocontrol.int/
IATA Travel Center	http://www.iatatravelcentre.com/
ICAO Flight Plan Filing Overview	https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/air_traffic_services/flight_plan_filing/
International Flight Folder	https://www.aviationweather.gov/flightfolder
Naval Observatory Master Clock	http://www.usno.navy.mil/
NBAA – International Operations	http://www.nbaa.org/
NOAA National Weather Service	http://www.weather.gov/
NOTAMs (Current – US)	https://www.faa.gov/air_traffic/publications/notices/
NOTAMs (Searchable)	https://pilotweb.nas.faa.gov/PilotWeb/
Oceanic and Remote Operations (Including Planning Guides)	https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/oceanic_remote/
Planning Charts	https://www.planningcharts.com/
Rescue Coordination Center	http://www.sarsat.noaa.gov/rcc.html

RTMA Alternate Report of Surface Temperature	http://nomads.ncep.noaa.gov/pub/data/nccf/com/rtma/prod/airport_temps/
RVSM Height-Monitoring – US (AGHME)	https://www.faa.gov/air_traffic/separation_standards/aghme/
Search and Rescue Contacts	https://sarcontacts.info/
SELCAL User's Guide (ASRI)	https://asri.aero/selcal/how-selcal-works/
Ship Locations / Live Tracker	http://www.sailwx.info/shiptrack/shiplocations.phtml
Skybrary	http://www.skybrary.aero/index.php/Main_Page
Smart Traveler Enrollment Program	https://step.state.gov/step/
Space Weather Prediction Center	https://www.swpc.noaa.gov/
Space Weather Regional Warning Centers	http://www.ises-spaceweather.org/
State Department Travel Warnings and Consular Information Sheet	http://travel.state.gov/content/passports/english/alertswarnings.html
Time and Distance Calculator	http://www.flightmanager.com/content/TimeDistanceForm.aspx
Time Zone Converter	http://www.timezoneconverter.com/cgi-bin/tzc.tzc
Universal Currency Converter	http://www.xe.com/currencyconverter/
Volcano Advisories	http://www.ssd.noaa.gov/VAAC/messages.html
WGS-84: World Geodetic System 1984 (Jeppesen)	https://ww2.jeppesen.com/wgs-84-status/
World Health Organization	http://www.who.int/en/

Regulatory Sources

ADS-B Out Requirements	https://www.faa.gov/nextgen/equipadsb/
FAA Dynamic Regulatory System (DRS)	https://drs.faa.gov/
ICAO Documents (Atlantic / Europe)	http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx
ICAO Documents (Pacific / Asia)	http://www.icao.int/APAC/Pages/edocs.aspx
RVSM (FAA)	https://www.faa.gov/air_traffic/separation_standards/rvsm/

Reporting Programs / Monitoring Agencies

Overview of International Reporting Programs	http://asrs.arc.nasa.gov/international/overview.html
Australian Confidential Reporting Program	http://www.atsb.gov.au/voluntary/repcon-aviation.aspx
Brazilian Confidential Reporting Program	http://www.cenipa.aer.mil.br/cenipa/index.php
French Confidential Reporting Program	http://www.bea.aero/en/index.php
GNSSU Report Form	http://www.navcen.uscg.gov/?pageName=gpsUserInput
Japanese Confidential Reporting Program	http://www.atec.or.jp/
Middle East Regional Monitoring Agency	http://www.midrma.com
Monitoring Agency for Asia Region	http://www.aerothai.co.th/maar/
Taiwan Confidential Reporting Program	http://www.tacare.org.tw/sub_en/index.aspx?uid=371&pid=371

United Kingdom Confidential Reporting Program	http://www.chirp.co.uk/
US Confidential Reporting Program	http://asrs.arc.nasa.gov/

Regional

Australia

Australian Customs: Travelers' Guide	http://www.customs.gov.au/
Australian Organized Track Structure – AUSOTS	http://www.airservicesaustralia.com/ausots/ausotstoday.asp

Canada

Canada Border Services Agency	http://www.cbsa-asfc.gc.ca/prog/canpass/generalavi-eng.html
Canada Customs and Revenue Agency (CCRA)	http://www.ccra-adrc.gc.ca
Canada – Rehabilitation for Persons Who Are Inadmissible to Canada Because of Past Criminal Activity	http://www.cic.gc.ca/english/information/applications/guides/5312ETOC.asp#5312E4
Canadian Confidential Reporting Program	http://www.tsb.gc.ca/eng/securitas/index.asp
Canadian Electronic Travel Authorizations	http://www.cic.gc.ca/english/visit/visas.asp
Collaborative Flight Planning Services (Weather, Flight Planning, NOTAMs, etc)	https://plan.navcanada.ca/

Europe

Bird Strike Avoidance: Europe	https://www.flysafe-birdtam.eu/
Eurasia Regional Monitoring Agency	http://www.rma-eurasia.ru/
Eurocontrol	http://www.eurocontrol.int/
Eurocontrol 8.33kHz Channel Spacing Site	http://www.eurocontrol.int/articles/voice-channel-spacing-vcs-2-mandate
Eurocontrol Regional Charts	http://www.eurocontrol.int/carto
European and North Atlantic (EUR/NAT) Office	http://www.icao.int/EURNAT/Pages/welcome.aspx
European Civil Aviation: ECAC	http://www.ecac-ceac.org/
LPV Procedures Map	https://egnos-user-support.essp-sas.eu/new_egnos_ops/resources-tools/lpv-procedures-map
OneSky Online Login Portal	https://extranet.eurocontrol.int/
SAFA Program	http://easa.europa.eu/easa-and-you/aviation-domain/commercial-aviation/safety-assessment-foreign-aircraft-ec-safa-programme
SESAR 2020 Program	http://www.sesarju.eu/
United Kingdom Customs and Excise Information	https://www.gov.uk/government/organisations/hm-revenue-customs

United States

Advance Passenger Information System Overview	http://www.cbp.gov/travel/travel-industry-personnel/apis2
Bird Strike Avoidance	http://www.usahas.com/
Chart Supplements	https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/
Customs Preclearance Information	http://www.cbp.gov/border-security/ports-entry/operations/preclearance

International Security Considerations

General Security Considerations

A. Prior to departure

- Review the U.S. State Department's website regarding travel alerts and warnings for the destination (https://travel.state.gov/content/passports/en/alertswarnings.html).
- Obtain contact information for the following:
  - Nearest embassy or consulate;

    Note: A list of U.S. Embassies and Consulates can be found at the following website: https://www.usembassy.gov/
  - Other crewmembers and passengers on the trip;

    Note: In addition to personal contact numbers, the Director of Aviation should maintain a copy of crewmember and passenger emergency contacts at home base.
  - Local emergency services (police and/or medical emergency phone numbers).

    Note: It is recommended that this information be kept in physical (not electronic) format in the event of failure or theft of the electronic device.
- Review emergency departure considerations with all crewmembers and passengers. Ensure everyone understands meeting locations, departure procedures, etc.

B. Appearance and dress

- Avoid clothing with information that may disclose nationality, company, or specific affiliations (e.g., apparel with sports teams, company names, etc.).
- Avoid wearing expensive looking jewelry or accessories.
- Be mindful of any dress requirements at the destination.
- Keep wallets, money, and other valuables in a front pants pocket or pouch hidden in your clothing. Carry your passport with you at all times.

C. Vigilance and situational awareness is key to staying secure abroad. It is critical to remain observant to any situations that seem unusual, suspicious, or concerning.

D. In the event of an emergency abroad (including, but not limited to, arrest / detention, medical emergency, lost or stolen passport, natural disaster, crime, missing persons, or death abroad), contact one of the following:

- Local embassy.
- Local consulate.
- U.S. Department of State - Overseas Citizens Services at 888-407-4747 (from US and Canada) or 202-501-4444 (from other international locations).

  Note: The organizations listed above will not typically alert local police or medical assistance. In the event police or medical assistance is required, contact them via the appropriate local police and/or medical emergency phone numbers.

E. Crew and Passenger Coordination

- Flight crewmembers and passengers should exchange mobile phone numbers for emergency contact purposes. An emergency meeting location and exit plan should be discussed with passengers in advance of the trip.
- In the event of an emergency (such as natural disaster, act of warfare, etc.), mobile phone service may be unreliable or completely unavailable due to high load and disruption of cellular towers.
  - While calling service may be unavailable, crewmembers and passengers should attempt to communicate via text or email.
  - Satellite phones may be utilized, when available.

Note: Prior to flight, crewmembers should verify local regulations do not prohibit the carriage and/or use of satellite phones. Satellite phones shall not be carried when restricted by local law.

- Passengers should be briefed to meet at the emergency meeting location in the event mobile phone service becomes unavailable.

Information Security While Abroad

A. Computer and mobile device considerations

- Install security updates provided by your operating system provider prior to travel and use a firewall and anti-malware software whenever possible.
- Clear your Internet browser's history, cache, cookies, and temporary files after every use.
- Use of a Virtual Private Network (VPN) is advisable to support data encryption and reduce the risk of communication interception.
- Use of a disposable mobile phone ("burner phone") may be advisable, particularly when operating into areas of potential cyber-security risk.
- Avoid using public charging stations, as they may be compromised and lead to data interception or malware upload. Should use of these stations be necessary, consider using a USB data blocking adapter or powering off the device to help mitigate some risk of data interception.
- Avoid application and mobile phone firmware/OS updates while abroad, as falsified application updates are a common malware technique.
- Utilize robust passwords on devices where possible. Two-factor authentication and/or biometric authentication (e.g., facial recognition, fingerprint sign-on) is strongly encouraged.

  Note: Passwords should be changed at the conclusion of the trip.
- Factory reset or hard drive reformatting may be necessary after the trip, particularly when travelling to locations at higher risk of cyber-security concerns. Do not connect the device to other devices until the factory reset or reformat is complete.
- In the event a mobile device, laptop / computer, or tablet is stolen, contact the local U.S. Embassy or Consulate.

B. Phishing Attempts: It is important to be mindful of attempts to gather personal or sensitive information from outside parties (phishing). Review all correspondence closely, including emails, phone calls, or text messages. Some items to remain alert for include:

- Frequent misspellings and/or poor grammar.
- Requests to add or update personal information.
- Email attachments, as they may contain ransomware, malware, or viruses.
- URLs embedded in emails. Verify the URL displayed is the same as the URL shown when hovering over it with a mouse pointer, if possible. If the email only contains a URL link and no additional context, do not open it.
- Emails reflecting a particular sense of urgency.

C. Internet connections at international locations (including hotels) may not be secure or private, and information may be subject to technical surveillance.

- Public or hotel Wi-Fi should be avoided whenever possible.
- If hotel-provided Internet service must be used, confirm the network name and password with the hotel manager prior to use. Do not transmit sensitive information while utilizing the hotel network, regardless of promises of network security.

  Note: In the event a network of a similar name is discovered, **do not connect to it** and inform the hotel manager as soon as possible.
- It is recommended that a Virtual Private Network (VPN) (either one provided by your company or a third-party provider) be utilized when possible.

Note: Some countries have restrictions regarding use of a VPN. Prior to the trip, it is recommended that the VPN provider be contacted regarding VPN use in the travel region.

D. All oral and written flight and travel information will be distributed on a need-to-know basis.
- Employees shall discuss schedules or flight details with others only on a need-to-know basis.
- Information about trip itineraries and passenger identities will not be given to any person who is not positively identified or has not demonstrated a need to know.

Chartered Vehicle Considerations

A. The PIC, or delegate, should gather the following information prior to flight:
- Vehicle driver information:
  - Recent photograph for identification;
  - Criminal background check, if available;
  - Phone number and contact information;
  - Confidentiality agreements;
  - Licensed and insured.
- Vehicle description:
  - Make/model/year/color;
  - License plate number;
  - Distinguishing markings, such as charter company logos.
- Pickup, travel, and drop-off locations:
  - Exact location of pickup and drop-off;
  - Specific company policies/procedures (such as a positive verification phone call or use of company-specific cellphone applications);
  - Exact route the driver will take between destinations.

B. The PIC is responsible for confirming the information listed above prior to releasing passengers to the chartered vehicle operator. Should the information listed above not be accurate, the charter operator should be contacted to ensure there have not been changes to the reservation.

Note: In the event the reservation has not changed and the information is not accurate, **do not board the vehicle**. Contact the charter operator and/or local police, as necessary.

Hotel Security Considerations

A. When staying at a hotel abroad, individuals must consider the safety and security of personnel and property. A trip support company, security assessment company, or international handling organization may be able to assist in assessing the items listed below:
- Review the U.S. State Department's website regarding travel alerts and warnings for the destination (https://travel.state.gov/content/passports/en/alertswarnings.html).
- Research local police and emergency services contact information. Ensure all individuals have this contact information in the event of emergency.
- Remind passengers and crewmembers to lock hotel room doors at all times, even when the room is occupied. Multiple locking methods (e.g., deadbolt and/or chain lock, in conjunction with the door handle lock) should be used whenever possible.
- Review evacuation procedures (i.e., fire evacuation routes) for the hotel, where established.
- Should the hotel require you to leave passports with them, request a receipt and verify that everyone has collected their passports at the conclusion of the stay.
- Avoid solo travel, even on hotel grounds (especially at night).

B. Should changes to the itinerary occur while abroad, it is important to notify the PIC and/or Director of Aviation, as required, as soon as possible.

ICAO Flight Plan Procedures

General

- Where excess space is available, leave unused spaces blank.
- Insert all clock times in 4 figures UTC. Insert all estimated elapsed times in 4 figures (hours and minutes).
- The shaded area preceding Item 3 is to be completed by ATS and COM services, unless the responsibility for originating flight plan messages has been delegated.
- Complete Items 7 to 18 as indicated below.
- Item 19 should only be completed if required by the applicable ATC authority.

Item 7: Aircraft Identification (Maximum 7 Characters)

Insert one of the following aircraft identifications. This field must contain 2-7 characters.

- Insert the registration marking of the aircraft (e.g., N123A, VPBXX) when:
  - In radiotelephony the call sign to be used by the aircraft will consist of this identification alone, or preceded by the ICAO telephony designator for the aircraft operating agency; or
  - The aircraft is not equipped with radio.
- Insert the ICAO designator for the aircraft operating agency followed by the flight identification (e.g., KLM511, NGA213, JTR25) when in radiotelephony the call sign to be used by the aircraft will consist of the ICAO telephony designator for the operating agency followed by the flight identification
  (e.g., KLM511, NIGERIA 213, HERBIE 25).
  Note: Provisions for the use of radiotelephony call signs are contained in Annex 10, Volume II, Chapter 5. ICAO designators and telephony designators for aircraft operating agencies are contained in Doc 8585 - Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services.

Item 8: Flight Rules and Type of Flight (One or Two Characters)

8a. Flight Rules: Insert one of the following letters to denote the category of flight rules with which the pilot intends to comply:

I	IFR (Entire Flight)	
V	VFR (Entire Flight)	
Y	Both (IFR First)	(Specify in Item 15 the point or points where a change of flight rules is planned)
Z	Both (VFR First)	

8b. Type of Flight: Insert one of the following letters to denote the type of flight when so required by the appropriate ATC authority:

S	If scheduled air service
N	If non-scheduled air transport operation
G	If general aviation
M	If military
X	If other than any of the defined categories above

Item 9: Number and Type of Aircraft and Wake Turbulence Category

9a. Do not insert anything if the flight plan is for only one aircraft. If the plan is being filed for 2 or more, insert the number of aircraft up to 99.

9b. Type of aircraft (2 to 4 characters)

- Insert the appropriate designator as specified in ICAO Doc 8643, Aircraft Type Designators.

- If no such designator has been assigned, or in case of formation flights comprising more than one type, insert ZZZZ and specify the numbers and type(s) of aircraft preceded by "TYP/" in Item 18.

9c. Wake turbulence category (1 character): Insert an oblique stroke followed by one of the following letters to indicate the wake turbulence category of the aircraft:

J	Super (Jumbo)	To indicate an aircraft noted in ICAO Doc 8643 as having an exceptionally large maximum certificated takeoff mass (i.e., Airbus A380 and AN-225)
H	Heavy	To indicate an aircraft type with a maximum certificated takeoff mass of 136,000 kg or more
M	Medium	To indicate an aircraft type with a maximum certificated takeoff mass of less than 136,000 kg but more than 7,000 kg
L	Light	To indicate an aircraft type with a maximum certificated takeoff mass of 7,000 kg or less

Item 10: Equipment

10a. Navigation / Communication Equipment and Capability

Insert one or more of the following letters to indicate the NAV/COM equipment available and serviceable:

A	GBAS Landing System
B	LPV (APV with SBAS)
C	(Not allocated)
D	DME
E1	FMC WPR ACARS
E2	D-FIS ACARS
E3	PDC ACARS
F	ADF
G	GNSS
H	HF RTF
I	Inertial Navigation
J1	CPDLC – ATN VDL Mode 2
J2	CPDLC – FANS 1/A HFDL
J3	CPDLC – FANS 1/A VDL Mode A
J4	CPDLC – FANS 1/A VDL Mode 2
J5	CPDLC – FANS 1/A SATCOM (INMARSAT)
J6	CPDLC – FANS 1/A SATCOM (MTSAT)
J7	CPDLC – FANS 1/A SATCOM (Iridium)
K	MLS
L	ILS
M1	ATC SATVOICE (INMARSAT)

M2	ATC SATVOICE (MTSAT)
M3	ATC SATVOICE (Iridium)
N	No Com / NAV / Approach equipment is carried, or the equipment is unserviceable
O	VOR
P1	CPDLC RCP 400
P2	CPDLC RCP 240
P3	SATVOICE RCP 400
P4-P9	(Reserved by ICAO for future RCP designations)
Q	(Not accepted)
R	PBN Approved (RNP / RNAV Capability) – **See Note 1**
S	Standard Equipment – **See Note 2**
T	TACAN
U	UHF RTF
V	VHF RTF
W	RVSM certified – **See Note 3**
X	NAT HLA certified – **See Note 3**
Y	VHF radio with 8.33 kHz channel spacing capability
Z	Other equipment carried – **See Note 4**

Note 1: When item “R” is entered in Item 10a to indicate RNP / RNAV capability, additional information must be entered in Item 18 with the “PBN/” indicator. See the detailed instructions for Item 18.

Note 2: This includes the carriage of VHF RTF, VOR, and ILS (the equipment represented by the letters “V,” “O,” and “L”).

Note 3: If an aircraft is suitably equipped, the letters “W” and “X” must be included, even if the flight plan is for a flight that will not penetrate RVSM and/or NAT HLA airspace.

Note 4: If the letter “Z” is used, specify the other equipment in Item 18. At least one “COM/” or “DAT/” or “NAV/” entry is required in Item 18.

10b. Surveillance Equipment

INSERT one or more of the following letters to describe the serviceable surveillance equipment and capability:

N	Nil
A	Transponder – Mode A – 4 digits – 4 096 codes
C	Transponder – Mode A – 4 digits – 4 096 codes and Mode C
L	Transponder – Mode S – Including aircraft identification, pressure-altitude, Extended Squitter (ADS-B), and enhanced surveillance capability
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 not pressure-altitude capability
P	Transponder – Mode S – Including pressure-altitude, but not aircraft identification capability
S	Transponder – Mode S – Including both pressure-altitude and aircraft identification capability
X	Transponder – Mode S – Without either aircraft identification or pressure-altitude capability
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 using UAT
U2	ADS-B Out and In using UAT
V1	ADS-B Out using VDL Mode 4
V2	ADS-B Out and In using VDL Mode 4
D1	ADS-C with FANS 1/A capabilities
G1	ADS-C with ATN capabilities

Note 1: It is highly recommended that a single indication be used to provide the appropriate SSR capability.

Note 2: Additional surveillance equipment or capabilities, including RSP specifications, if applicable, should be listed in Item 18, preceded by “SUR/.”

Item 13: Departure Airport and Time (8 Characters)

13a. Insert the four-letter ICAO indicator of the departure airport. If no location indicator has been assigned, insert ZZZZ and specify the name of the airport in Item 18, preceded by “DEP/.”

13b. Insert the proposed time of departure / Estimated Off-Block Time (EOBT).

Item 15: Route

15a. Expected cruise speed (maximum 5 characters)

Insert the True Air Speed for the first or the whole cruise portion of the flight, in terms of:

- Kilometers per hour, expressed as K followed by 4 figures (e.g., K0830); or
- Knots, expressed as N followed by 4 figures (e.g., N0485); or
- True Mach number, when so prescribed by the appropriate ATC authority, to the nearest hundredth of unit Mach, expressed as M followed by 3 figures (e.g., M082).

15b. Requested cruise altitude (maximum 5 characters)

Insert the planned cruising level for the first or the whole portion of the route to be flown, in terms of:

- Flight Level, expressed as F followed by 3 figures (e.g., F330); or
- Standard Metric Level in tens of meters, expressed as S followed by 4 figures (e.g., S1130); or
- Altitude in hundreds of feet, expressed as A followed by 3 figures (e.g., A045; A100); or
- Altitude in tens of meters, expressed as M followed by 4 figures (e.g., M0840); or
- For uncontrolled VFR flights, the letters VFR.

15c. Route (Including Changes of Speed, Level and/or Flight Rules)

i. Flights Along Designated ATS Routes

- If the departure airport is located on, or connected to the ATS route, insert the designator of the first ATS route.
- If the departure airport is not on or connected to the ATS route, insert the letters “DCT” followed by the point of joining the first ATS route, followed by the designator of the ATS route.
- Insert each point at which either a change of speed or level, a change of ATS route, and/or a change of flight rules is planned.

  Note: When a transition is planned between a lower and upper ATS route and the routes are oriented in the same direction, the point of transition need not be inserted.
- Followed in each case by the designator of the next ATS route segment, even if the same as the previous one; OR
- By DCT, if the flight to the next point will be outside a designated route, unless both points are defined by geographical coordinates.

ii. Flights Outside Designated ATS Routes

- INSERT points normally not more than 30 minutes flying time or 370km (200 NM) apart, including each point at which a change of speed or level, a change of track, or a change of flight rules is planned; OR
- When required by appropriate ATS authority(ies), DEFINE the track of flights operating predominantly in an east-west direction between 70°N and 70°S by reference to significant points formed by the intersections of half or whole degrees of latitude with meridians spaced at intervals of 10 degrees of longitude. For flights operating in areas outside those latitudes the tracks shall be defined by significant points formed by the intersection of parallels of latitude with meridians normally spaced at 20 degrees of longitude. The distance between significant points shall, as far as possible, not exceed one hour's flight time. Additional significant points shall be established as deemed necessary.
- For flights operating predominantly in a north-south direction, define tracks by reference to significant points formed by the intersection of whole degrees of longitude with specified parallels of latitude which are spaced at 5 degrees.
- INSERT DCT between successive points unless both points are defined by geographical coordinates or by bearing and distance.
- 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 including, where appropriate, the coded designator assigned to the standard departure or arrival route (e.g., BCN1. B1, A14, UB10, KODAP2A).

     Note: Provisions for the application of route designators are contained in Annex 11, Appendix 1, while guidance material on the application of an RNP type to a specific route segment(s), routes, or area, is contained in ICAO Doc 9613.
  2. Significant Point (2 to 11 Characters): The coded designator (2 to 5 characters) assigned to the point (e.g., LN, MAY, HAOOY), or, if no coded designator has been assigned, one of the following ways:
     - Degrees only (7 characters): 2 figures describing latitude in degrees, followed by "N" (North) or "S" (South), followed by 3 figures describing longitude in degrees, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros; e.g., 46N078W.
     - Degrees and minutes (11 characters): 4 figures describing latitude in degrees and tens of minutes followed by “N” (North) or “S” (South), followed by 5 figures describing longitude in degrees and tens 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.

- Bearing and distance from a navigation aid: The identification of the navigation aid (normally a VOR), in the form of 2 or 3 characters, THEN the bearing from the aid in the form of 3 figures giving degrees magnetic, THEN the distance from the aid in the form of 3 figures expressing NM. Make up the correct number of figures, where necessary, by insertion of zeros; e.g., a point 180 magnetic at a distance of 40 NM from VOR "DUB" should be expressed as DUB180040.

3. 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, expressed exactly as in a and b above, without a space between them, even when only one of these quantities will be changed.
4. Change of Flight Rules (Maximum 3 Characters): The point at which the change of flight rules is planned, expressed exactly as in 2 or 3 above as appropriate, followed by a space and one of the following.
   a) VFR if from IFR to VFR
   b) IFR if from VFR to IFR
5. 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 in 2 above, followed by an oblique stroke; THEN the speed to be maintained during cruise climb, expressed exactly as in a. above, followed by the two levels defining the layer to be occupied during cruise climb, each level expressed exactly as in b above, or the level above which cruise climb is planned followed by the letters “PLUS,” without a space between them.

Item 16: Destination Airport and Total Estimated Elapsed Time, Alternate Airport(s)

16a. Destination Airport

- Insert the four-letter ICAO indicator of the destination airport followed; OR
- If no location indicator has been assigned, insert ZZZZ followed, without a space, by the total estimated elapsed time, and specify the name of the airport preceded by “DEST/” in Item 18.

16b. Total Estimated Elapsed Time (EET): Insert the 4-digit EET after the destination airport without a space between.

Note: For a flight plan received from an aircraft in flight, the total estimated elapsed time is the estimated time from the first point of the route to which the flight plan applies.

16c. Alternate airport(s) (4 characters), if applicable

- Insert the four-letter ICAO indicator(s) of not more than two alternate airports, separated by a space; OR
- If no location indicator has been assigned to the alternate airport, insert ZZZZ and specify the name of the airport, preceded by “ALTN/” in Item 18.

Item 18: Other Information

- Insert 0 (zero) if no other information is required or applicable. Otherwise, insert the information beginning with the appropriate indicator below followed by a slash (/) mark and no space.
- Sequence of Remarks: Information should be filed in the order below. Some ANSPs will accept this information in any order, but some will truncate the information received in Item 18 which may result in an incomplete flight plan. The order specified reflects the order of importance.

- Duplicate Entries: If duplicate entries of certain types are found, they will be concatenated into a single entity with a space inserted between data streams. Duplicates of other types will instead raise an error, resulting in an inability to file the flight plan. Items in red font below will raise an error, if duplicated.

STS/	Indicates a reason for special handling by ATC (e.g., hospital aircraft – STS/HOSP, one engine inoperative - STS/ONE ENG INOP).
PBN/	Indicates the level of RNAV capability of the aircraft. Required if the letter "R" is entered in Item 10a. **See Note 1**.
NAV/	Indicates significant data related to navigation equipment as required by the appropriate ATC authority. **See Note 2.**
COM/	Indicates significant data related to communication equipment and capabilities as required by the appropriate ATC authority.
DAT/	Indicates significant data related to data link communication equipment or capabilities (e.g., DAT/S for satellite datalink; DAT/H for HF datalink; DAT/V for VHF datalink; DAT/M for SSR Mode S datalink). When operating in the US, this entry is also optionally used to notify FAA automation to generate a CPDLC-DCL or PDC, as well as to indicate preference. In addition, for aircraft exempt from the European ATN mandate, the entry "*CPDLCX*" should be included with DAT/.
SUR/	Indicates any surveillance applications or capabilities that are not specified in Item 10b. Any ADS-B or RSP specifications that apply to the flight should be listed, using designators with no spaces. Multiple RSP specifications are separated by a space. (Example: *SUR/260B RSP180*)
DEP/	Name of departure airport, if ZZZZ is inserted in Item 13, or the ICAO four letter location indicator of the location of the ATS unit from which supplementary flight plan data can be obtained, if AFIL is inserted in Item 13.
DEST/	Name of destination airport, if ZZZZ is inserted in Item 16.
DOF/	The date of flight departure in a six-figure format (YYMMDD)
REG/	The registration of the aircraft, if different from the aircraft identification in Item 7.
EET/	Significant points or FIR boundary designators and accumulated estimated elapsed times to such points or FIR boundaries, when so prescribed on the basis of regional air navigation agreements, or by the appropriate ATS authority.
SEL/	SELCAL Code, if so prescribed by the appropriate ATS authority.
TYP/	Type(s) of aircraft, preceded by number(s) of aircraft, if ZZZZ is inserted in Item 9.
CODE/	Aircraft address (expressed in the form of an alphanumerical code of six hexadecimal characters) when required by the appropriate ATS authority. Example: "F0000l" is the lowest aircraft address contained in the specific block administered by ICAO.
RVR/	Indicates a 3-digit Runway Visual Range expressed in meters.
DLE/	For an 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 the delay using four-figure time in hours and minutes (hhmm).
OPR/	Name of the operator, if not obvious 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.

PER/	Aircraft performance data, if so prescribed by the appropriate ATS authority.
ALTN/	Name of destination alternate airport(s), if ZZZZ is inserted in Item 16.
RALT/	Name of en route alternate airport(s).
TALT/	Name of takeoff alternate airport(s).
RIF/	The route details to the revised destination airport, followed by the ICAO four-letter location indicator of the airport. The revised route is subject to re-clearance in flight.
RMK/	Any other plain language remarks when required by the appropriate ATS authority or deemed necessary.
RFP/	Indicates a replacement flight plan number.

Note 1: When PBN/ is entered, at least 1 and no more than 8 of the following must be entered:

A1	RNAV 10 (RNP-10)	D2	RNAV 1 GNSS
B1	RNAV 5 all permitted sensors	D3	RNAV 1 DME/DME
B2	RNAV 5 GNSS	D4	RNAV 1 DME/DME/IRU
B3	RNAV 5 DME/DME	L1	RNP-4
B4	RNAV 5 VOR/DME	O1	Basic RNP-1 all permitted sensors
B5	RNAV 5 INS OR IRS	O2	Basic RNP-1 GNSS
B6	RNAV 5 LORAN C	O3	Basic RNP-1 DME/DME
C1	RNAV 2 all permitted sensors	O4	Basic RNP-1 DME/DME/IRU
C2	RNAV 2 GNSS	S1	RNP APCH
C3	RNAV 2 DME/DME	S2	RNP APCH with BARO-VNAV
C4	RNAV 2 DME/DME/IRU	T1	RNP AR APCH with RF (special authorization required)
D1	RNAV 1 all permitted sensors	T2	RNP AR APCH without RF (special authorization required)

Note 2: When filing in the US, a “NAV/” entry must be included in Item 18 along with any of the following that may apply in order to make use of advanced navigation capabilities:

Z1	RNP-capable flight that is authorized for RF operations
Z2	RNP-capable flight that is authorized for FRT operations
Z5	RNP-capable flight that is authorized for TOAC operations
P1	Flight is authorized for A-RNP operations
R1	Flight is authorized for RNP 0.3 operations (Helicopters only)
M1	Flight is authorized for RNP-2 in continental airspace
M2	Flight is authorized for RNP-2 in oceanic / remote airspace

If any supplementary non-code descriptor (such as those listed below) also applies, a space should be entered after the codes listed above, followed by the descriptors:

SBAS	Aircraft is equipped with WAAS compliant avionics (Appendix Q)
GBAS	Aircraft is equipped with LAAS compliant avionics (Appendix Q)

Example: "NAV/Z1P1M2 SBAS"

Item 19: Supplementary Information

Item 19 is used to provide information concerning the safety and security of the flight, including details to aid search and rescue mission, as follows:

E/	The fuel endurance in hours and minutes, in 00:00 format.
P/	Total number of people (both passengers and crew) on board. Use zeroes in advance of the total if less than 100. If this is not known during preflight planning, insert "P/TBN" (i.e., "To Be Notified").
R/ U V E	Indicates radio equipment capabilities. Any capabilities that the aircraft *does not have* should be ticked / crossed out: U = UHF on frequency 243.0 MHz V = VHF on frequency 121.5 MHz E = Emergency Locator Transmitter (ELT)
S/ P D M J	Indicates types of survival equipment carried on board. Any equipment that the aircraft *is not carrying* should be ticked / crossed out: P = Polar survival equipment D = Desert survival equipment M = Maritime survival equipment J = Jungle survival equipment
J/ L F U V	Indicates features of the life jackets that are carried on board. Any features that the life jackets *do not have* should be ticked / crossed out: L = Lights F = Fluorescein U = UHF radio capability V = VHF radio capability Note: If no life jackets are carried, cross out *all* indicators.
D/	Indicates dinghies and additional details. If no dinghies are carried, cross out the "D/" field as well as the "C" (Cover) field. Otherwise, fill out the fields under "D/" as follows: • Number (Two digits): Number of dinghies carried • Capacity (Three digits): Total capacity, in persons, of all dinghies carried (e.g., if there are 2 dinghies with a capacity of four each, enter "008") • C / Cover: Leave alone if the dinghies are covered. Cross out if they are not covered. • Color: Color(s) of the dinghies
A/	The aircraft colors and significant markings.
N/	Additional remarks regarding survival / safety equipment, including any notes about survival equipment to be carried that is not otherwise indicated above. If there are no remarks, cross out the "N" indicator.
C/	Name of the PIC

Fuel Requirements

ICAO Requirements

Per Annex 6, Part II, Section 3.4.3.5.3, *Fuel Requirements*, the preflight calculation of required fuel must include:

1. **Taxi fuel**, i.e., fuel expected to be consumed before takeoff.
2. **Trip fuel**, i.e., fuel required to fly from takeoff, or the point of inflight re-planning, until landing at the destination airport.
3. **Contingency fuel**, i.e., fuel required to compensate for unforeseen factors, such as weather deviations, individual aircraft variance in fuel consumption, extended taxi times, etc. Contingency fuel must be calculated as no less than five percent of the planned trip fuel, based on the consumption rate used to plan the trip fuel. (For commercial operations, contingency fuel must also not be lower than the amount required to fly for five minutes at holding speed at 450 m / 1,500 ft above the destination aerodrome in standard conditions.)

   Note 1: For IFR flights from, to, or within the US and Europe, the amount of contingency fuel required by ICAO may be exceeded by the fuel required by the "45 minute rule." That is, the airplane must have sufficient fuel to complete the flight to the airport of intended landing, then to the destination alternate, if required, and thereafter for a period of 45 minutes at normal cruising speed.

   - The greater of the two (i.e., the FAA's "45 minute rule" or the sum of ICAO's requirements), by weight, should be used.
   - The contingency fuel calculation may be entered onto the fuel block of the flight plan under a variety of names, such as "Reserve," and crews must be familiar with those labels in the event they are asked to explain their fuel calculations during a ramp inspection. Sample fuel block labels are described later in this appendix.

   Note 2: Regardless of what is entered on the flight plan as the contingency fuel, sufficient fuel must also be carried to comply with holding fuel requirements as described under "final reserve fuel" below.
4. **Destination alternate fuel**:
   a) Where a destination alternate airport is required, the amount of fuel required to enable the airplane to:
      i. Perform a missed approach at the destination aerodrome;
      ii. Climb to the expected cruising altitude;
      iii. Fly the expected routing;
      iv. Descend to the point where the expected approach is initiated; and
      v. Conduct the approach and landing at the destination alternate aerodrome; or

   b) Where two destination alternate aerodromes are required, the amount of fuel required to enable the airplane to proceed to the destination alternate airport which requires the greater amount of alternate fuel; or

   c) Where a flight is operated without a destination alternate airport, the amount of fuel required to enable the airplane to fly for 15 minutes at holding speed at 450 m (1,500 ft) above destination airport elevation in standard conditions; or

   d) Where the airport of intended landing is an isolated airport:
      i. For a reciprocating engine airplane, the amount of fuel required to fly for 45 minutes; or
      ii. For a turbine-engined airplane, the amount of fuel required to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel.

5. **Final reserve fuel**, which is the amount of fuel calculated using the estimated mass on arrival at the destination alternate airport, or the destination airport when no destination alternate airport is required:
    a) For a reciprocating engine airplane, the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the State of the Operator; or
    b) For a turbine-engined airplane, the amount of fuel required to fly for 30 minutes at holding speed at 450 m (1,500 ft) above aerodrome elevation in standard conditions.
6. **Additional fuel**, which is the supplementary amount of fuel required if the minimum fuel calculated above is not sufficient to:
    a) Allow the airplane to descend as necessary and proceed to an alternate airport in the event of engine failure or loss of pressurization, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route;
        i. Fly for 15 minutes at holding speed at 450 m (1,500 ft) above airport elevation in standard conditions; and
        ii. Make an approach and landing;
    b) Allow an airplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by the State of the Operator; or
    c) Meet additional requirements not covered above.
7. **Discretionary fuel**, which is the extra amount of fuel to be carried at the discretion of the PIC.

Flight Plan Fuel Summaries

A. Based on the requirements described above, flight plans should include a fuel summary block such as the sample below:

```
DEPARTURE DATE/TIME     ARRIVAL DATE/TIME - INCLUDES TAXI TIMES
27/17.00 (ZULU)         27/21.07 (ZULU)
27/14.00 (LOCAL)        27/22.07 (LOCAL)

           FUEL   TIME  DIST ARRIVE  TAKEOFF   LAND   AV PLD  OPNLWT
POA  EIDW  008781 03.54 1968 20.54Z   032367  023586  000200  020500
ALT  EINN  000746 00.32 0143
HLD        000581 00.30
TXI        000150
RES        001559 00.45
EXTRA      000000 00.00
TOT        011817 05.51                 GREAT CIRCLE DIST 1899
```

B. Fuel is typically broken into the ICAO categories listed above and described both in weight (kg) under a “fuel” column, as well as time (HH.MM) in a “time” column. Flight planning services might label the categories differently from each other, as well as from the ICAO terminology. Below are the corresponding ICAO designations based on the sample flight plan block above:

POA / DEST	Trip Fuel. Takeoff and landing fuel may be further broken out.
ALT / ATLN	Destination Alternate Fuel.
HLD / HOLD	Final Reserve Fuel.
TXI / TAXI	Taxi Fuel.
RES / RESV	Contingency Fuel.
EXTRA	Additional Fuel and/or Discretionary Fuel.
TOT / TTL	The sum of all fuel.

REQ / REQD (Not Pictured)	Some flight plan formats include a "Required" block, which indicates the minimum required time and fuel for the flight, calculated as the sum of the trip, alternate, reserve, and contingency fuel.

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Appendix B: Master Document

Overview of Master Document Notations

Note: If plotting / charting software is available (i.e., ARINC Direct Electronic Plotting and Charting), crews may use such software in lieu of a paper copy of the Master Document. Crews should reference the software developer's manual(s) regarding applicable electronic plotting / charting procedures (i.e., ARINC Direct iPad Manual Section 13 - Plotting Chart). The below notations should be used on the Master Document if a paper copy is used, or as an alternate in the event that the software becomes unusable.

5150N — **Lat / long is circled** to signify that waypoint has been doublechecked after insertion into FMS.

✓ 5150N — Circled **lat / long is ticked** to signify that relevant track and distance have been doublechecked.

✓ 5150N — A **diagonal line is placed through the distance tick mark** after the clearance is verified.

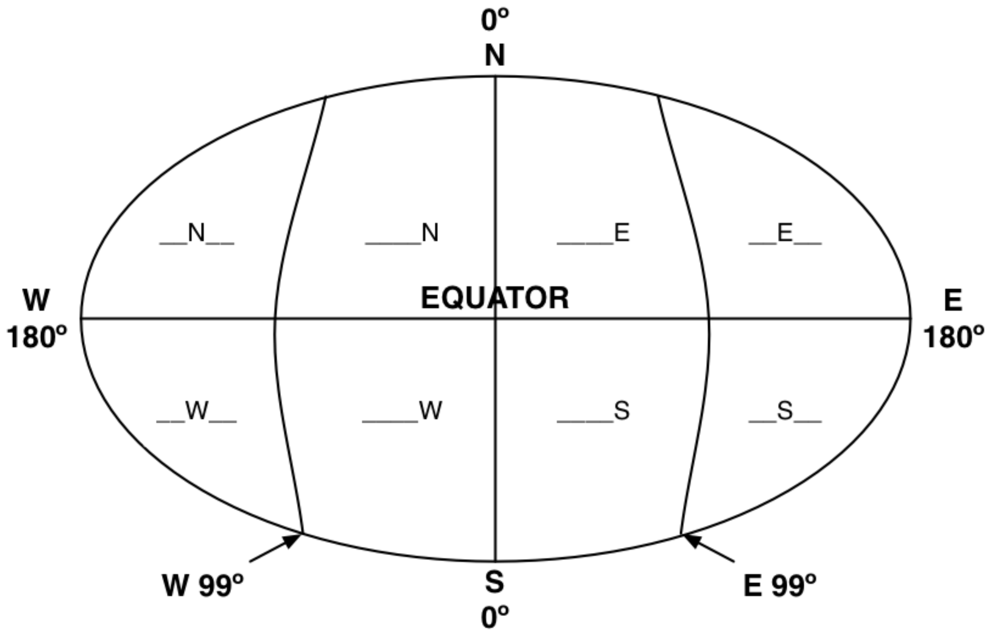
✓ ~~5150N~~ — **A diagonal line will be placed through the waypoint** indicating that the report has been made and recorded on the Master Document.

✓ ~~5150N~~ — A **final diagonal line (creating an "X")** will be placed through the waypoint indicating that the ten (10) minute check has been accomplished and the aircraft position is correct.

Additional Notations: (Reverse side may be used)

- Fuel On Board Before Leaving the Ramp;
- All Pertinent Operational Information;
- All Assigned Frequencies;
- Any Clearance Differences and Resolutions;
- Wind, Time, and Fuel Remaining;
- FMS / LRNS Positions, Differences and Errors;
- ETP / PSR.

ARINC 424 Waypoint Naming



Oceanic waypoints are named according to the ARINC 424 navigation database specifications below.

1) Southern Hemisphere uses the letter S or W.
2) Northern Hemisphere uses the letters N or E.
3) Latitude always precedes longitude.
4) Only the last two digits of longitude are used.
5) Placement of the letter designator (N, S, E, W) in the string of five characters indicates the value of the longitude one-hundredths digit.
6) The letter in the last position indicates longitude is less than 100; the letter in the third position indicates longitude is 100 or greater.
7) Letters are used for position designation as follows:

Waypoint Position		Examples
Letter	Latitude and Longitude	N 52 30 / W 050 00 = H5250
N	North and West	N 50 00 / W 040 00 = 5040N
E	North and East	N 50 00 / E 020 00 = 5020E
S	South and East	S 50 00 / E 020 00 = 5020S
W	South and West	S 52 00 / W 075 00 = 5275W

Half-Degree Waypoints

1) When unnamed half-degree waypoints are used, the display labels can be misleading (i.e., minutes may be truncated our rounded) or the FMS might create a generic label. Accordingly, crews should always check the expanded coordinates of all oceanic waypoints.
2) The placement of the letter *H* in the first position indicates a half-degree waypoint. These waypoints take the form *Hxxyy*, where *xx* measures degrees North, plus 30 minutes, and *yy* measures degrees West (e.g., *H5250 = 52°30' N, 050°00' W*).

   Note: Although *Hxxyy* is the primary format, some database vendors may utilize alternate naming conventions. Crews should consult navigation database vendor information.

Journey Log Book

ICAO Annex 6 (both Parts I and II) requires that pertinent details, as noted on the following form, be recorded for each flight. However, ICAO does not prescribe a specific format. When possible, crews may utilize other forms such as the Master Document, flight log, etc. to capture such details. If such forms do not adequately capture the information listed below, this form must be completed.

I. Aircraft nationality and registration

II. Date

III. Name(s) and duty assignment(s) of crew member(s)

PIC:

SIC:

IV. Place of departure

V. Place of arrival

VI. Time of departure

VII. Time of arrival

VIII. Hours of flight

IX. Nature of flight (scheduled or non-scheduled)

X. Incidents, observations, if any

XI. Signature of person in charge

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Data Link Communications Procedures

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Appendix C: Data Link Communications Procedures

C.1.0 Introduction

A. “Data Link” is a generic term that encompasses different types of systems and subnetworks that are designed to transmit and receive aircraft information. As used in this appendix, the term “Data Link Communications” refers specifically to those aircraft communication applications and/or operations that require state authorization for use, including:

- Automatic Dependent Surveillance – Contract (ADS-C);
- Controller Pilot Data Link Communications (CPDLC); and
- CPDLC Departure Clearances (CPDLC-DCL).

B. “Data Link Communications” will *not* be used in this appendix to refer to the use of data link systems for Aeronautical Operational Control (AOC) applications or certain ATC applications, including the following:

- Pre-Departure Clearance (PDC);
- Digital Automatic Terminal Information Service (D-ATIS);
- Terminal Weather Information for Pilots (TWIP);
- Oceanic Clearance Delivery (OCD);
- Graphics / Text Weather Server (G/TWS); or
- Digital Delivery of Expected Taxi Clearance (DDTC).

C.1.1 Definitions

A. *Aircraft Communications Addressing and Reporting System (ACARS)* refers to the overall structure of digital systems used for data link transmissions (including both radio and satellite) and consists of a variety of sub-networks, including:

- *Satellite*, including Inmarsat and Iridium SATCOM equipment;
- *VDL Mode 0/A*, which uses VHF radio equipment;
- *VDL Mode 2*, which uses VHF radio equipment; and
- *High Frequency Data Link (HFDL)*, which uses HF radio equipment.

B. *Future Air Navigation System (FANS)* is an analog DLC system used in oceanic and remote airspace that makes use of Satellite, VDL-Mode 0/A, and HFDL sub-networks.

C. *Aeronautical Telecommunication Network-Baseline 1 (ATN-B1)* is a digital DLC system used primarily for continental transmissions through the VDL-Mode 2 sub-network.

D. *B2* is a proposed data link system that is planned for global implementation in the future. When active, B2 will harmonize both the FANS and ATN networks and provide expanded capabilities and services.

E. *LINK 2000+* is the former name of a program and mandate for European airspace requiring the use of CPDLC with equipment that complies with ATN-B1 (i.e., VDL Mode 2 capable VHF units). Although the terminology “LINK 2000” is no longer used, the mandate still exists as part of the European Union’s *SESAR 2020* program.

<u>Note</u>: This mandate is applicable only to European airspace, but includes operations that require state authorization (i.e., CPDLC). Accordingly, operators will obtain operational approval from their state of registry for CPDLC, not for “LINK 2000+” or “SESAR 2020.”

F. *Protected Mode CPDLC (PM CPDLC)* is a proprietary term for Honeywell DLC equipment that provides support for ATN-B1 (e.g., VDL Mode 2), but does not otherwise refer to a separate technology.

G. *FANS 2* is another proprietary term that usually refers to DLC equipment that supports both FANS and ATN-B1.

C.1.2 Purpose

The purpose of this appendix is to outline maintenance, training, and operational procedures for initial compliance and continued airworthiness for aircraft operating in airspace where DLC capability is required. These procedures are based on and comply with the Global Operational Data Link Document (GOLD), ICAO Doc 10037.

C.1.3 Responsibilities

A. The Director of Aviation will be the primary responsible authority for developing and monitoring department DLC operational requirements and procedures. Changes to this appendix will be authorized and approved only by the Director of Aviation.

B. The Director of Maintenance will be the primary responsible authority for developing and monitoring department maintenance requirements and procedures for DLC systems. The Director of Maintenance may delegate authority to other qualified individuals to complete these tasks.

C. A copy of this document will be maintained in the flight department office and made available to all flight crewmembers prior to operations in DLC airspace, as well as to any maintenance personnel performing maintenance on DLC systems.

C.2.0 Compliance

A. Aircraft equipment has been approved for the intended use per interoperability standards and performance specifications (e.g., RCP 240 or RCP 400 operations) and in accordance with airworthiness requirements and related means of compliance.

B. The Director of Aviation has ensured that flight crews, maintenance, and operational staff (e.g., dispatchers) have received appropriate training in accordance with Annex 1 and Annex 6 to the Convention on International Civil Aviation.

C. When conducting DLC operations, pilots must adhere to the following published guidance:

Reference	Title
GOLD (ICAO Doc 10037)	Global Operational Data Link Document, Latest Revision
AC 90-117	Data Link Communications
AC 20-140C	Guidelines for Design Approval of Aircraft Data Communications Systems
ECR No 29/2009	European Commission Regulation No 29/2009, laying down requirements on Data Link services for the Single European Sky
FAA Asia Pacific Package	Asia Pacific Operational Authorization Information Package: CPDLC and ADS-C
ICAO NAT Doc 007	North Atlantic Operations and Airspace Manual
ICAO OESB	ICAO Oceanic Errors Safety Bulletin
AIPs and NOTAMs	Any Aeronautical Information Publications or Notices to Airman applicable to the areas to be overflown

Note: As these documents may be updated over time, flight crews should ensure that the most recent revision is being used. Currency of the document will be verified prior to any review of the materials referenced above.

C.3.0 Training and Qualifications

Any individual who will be involved in the operation, dispatch, or maintenance of DLC-equipped aircraft, whether full-time or on a contract basis, must complete a DLC training program before they may perform any such duties.

C.3.1 Operational Personnel (Flight Crews)

C.3.1.1 Initial Training

A. Subject Areas:

1. Normal pilot response to DLC messages, including: *ROGER* (DM3)/*WILCO* (DM0), *UNABLE* (DM1), and *STANDBY* (DM2);
2. Message elements in the message set used in each environment (e.g., ground, oceanic, en route) including terms, abbreviations, and conventions;
3. RCP/RSP specifications and their performance requirements;
4. Terminology (e.g., CPDLC and ADS-C reporting contracts);
5. Chart depictions of data link communication services;
6. Implementation of reduced separation with associated data communication system requirements to comply with RCP240 and RSP180, or other possible performance requirements associated with their routes;
7. Data link communications system theory (relevant to operational use);
8. Operations involving data link communication services;
9. Nominal and unacceptable performance;
10. Normal and non-normal use;
11. Data link communication events and reporting;
12. AFM and AFM Supplement limitations;
13. CRM of independent message verification, discussion, and action;
14. MEL deferrable items and procedures;
15. Human factors specific to the operating environment and operation of installed communication equipment; and
16. Proper use of flight plan designators for data link operations in U.S. domestic airspace and, if applicable, in oceanic and remote continental airspace.

   Note: For subsequent ground training, only the new, revised, or emphasized items need be addressed.

B. Procedural Training Items:

1. Proper use of data link communication controls, procedures, and limitations;
2. Logon/notification procedures and reestablishing system operation after loss of network logon/notification;
3. Display features;
4. Weather deviations, offsets, and waypoint sequencing;
5. Advisories and annunciation;
6. Timely and correct responses to data link communication failures;
7. Recognition of data link communications system failures and data link communication issues unique to the air carrier or operator;
8. Appropriate interaction with the Air Traffic Service Unit (ATSU) following data link communication messages that are not acceptable;
9. CRM (Independent message verification, discussion, and action);
10. Understanding, accepting, receiving, rejecting, or canceling messages;

11. Storing and retrieving messages;
12. Loading messages into appropriate controls/displays for use (e.g., FMS) formulating and sending messages;
13. Departures and departure transitions are not included in the loadable route uplink and must be manually entered by the pilot into the FMS when provided in the Departure Clearance (DCL). Refer to the NAS Data Communications Guide;
14. Loading message requests from the FMS (e.g., flight plan waypoints into data link communication for transmission, if applicable);
15. Managing the communications systems;
16. Establishing and terminating system operation;
17. Switching use of Radio Frequency (RF) media (if this is a pilot-controllable feature);
18. Issues unique to Target Corporation due to aircraft capabilities and/or flight department procedures;
19. Applicable message sets, expected transmission times, failure annunciations, constraints, and limitations;
20. CRM in responding to data link communication exchanges;
21. Data link communication modes of operation;
22. Normal and non-normal pilot operating procedures;
23. Conditional clearances and the adherence to certain conditions or restrictions such as changing a flight level based on a time or place; and
24. Selection of data sources (e.g., VDL, Satellite, or HFDL) in areas where DLC infrastructure is limited or unreliable.

C. Pilots will be trained on the latest version of the OESB. In addition, pilots will be informed of the ICAO website below and reminded to consult it for any documentation updates: http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx

C.3.1.2 Recurrent Training

A. Topics relevant to DLC operations will be integrated into the curriculum of the aircraft type-specific and/or international operations recurrent training programs. These topics should include:

- Any changes to the applicability of DLC operations or use;
- Any type-specific changes due to system modifications or software updates; and
- Any issues unique to Target Corporation based on operating experience.

B. Unless otherwise required in an operational authorization, once a pilot has completed initial DLC training and as long as the recurrent training requirements described above are met, there will not be any additional currency requirements for DLC operations.

Note: Although formal recurrent training may not be strictly required, crews must be made aware of any new operational procedures that result from software updates that affect DLC systems or components (e.g., FMSs).

C.3.2 Dispatcher Personnel

A. Any individual involved in the dispatch of aircraft that are DLC-capable must complete an initial training program that includes at least the following components:

- Proper use of flight plan designators;
- ATSU separation criteria and procedures;
- MEL remarks or exceptions based on data link communications;
- Procedures for transitioning to voice communication and other contingency procedures related to the operation in the event of abnormal behavior of the data link communication services;

- Coordination with the ATSU related to or following a special data link communication exceptional event; and
- Contingency procedures to transition to a different separation standard when data link communication services fail.

B. Dispatchers will not be assigned to duty unless they have demonstrated knowledge of the communication equipment used in the airplanes.

C.3.3 Maintenance Personnel

A. Before any maintenance personnel may perform service on any DLC systems or components, they must be trained on the aircraft's data link communications equipment. The Director of Maintenance is responsible for vetting any external maintenance technicians to ensure they are appropriately trained.

B. If there is any uncertainty of the required maintenance procedures for DLC equipment, the Director of Maintenance will contact the manufacturer for further consultation.

C.4.0 Maintenance Procedures

A. DLC equipment is maintained as an "on condition" system; that is, it is a self-checking and self-maintaining system that does not require recurrent functional checks. Other than actions to correct discrepancies or hardware failure, the equipment does not require maintenance.

Note: Should any maintenance be required, the procedures and standards in any applicable Aircraft Maintenance Manual sections, Service Bulletins, Supplemental Type Certificates, and/or Instructions for Continued Airworthiness will be followed.

B. Only appropriately-rated repair stations, factory-authorized maintenance providers, or appropriately-trained maintenance personnel will work on DLC systems or components.

Note: If technicians are unsure of required maintenance procedures for DLC-related equipment, the aircraft manufacturer or equipment-specific field service representatives should be contacted.

C. Before the aircraft equipage is reconfigured in any way that may affect performance, capability, or operational procedures, the Director of Aviation will ensure that the impact on intended DLC operations is communicated to all crew members.

D. The aircraft will be maintained in an avionics configuration that has been shown to provide acceptable DLC performance. Maintenance personnel may contact DLC service providers for information regarding poor performance by individual aircraft.

C.4.1 Discrepancies

A. Any malfunction or discrepancy that affects DLC operations will be recorded in detail on the Aircraft Discrepancy Log.

B. Return to DLC service may be accomplished only by a factory-trained and qualified person or facility, or by an appropriately rated person or facility under supervision of flight department maintenance personnel.

C.4.2 Software Updates

A. Software updates will be completed in accordance with the maintenance policies and timeframes specified in the Target Corporation Flight Operations Manual. The Director of Maintenance will coordinate with the Director of Aviation on a distribution schedule for software updates to ensure that crews are aware of the impact such updates may have on DLC operational procedures.

B. The Director of Maintenance will ensure that both air and ground systems are able to identify and properly respond to the installed level of DLC capability following any software updates.

C. RNP AR Compliance: If an aircraft qualifies for RNP AR operations, software updates must be approved by AFS-400 in order to ensure continued RNP AR compliance.

C.5.0 Introduction to DLC Applications

C.5.1 Automatic Dependent Surveillance - Contract (ADS-C)

A. ADS-C allows the establishment of communication contracts between ground systems and an aircraft's avionics system. An ADS-C contract contains the ATC data requirements for ADS reporting, as well as the frequency of the ADS reports.

B. The implementation of ADS-C provides surveillance capability in oceanic and en route continental airspace and is intended to replace CPDLC and verbal position reporting in areas where non-radar separation is currently applied.

C. In non-radar airspace, the effective use of ADS-C in the provision of Air Traffic Services enhances flight safety, facilitates the reduction of separation minima and better accommodates user-preferred flight profiles.

D. The ATS Facilities Notification (AFN) function allows the pilot to logon to an ATC center to begin ADS operations. The ADS function allows ATC to request the aircraft to automatically transmit, via a data link, aircraft data derived from onboard navigation systems. This data can then be used by ATC for estimating and predicting the aircraft position.

E. ADS reports are generated in response to commands, called contract requests, issued by ATC. The contract identifies the types of information and the conditions under which reports are to be transmitted from the aircraft. Three types of contract reporting have been defined:

   1. Periodic Contract: In response to a periodic contract, the aircraft assembles and transmits a message containing the fields at the interval specified in the contract request.

   2. Event Contract: Event contracts define certain events (such as waypoint changes) that will cause a report to be sent independent of any periodic contracts in effect. Reference Appendix C.5.1.2 for more information.

   3. Demand Contract: A demand contract is sent each time it is commanded from ATC.

F. The aircraft can also initiate emergency reporting, which is a special case of periodic reporting.

G. Within the contract request, several different data groups may be specified. These include the basic position report, which contains three-dimensional position and time, and additional on request groups.

H. When an ADS Waypoint Change event contract is active, position report data will be sent when the aircraft reaches the bisector of the angles at a flight plan waypoint. (This corresponds to the VNAV sequence point.)

I. An ATS Provider may issue multiple simultaneous contracts to a single aircraft, including one periodic and one event contract, which may be supplemented by any number of demand contracts. In addition, up to four (4) separate ATS Provider systems can initiate ADS contracts simultaneously with the aircraft.

J. The pilot interface used to view the active ADS periodic and event contracts is provided by the ADS REVIEW MCDU pages.

C.5.1.1 Aircraft Separation

A. ADS-C may be used for the application of procedural separation within a mixed surveillance environment, such as airspace where position reports are provided by a mixture of ADS-C, CPDLC and voice. For example, ADS-C may be used to determine separation between two or more aircraft reporting by ADS-C, between ADS-C and non-ADS aircraft, between ADS-C aircraft and an aircraft identified on radar, and to ensure separation between ADS-C aircraft and special use airspace, such as military restricted areas.

B. In the case of separation being applied between ADS-C and non-ADS aircraft, the separation standard must be appropriate to the capabilities of the non-ADS aircraft.

C. Where practical, the tolerances used to determine whether a specific level is occupied by an ADS-C reporting aircraft within the airspace of a specific ATSU should be consistent with other tolerances used throughout the airspace. For example, the vertical tolerances for ADS-C should be consistent with vertical tolerances used for level adherence monitoring by other forms of surveillance, such as radar.

D. If displayed ADS-C level information does not satisfy the required tolerance for an individual ATSU, then the pilot shall be advised accordingly and requested to confirm the aircraft's level. If following confirmation of the level the displayed ADS-C level information is still beyond the required tolerance, another method of separation or another method of determining level information may need to be applied.

E. An aircraft can be considered to have left a specified level when the displayed ADS-C level information indicates that the aircraft has passed the level in the required direction by more than the required tolerance.

F. ADS-C reports may be used to establish and monitor longitudinal time and distance separation standards.

G. ADS-C reports can be used to determine whether an aircraft is within or beyond an area of lateral conflict. Where lateral conflict calculations are not made by automated conflict detection tools, an ADS-C report observed outside an area of lateral conflict displayed or calculated on the screen is confirmation that the aircraft is outside the area of conflict.

C.5.1.2 Event Contracts

A. An event contract allows an ATSU to request an ADS-C report whenever a specific event occurs. An ATSU can establish only one event contract with an aircraft at any one time. However, the event contract can contain multiple event types. These types of optional events include:

- Waypoint Change Event (WCE): Triggered when a change occurs to the Next and/or Next + 1 waypoint (due to a flight plan change or waypoint sequence) in the FMS. A WCE report is sent to all ATSUs that have an event contract containing a WCE with the aircraft. Other events that may cause the system to send a WCE report include:
  - The crew executes a clearance direct to a waypoint (i.e., the next waypoint is changed);
  - The crew inserts a waypoint ahead of the aircraft; and
  - The crew executes a lateral offset resulting in a change to the next waypoint.
- Level Range Deviation Event (LRDE): Triggered when the aircraft’s FL is outside the range tolerances defined in the ADS-C event contract. The ATSU specifies the LRDE by defining the lower and upper limits of the level range.

  Note: Once an aircraft sends an LRDE report, it will not send another LRDE report until the ATSU establishes a new ADS-C LRDE contract.
- Lateral Deviation Event (LDE): Triggered when the lateral distance between the aircraft’s actual position and its expected position, as defined in the aircraft active flight plan, exceeds the lateral deviation threshold defined by the ATSU in the ADS-C event contract. The defined threshold will be the same on each side of the route. If the active flight plan is different to the plan held by the ATSU, no LDE will be triggered as long as the aircraft remains within the lateral deviation threshold.

  Note 1: Under certain circumstances, such as when the crew activates an offset that is greater than the lateral deviation threshold, the aircraft may transmit an LDE report immediately while still on the cleared route. This should be interpreted as an early warning of an impending lateral deviation.

  Note 2: Once an aircraft sends an LDE report, it will not send another LDE report until the ATSU establishes a new ADS-C LDE contract.

- Vertical Rate change Event (VRE): Triggered when the aircraft's rate of climb or descent is greater than the vertical rate threshold.

  Note: The VRE does not detect a reduction in either the climb or descent rate.

B. In response to a new ADS-C event contract, the aircraft separately sends an acknowledgement and then the ADS-C reports are transmitted only after one of the specified events occurs.

C. An event contract remains in effect until the ATSU cancels it or until the event(s) used to trigger the report occurs. The WCE contract will trigger a report for all waypoint changes. All other event contracts will trigger a report on the first occurrence and then, if necessary, the ATSU will need to request a new event contract indicating all desired event types.

D. ADS-C Reports

- The aircraft system sends specific data in different groups of an ADS-C report. All ADS-C reports will send the "basic group" of data, which includes the aircraft's present position, altitude, figure of merit, navigation system redundancy, TCAS status, and a time stamp.
- WCE reports will also send the "predicted route group" of data, which includes the position, time interval, and predicted altitude of the next waypoint in the FMS, as well as the position and predicted altitude of the next + 1 waypoint in the FMS.
- VRE reports will also send the "Earth reference group" of data, which includes the aircraft's vertical rate and the true track and ground speed.

C.5.2 Controller Pilot Data Link Communications (CPDLC)

A. CPDLC is a DLC application that allows for the direct exchange of text-based messages between a controller and a pilot.

B. CPDLC improves communication capabilities in oceanic areas, especially in situations where controllers and pilots have previously had to rely on a Third Party HF communications relay.

Note: CPDLC includes a set of clearance / information / request message elements which correspond to existing phraseology employed by current ATC procedures.

C. In airspace with VHF coverage, an ATSU may provide CPDLC service as a normal means of communication to alleviate frequency congestion or to enable the use of automation associated with the use of CPDLC. In such airspace, VHF voice communication is the alternative means of communication for CPDLC aircraft.

D. Generally, when a CPDLC aircraft is operating in an airspace beyond the range of VHF voice communications, CPDLC is available, and other local rules do not apply, then:

- CPDLC will be the normal means of communication; and
- Voice will be used as the alternative means of communication (for example direct HF, third party HF, SATCOM voice).

E. Apart from the direct link, CPDLC adds a number of other benefits to the ATS system, such as:

- Allowing the flight crew to print messages;
- Allowing messages to be stored and reviewed, as needed;
- Reducing flight crew-input errors by allowing the loading of information, such as route clearances or frequency change instructions, from specific uplink messages into other aircraft systems, such as the FMS or radios;
- Allowing the flight crew to downlink a complex route clearance request, which the controller can re-send when approved without having to type a long string of coordinates; and

- Specific uplink messages arming the FMS to automatically downlink a report when an event, such as crossing a waypoint, occurs. This automation assists with workload management for the flight crew and the controller.

C.5.2.1 CPDLC Departure Clearance (CPDLC-DCL)

A. CPDLC-DCL is the initial phase of US domestic airspace implementation of DLC and is limited to tower services. CPDLC-DCL provides automated assistance for requesting and delivering initial and revised departure clearances using CPDLC.

B. The supported information includes:

- Flight plan route;
- Climb via and/or initial/requested altitude;
- Beacon code assignment; and
- Departure frequency.

C. An unlimited number of clearances can be sent and, if aircraft systems are capable, can be "push-to-load" directly into the flight management system. The information is exchanged using CPDLC messages from those already used in FANS-equipped aircraft. The CPDLC-DCL service, when available, is designed for use in surface operations and replaces PDC for properly-equipped aircraft.

Note: CPDLC-DCL is different than current European and Asian DCL operations. European and Asian DCL use communication via ARINC 623 ACARS / EUROCAE ED-85A, not FANS / CPDLC.

D. CPDLC-DCL requires the equipage of FANS 1/A and VDL Mode 0/A compliant equipment.

E. An operational authorization may or may not be required to use CPDLC-DCL in the US. The crew must verify that such an authorization is held, if required, and must also have received acceptable training on the CPDLC-DCL ground system and how it interacts with the aircraft's avionics equipment.

C.5.3 CPDLC Versus ADS-C

A. CPDLC and ADS-C have a number of similarities:

- CPDLC and ADS are both DLC applications.
- In the airborne implementation they are both controlled by the FMS.
- While they are separate entities, and it is possible to have one without the other (the pilot can select ADS on and off independently), the reality is that an FMS unserviceability is likely to lead to the loss of both applications.
- Both applications accept messages from the ground system and return responses.
- Both applications are capable of initiating downlink reports based on messages from the ground system.
- It takes only one logon from the aircraft to allow a ground system to connect with both applications.

B. The connections established between an aircraft and a ground system differ for each of the applications.

C. CPDLC uses the concept of Data Authority. There can only be two Data Authorities, and therefore a maximum of two ATS units connected to the aircraft for CPDLC at any one time. However, as ADS does not use Data Authority, the maximum number of ADS connections is five: four external (ATSU) ADS connections plus one internal (AOC) connection.

D. The CPDLC connection has in-built integrity with a number of security mechanisms. The FANS-1/A ADS-C connection has no such security. If a suitably equipped ground station, perhaps a research facility or a competing airline, knows the ACARS address and tail number of a particular aircraft, an ADS connection can be established from anywhere on the globe.

E. Human Interaction

- CPDLC: Although the connections are established at a system level, the CPDLC application is a hands-on crew tool. The crew is aware of the ATS unit with the active connection; and they actively use the functionality to send response messages, request messages and reports. They are also aware of when a transfer from one ATSU to another has occurred.
- ADS-C: The flight crew can turn the ADS application on and off, and only the crew can initiate and cancel an emergency-reporting mode, but other than that, the ADS application generally operates without flight crew interaction. When a logon occurs, the ground system automatically establishes a series of contracts directly with the avionics. The contracts are generally defined off-line, but in some ground systems, the controllers are able to construct their own contract contents.

C.6.0 General Operational Considerations

A. Flight crews will operate all aircraft in accordance with the GOLD and the applicable AFM. In addition, prior to flight, crews will review the aircraft-specific section of this Appendix (e.g., C2, C3, etc.) for any unique operational considerations due to the specific aircraft equipment or features.

B. If any incident or event involving DLC occurs, then the Director of Aviation will ensure that the Event Reporting procedures in C.13.0 will be followed. The Director of Aviation will also ensure that lessons learned from such an event will be incorporated into the DLC training program, as appropriate.

C. If further unique operational considerations arise relevant to the routes being flown or the flight department DLC training program, this section will be further revised to account for additional Standard Operating Procedures (SOPs). Such considerations could include, but are not limited to:

- Route Environment Issues, such as peculiarities associated with a particular route that may involve either end-user application issues or communications performance issues;
- Procedural Issues, such as precautions that may be appropriate when operating in states where DLC policies are uncertain;

  Note: Flight crews will always conform to the laws and regulations that govern the airspace being used and use only authorized communications equipment and methods. The availability, use, and requirements for DLC systems will be confirmed by the PIC during preflight planning.
- Other unique DLC system issues, such as any differences in particular DLC systems, or their versions, that may have operational impact.

C.6.1 Preflight Procedures and Considerations

A. Prior to any flight in which DLC operations will be conducted, the PIC will verify that the aircraft is DLC-capable and has received and will carry any applicable operational authorizations. The PIC will also ensure that the Aircraft Discrepancy Log shows no open discrepancies affecting DLC equipment.

B. Prior to flight, crews will review all International NOTAMs, FIR information or bulletins, the ICAO website below, and any state-specific procedures that need to be accomplished as applicable to the areas to be overflown.

http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx

Note: In addition, all flight crews will be familiar with the Oceanic Errors Safety Bulletin (OESB) published by ICAO on the website above. If there is any doubt as to the content of the OESB, then the latest version will be downloaded and reviewed prior to any oceanic operations.

C. The following minimum equipment is required for DLC operations. The flight crew will verify availability of this equipment during preflight:

- In aircraft with a FANS-compliant DLC system:
  1. VHF, SATCOM, HF radios, and/or ADLU, as appropriate;
  2. ACARS DMU; and
  3. Flight Management Computers / Systems (FMC/S).
- In aircraft with an ATN-B1-compliant DLC system:
  1. VHF, SATCOM, HF radios, and/or ADLU, as appropriate; and
  2. ACARS DMU.

     Note: VHF DLC Radio in Data mode may be used in regions of VHF coverage.
- For operations within the domestic United States: En Route CPDLC clearances are available only to aircraft that meet the following criteria:
  1. Have a FANS-compliant DLC system;
  2. Are able to interact with the VDL M2 subnetwork using equipment that meets the equivalent of TSO-C160a or later (i.e., the system includes a tunable multi-frequency radio and CMU); and
  3. Are capable of “push-to-load” (i.e., the system can automatically load routing changes into the FMS).

     Note 1: Some systems are capable of “push-to-load,” but have issues with loading uplink message UM80. These aircraft can still receive US en route CPDLC clearances, but must file the appropriate “DAT/” code in Item 18 (reference paragraph F below).

     Note 2: Due to ongoing interoperability issues between the US CPDLC network and many CPDLC avionics, operators who wish to make use of en route CPDLC within the domestic US must be participants in the CPDLC trial being managed by L3Harris via the following URL: https://www.l3harris.com/datacomm Aircraft that meet the equipage requirements above, but which are not part of the trial, are ineligible for US domestic en route CPDLC.

D. VHF and SATCOM Availability: DLC functionality is provided via the VHF and SATCOM equipment. The aircrew should verify that both VHF (if operative and VHF coverage is available) and SATCOM functions are available.

Note: In some areas, the DLC system infrastructure may be limited or unreliable (e.g., lack of support via VDL), and a NOTAM may not be available to inform crews in advance. Accordingly, crews should check the aircraft AFM to confirm whether the aircraft’s system is capable of automatically bypassing a data source (e.g., use Satellite instead of VDL) or if they can manually select a data source.

E. Notification of Outages: Preflight and Enroute. Oceanic Centers will issue NOTAMS for planned or predicted system outages.

- Pilots should inform the active Oceanic Center if system outages are noted enroute (requiring reversion to back-up voice communication).
- DLC service providers will inform affected ATS units if a system outage is noted or planned for the network.
- Oceanic Centers will inform all affected aircraft and their Aeronautical Operations Control Centers of an unplanned outage and its expected duration.

F. Flight crews are responsible for inserting the following items in the ICAO flight plan:

- Item 10a
  - The letter “J” followed by the numeral 1 – 7 should be entered to indicate the CPDLC configuration installed in the aircraft, per the table below:

J1	CPDLC – ATN VDL Mode 2
J2	CPDLC – FANS 1/A HFDL
J3	CPDLC – FANS 1/A VDL Mode 0/A
J4	CPDLC – FANS 1/A VDL Mode 2
J5	CPDLC – FANS 1/A SATCOM (INMARSAT)
J6	CPDLC – FANS 1/A SATCOM (MTSAT)
J7	CPDLC – FANS 1/A SATCOM (Iridium)

  - The letter “P” followed by the numeral 1 – 2 should be entered to indicate the RCP capability of the aircraft CPDLC equipment, per the table below:

P1	CPDLC RCP 400
P2	CPDLC RCP 240

  - The letter “R” to indicate approval for Performance-Based Navigation (e.g., RNP-4). The inclusion of “R” in Item 10a also indicates that a description of the aircraft’s PBN capability will also be included in Item 18.

    Example: *J7M3RSWX*

- Item 10b: One or both of the descriptors on the following table to indicate the ADS-C surveillance capabilities of the aircraft.

D1	ADS-C with FANS 1/A capabilities
G1	ADS-C with ATN capabilities

  Example: *D1EU2*

- Item 18 (Remarks):
  - The letters PBN/ followed by the characters “L1” to indicate RNP-4 capability, in addition to any other PBN levels that can be met by the aircraft.

    Example: *PBN/A1B1C1D1L1O1*

  - When operating to, out of, or in the US, the letters DAT/ followed by the method in which the crew would like to receive a CPDLC-DCL, PDC, or en route CPDLC clearance:

1VOICE	Indicates that the aircraft is capable of receiving PDC or CPDLC clearances, but the crew wants to use voice only.
1PDC	Aircraft is capable of receiving a PDC and the crew wants a PDC only, regardless of whether or not aircraft is capable of using CPDLC for departure or en route clearances.
1FANS	Aircraft is capable of receiving a CPDLC-DCL and the crew wants a CPDLC-DCL only, regardless of aircraft capability for PDC or en route CPDLC clearances.

1FANS2PDC	Aircraft is capable of both CPDLC-DCL and PDC, but not US en route CPDLC, and the crew prefers CPDLC-DCL over PDC. Indicates that ATC will send CPDLC-DCL first and then use PDC only if FANS is unavailable.
1FANSE2PDC	Aircraft is fully capable of both PDC and all CPDLC clearances, with no UM80 load issues. Indicates that crew prefers CPDLC for departure clearance rather than PDC.
1FANSER2PDC	Aircraft is capable of both PDC and all CPDLC clearances, but has UM80 load issues. Indicates that crew prefers CPDLC for departure clearance rather than PDC.
1PDCFANSE	Aircraft is fully capable of both PDC and all CPDLC clearances, with no UM80 load issues. Indicates that crew either prefers PDC for departure, or airport is incapable of CPDLC-DCL.
1PDCFANSER	Aircraft is capable of both PDC and all CPDLC clearances, but has UM80 load issues. Indicates that crew either prefers PDC for departure, or airport is incapable of CPDLC-DCL.
FANSE	Aircraft is fully capable of all CPDLC clearances, with no UM80 load issues. Indicates that departure airport is incapable of either CPDLC-DCL or PDC.
FANSER	Aircraft is capable of all CPDLC clearances, but has UM80 load issues. Indicates that departure airport is incapable of either CPDLC-DCL or PDC.

- If the aircraft is exempt from the European ATN mandate for FL285 and above, and if operating to, out of, or in Europe, the entry "*CPDLCX*" must be included behind the "*DAT/*" entry in Item 18.
- The letters SUR/ followed by the RSP specifications the aircraft is capable of meeting, using designators with no spaces (except to indicate another RSP specification).

  Example: *SUR/ RSP180 RSP400*

• Inoperable Equipment: If the DLC equipment (e.g., SATCOM, VHF radios, etc.) is inoperable, crews must ensure no ICAO code relating to CPDLC capability is filed in Items 10 or 18 of the ICAO flight plan.

  Note: In addition, crews must not file a flight plan to operate in any area where CPDLC may be a requirement, such as NAT PBCS airspace.

G. ATS systems compare the registration number of the aircraft contained in Item 18 of the ICAO flight plan with the registration contained in the AFN logon. Flight crews are responsible for ensuring that the correct aircraft registration is filed in Field 18 of the ICAO flight plan.

H. Non-Compulsory Waypoints: Reporting by ADS-C only, the flight crew is not required to modify the route to remove non-compulsory waypoints. Waypoint event reports will be sent at all non-compulsory reporting points and will be reflected in the predicted route group.

C.6.1.1 MEL Considerations

A. The aircraft Minimum Equipment List includes provisions for DLC equipment and operations.

B. Prior to each flight, the flight crews will confirm that all DLC-required equipment is serviceable, or that the applicable MEL procedures have been followed.

C.6.1.2 Departure Clearance (DCL) Procedures

A. Logon may be completed anytime during preflight operations. Within 30 minutes of the proposed departure time an "*ATC Connection Established*" message will be received by the aircraft if the logon information was correctly formatted, there is an ATC filed flight plan on file, the aircraft has been indicated as DCL capable via the flight plan, and the ATC controller has approved the DCL.

Note: If the initial attempt to logon fails, crews should ensure that a flight plan is on file and verify the logon information is correct, then attempt one additional logon. If the second logon attempt fails, the crew should revert to voice for the departure clearance.

B. Once a successful ATC connection has been established and the departure clearance has been approved by the controller, it will be available for the crew's request.

Note: When making a DCL request, do not add any free text to the downlink page. If any free text information is added, the ground system will send an auto reply message indicating "*MESSAGE NOT SUPPORTED BY THIS ATS UNIT*."

C. The available responses to ATC to a DCL are *ACCEPT*, *REJECT/UNABLE*, and *STANDBY*.

- The flight crew should *ACCEPT* the clearance when:
  - The FMS indicates that the clearance has been successfully loaded and no discontinuities exist; and
  - No clarification from ATC is required.
- The flight crew should *REJECT/UNABLE* the clearance when:
  - The FMS indicates that it cannot load the clearance; or
  - The FMS indicates any inconsistencies or discontinuities with the route modification that are not addressed by AIPs or local procedures and the flight crew is unable to resolve the clearance.

    Note: Voice should be used to clarify a clearance due to any loading failures or route discontinuities or inconsistencies. If equipped, the ATC Review Page or displayed full route clearance may be used to resolve the clearance in lieu of voice.
- The flight crew should select *STANDBY* when a timely response is not practical.

D. Termination of CPDLC-DCL Services

1. ATC Initiated Termination While Airborne: After takeoff, crews can expect an automated ATC initiated disconnect 5-10 minutes after takeoff.
2. Flight Crew Initiated CPDLC Logoff
   a. If the flight crew elects to disconnect, or the CPDLC session is terminated by the controller while on the ground, all subsequent DCL services with ATC clearance delivery will be handled via voice. Accepted CPDLC clearances will remain in effect for that flight unless amended by ATC via voice.
   b. For the DCL service, the automated ATC disconnect after takeoff may be adjusted for local airspace requirements for flight crew sterile periods.

E. Crews are reminded to logon to the next FIR when transitioning to the oceanic environment. The Tower Data Link System (TDLS) does not have controller-to-controller handoff capability. If the flight is still connected to the TDLS, the flight crew will have to disconnect / terminate the session before the oceanic controller can accept the logon.

C.6.2 Inflight Considerations

A. Although DLC may be used in preference to or as a supplement to voice communications, the use of DLC does not alleviate the requirement to monitor VHF/HF communications, nor does it alleviate any VHF / HF equipage requirements. Crews must ensure that VHF / HF equipment remains operable per the MEL and any Operation Specifications (e.g., RNP-10, PBN, etc.) applicable to the flight.

B. The flight crew should verify operation of these functions throughout the flight:

- VHF DLC, when in a region with VHF coverage;
- Transition to SATCOM when exiting VHF coverage;
- Transition to VHF when entering a VHF region.

Note: If using SATCOM exclusively, VHF operation is not applicable.

C. Flight crews must make a report to ATC via HF radio when media switching (e.g., excessive VHF/SATCOM or SATCOM/HFDL switching) causes system performance to degrade below that which is required for the intended operation. The priority for ATC data links is VHF, SATCOM, and finally HF.

D. DLC is intended to serve as either a primary or supplementary communication means as designated for the operations being conducted. For DLC to work as designed, prompt and correct initiation response to DLC advisories is important. Flight crews will operate within the following guidelines:

- Prompt initiation of messages where needed;
- Prompt response to messages where appropriate (e.g., RCP-240);
- Appropriate crew coordination so that each crewmember receives pertinent information needed;
- Appropriate retention of messages (archive) requiring later action;
- Appropriate resolution of message uncertainty;
- Appropriate use of DLC and voice, respectively, where circumstances or operations dictate (e.g., voice for backup or clarification of non-normal situations); and
- If an ATC DLC clearance contradicts a voice clearance, flight crews will comply with the voice clearance and query the controller.

E. To preclude unnecessary communication and possible interference with ground facilities, DLC should be used only in conjunction with facilities specified for the route or procedure to be flown. DLC with facilities other than the designated ground facility should be accomplished only as necessary to support flight plan or flight operations requirements.

F. Free text DLC messages should be avoided. If it is necessary to send a free text message, write it in English and use standard aeronautical terminology and accepted abbreviations.

C.7.0 ATS Facilities Notification (AFN) Logon

A. An initial logon request is necessary when the aircraft does not already have a connection (e.g., during departure, when leaving an area where DLC is not supported and entering an area where DLC is supported, or when instructed by ATC). The appropriate ATC unit's four-character ICAO identifier will be entered and the request will include the aircraft identification, aircraft registration and/or address, and departure / destination airports.

Note 1: Crews must ensure the logon information exactly matches that which is included in the flight plan, including the aircraft registration / address (Item 18).

Note 2: The identifiers for the OCAs are listed in the table in Appendix C.14.0 of this appendix.

B. If DLC is supported at the departure airport, crews should logon prior to takeoff. Otherwise, crews should initiate a logon request 10 to 25 minutes prior to entering the FIR where DLC will be used (15 to 25 minutes in the case of Reykjavik CTA).

Note: If no logon is detected by the ATSU prior to the oceanic boundary, ATC will be alerted and a late revision to the oceanic entry profile could occur.

C. Crews must verify that the logon is accepted.

Note: For some aircraft operating on the ATN network, the contact complete message will indicate a positive result even though the logon response from the ATSU indicates failure.

D. When the aircraft is south of 82° North, an initial logon request is required regardless of whether or not ATS surveillance is provided. CPDLC provides redundancy and ATC may use CPDLC for communication even though the pilot is maintaining a continuous air / ground communication watch on the assigned VHF frequency.

Note 1: At and north of 82° North, DLC services cannot be guaranteed for aircraft equipped with Inmarsat SATCOM due to limitations in satellite coverage. However, this does not prevent flights from trying to establish a data link connection. Such limitations do not apply to aircraft equipped with Iridium SATCOM.

Note 2: 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.

C.7.1 CPDLC Connections

A. ATSUs will manage CPDLC connections to ensure that wherever possible the active CPDLC connection is held by the ATSU with responsibility for the flight. The ATSU with an active CPDLC connection is referred to as the Current Data Authority (CDA) and an ATSU with an inactive CPDLC connection is referred to as a Not current Data Authority (NDA).

B. Aircraft may be connected with another ATSU or sector on occasions such as:

- When an aircraft is transiting a CPDLC serviceable FIR subject to coordination between ATSUs;
- During the CPDLC connection transfer process;
- Where the active connection is retained by the transferring ATSU subject to prior coordination;
- When the aircraft is within a non-serviceable or non-CPDLC FIR and logs on to the ATSU responsible for the next FIR; or
- In emergency circumstances.

Note: Care must be taken by the ATSU not to issue clearances or instructions to a flight via CPDLC when it is under the control of another sector/ATSU.

C. If a connection or transfer issue is identified, the controlling ATSU will normally try a reset of the connection by requesting the logon be recycled, even though the aircraft may indicate that the connection is working normally. Despite indications in the cockpit of the correct CDA, 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 can be maintained.

C.7.2 Abnormal / Non-Routine Behavior

When the flight crew recognizes abnormal behavior of the CPDLC connection, the flight crew should terminate the connection and initiate a new AFN logon with the current ATSU.

C.8.0 CPDLC Messages

C.8.1 CPDLC Message Format

A. CPDLC messages are comprised of one or more specific message elements, most of which correspond to radio phraseology. Each message element contains some or all of the following: fixed text, variable text, or free text.

B. Free text capability is given to exchange information not available in the defined (fixed or variable) formats. Free text is used by ATC and/or the crew, when necessary, to give additional information not defined by a preset message element.

C. Messages are referred to as "uplink" messages when sent to the aircraft, and as "downlink" messages when sent by the aircraft. Uplink message elements are prefixed with "UM" and downlink messages are prefixed by "DM."

D. Each message element is associated to:

- A message element identifier, including a UM/DM prefix and number, that uniquely identifies the element within the message set;
- A response attribute that defines whether or not a response is required and, if so, what type of response; and
- An alert attribute.

C.8.2 Message Sets

A. There are three CPDLC message sets, depending on which data link system is being used: FANS, ATN, and FANS-ATN. Although many messages are equivalent, Appendix A of the GOLD should be consulted for a thorough comparison of each set.

<u>Note</u>: The FANS-ATN message set is the equivalent of the ATN message set, either through the use of free text message elements and/or other message elements that are operationally equivalent.

B. The message set in use will depend on the aircraft and ground system capabilities as indicated below:

		Aircraft System		
		FANS	***ATN***	***FANS-ATN***
Ground System	***FANS***	FANS	(n/a)	FANS
	ATN	(n/a)	ATN	ATN
	FANS-ATN	FANS-ATN	ATN	ATN or FANS-ATN

C. All CPDLC message sets are based on ICAO Doc 4444. Appendix A of the GOLD provides recommendations for free text message content whenever free text is used to provide the operational equivalent of a standard message element from Doc 4444.

C.8.3 Uplink Messages

A. Uplink messages are CPDLC messages sent by an ATC center to the aircraft.

- Uplink messages are comprised of one or more message elements in accordance with the CPDLC message format (e.g., CLIMB TO AND MAINTAIN [altitude]).
- The scratchpad message INVALID ATC UPLINK is displayed if an uplink message is received that is determined to be invalid and not usable or displayable to the crew.

B. <u>Uplink Message Response</u>: Uplink messages specify a response type for each of the message elements contained in an uplink message. The type of the uplink message element determines the response message types available to the pilot. Examples of response messages are WILCO, STANDBY, and UNABLE.

C.8.3.1 Flight Crew Response Times for Uplinked Messages

A. System performance requirements have been established to support reduced separation standards. Specific latency times have been allocated to the technical performance, based on flight crew and controller response times. Regional monitoring agencies monitor performance to ensure the technical and operational components of the system meet required standards.

B. To support RCP 240 operations, the crew should respond to an uplink message within 1 minute. When operating on the ATN network, crews should respond within 100 seconds.

Note: Transmission times for messages may vary for a number of reasons including the type of transmission media, network loading, or the criteria for transitioning from one medium to another, e.g., VHF / SATCOM. Operational response times may vary depending on workload and complexity of the instruction or clearance.

C. For most uplinks, the flight crew will have adequate time to read and respond within one (1) minute. However, the flight crew should not be pressured to respond without taking adequate time to fully understand the uplinked message and to satisfy other higher priority operational demands.

D. If the flight crew determines they will need a significant amount of time to respond to a message, they should send a *RSPD-3 STANDBY* response.

E. If the flight crew has sent a STANDBY response, they should provide a closure response to the uplink within a reasonable period of time, e.g., five (5) minutes, or as required.

Note: The uplink message remains open. If the flight crew does not subsequently respond, the controller will query the flight crew.

C.8.3.2 Common Predefined Free Text Uplink Messages

<table>
<tr><th>Predefined Uplink Text</th><th>Reason ATC Would Uplink</th><th>Crew Action</th></tr>
<tr><td>DIVERGENCE FROM ATC ROUTE AFTER NEXT WAYPOINT IS DETECTED. CHECK FMS</td><td>Out of conformance of NEXT+1 waypoint contained within ADS-C report.</td><td>Check loaded routing, and confirm if any changes have been made.</td></tr>
<tr><td>YOUR POSITION REPORT INDICATES INCORRECT ROUTING. CHECK FULL DEGREES AND MINUTES LOADED INTO FMC.</td><td>Out of conformance contained within ADS-C report.</td><td rowspan="4">Check full degrees and minutes loaded to ensure no half or whole degree latitude errors, and report deviations from route to ATC immediately.

Immediately display the full DEGREES and MINUTES loaded into the FMC for the NEXT waypoint and verify against the cleared route.</td></tr>
<tr><td>CONFIRM ASSIGNED ROUTE DOWNLINK OUT OF CONFORMANCE.</td><td>Route contained within “CONFIRM ASSIGNED ROUTE” downlink out of conformance.</td></tr>
<tr><td>CHECK FMS AND CORRECT ACTIVE WAYPOINT</td><td>Incorrect Sequence (after Weather Dev, the ADS track is moving backward)</td></tr>
<tr><td>ADS-C DEVIATION DETECTED. VERIFY AND ADVISE.</td><td>ADS-C Present Position is off-route</td></tr>
<tr><td>ADS-C ESTIMATES APPEAR INACCURATE. CHECK FMS</td><td>Estimate for next waypoint contained in ADS differs from ATS Unit estimate</td><td>Confirm latest estimate for next Waypoint to ATS Unit</td></tr>
<tr><td>CONFIRM ASSIGNED ROUTE</td><td>Request to confirm assigned route</td><td>Respond to the uplink. If an anomaly occurs that prevents the pilot from responding, send free text “UNABLE TO SEND ROUTE”</td></tr>
</table>

Predefined Uplink Text	Reason ATC Would Uplink	Crew Action
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.

C.8.4 Downlink Messages

Downlink messages are CPDLC messages sent by the aircraft to an ATC center. Downlink messages are comprised of one or more message elements.

- Downlink message elements are encoded and validated in accordance with the preset CPDLC message format (e.g., “REQUEST CLIMB TO [altitude]”).
- The downlink message is time stamped with the GNSS UTC time. If GNSS time is not available, FMS time is used.
- If the aircraft is flying an offset path and the downlink message contains any of the following message elements: ASSIGNED ROUTE, NEXT WAYPOINT, ENSUING WAYPOINT, or POSITION REPORT, the downlink message also includes the following message: “DEVIATING [distance offset] and [direction] OF ROUTE” (e.g., “DEVIATING 3NM NORTH OF V58”).

C.8.5 Message Element Identifiers

CPDLC messages are indicated by the following four-character message element identifiers, along with the specific reference number indicated in the GOLD (e.g., LVLU-3). The corresponding downlink message sets, which include appropriate responses, are listed next to the uplink message identifiers.

Uplink Message Identifiers		Downlink Message Identifiers	
Route	*RTEU*	Route	*RTED*
Lateral	*LATU*	Lateral	*LATD*
Level	*LVLU*	Level	*LVLD*
Crossing Constraint	*CSTU*	(n/a – No corresponding downlink set)	
Speed	*SPDU*	Speed	*SPDD*
Air Traffic Advisory	*ADVU*	Air Traffic Advisory	*ADVD*
Voice Communications	*COMU*	Voice Communications	*COMD*
Spacing	*SPCU*	Spacing	*SPCD*
Emergency / Urgency	*EMGU*	Emergency / Urgency	*EMGD*
Standard Response	*RSPU*	Standard Response	*RSPD*
Supplemental	*SUPU*	Supplemental	*SUPD*
Free Text	*TXTU*	Free Text	*TXTD*
System Management	*SYSU*	System Management	*SYSD*

C.8.6 Message Status

A. Uplink Message Status: The following table, Uplink Message Status, lists the message display, status and status description of uplink messages.

Display Text	Status	Description
NEW	Pending	The message has not been viewed (XXXXz ATC Uplink page for the message has not been accessed). Note that a message is no longer new as soon as the uplink page for the message is accessed and displayed on the CDU; therefore, the UPLINK page does not display the NEW status (LOG page only).
OLD	Closed	The message has been reviewed by the pilot and the message does not require a response.
OPEN	Pending	The message has been reviewed by the pilot, the message requires a response, a closure response has not been sent (STANDBY is not a closure response) or, a closure response has been sent, and a network acknowledgement for that closure response has not been received.
ACCEPTED	Closed	The message has been reviewed by the pilot, the message requires a response, a positive closure response is sent, and a network acknowledgement to that closure response has been received.
REJECTED	Closed	The message has been reviewed by the pilot, the message requires a response, a negative closure response has been sent, and a network acknowledgement to that closure response has been received.
ABORTED	Closed	The message was pending when both CPDLC connections were terminated.

B. Downlink Message Status: The following table, Downlink Message Status, lists the message display, status and status description of uplink messages.

Display Text	Status	Description
SENDING	Pending	The SEND or RESEND prompt has been selected, a network acknowledgement for the corresponding message has not been received and the network acknowledgement timer for the corresponding message has not expired.
SENT	Closed	The SEND or RESEND prompt has been selected, a network acknowledgement for corresponding message has been received, and the message does not require a response.
OPEN	Pending	The SEND or RESEND prompt has been selected, a network acknowledgement for corresponding message has been received, the message requires a response, and a response has not been received or a STANDBY response has been received.

Display Text	Status	Description
DEFERRED	Pending	The SEND or RESEND prompt has been selected, a network acknowledgement for the corresponding message has been received, the message requires a response, and a REQUEST DEFERRED response has been received.
RESPONSE RCVD	Closed	The SEND or RESEND prompt has been selected, a network acknowledgement for the corresponding message has been received, the message requires a response, and a response other than REQUEST DEFERRED or STANDBY has been received.
ABORTED	Closed	The message was pending when both CPDLC connections were terminated or when a transfer of control was performed.
NO ACK	Closed	The SEND or RESEND prompt has been selected, and a network acknowledgement for the corresponding message has not been received prior to expiration of corresponding network acknowledgement timer.

C.9.0 Position Reporting

A. To harmonize waypoint position reports by either voice or data, the “Position” and “Next Position” shall only contain compulsory reporting points unless requested otherwise by ATC. The “Ensuing Significant Point” may be either the compulsory or non-compulsory reporting point after the “Next Position.”

B. Downlink of Position Report: CPDLC connection exists in a procedural, non-ADS-C environment; pilots shall ensure that position reporting is conducted via CPDLC. A CPDLC position report shall be sent manually by the pilot whenever an ATC waypoint is passed over, (or passed abeam when offset flight is in progress). ATC expects position reports based on downlink message POSITION REPORT.

C. Flexible Track Position Reports: Waypoints published for an independent flex track or User Preferred Route (UPR) are compulsory reporting points. However, when the track follows a published ATS route, position reports are not required at any non-compulsory waypoints defined for that ATS route.

D. First Position Report: Pilots shall downlink a CPDLC position report (ATC waypoint) to the next ATSU after the completion of:

1. An initial CPDLC connection (when inbound from an area not providing CPDLC services), or during a connection transfer;
2. Either when the CPDLC connection transfer has been completed; or at the associated FIR boundary.

   Note: This position report is required whether or not there is an ADS-C contract in place. It serves as confirmation that the receiving center is the current ATC Authority.

E. Sending of ATC Waypoints Only: Additional non-ATC waypoints may be sequenced by the FMS, however, information relating to these waypoints is not of interest to ATC. It is the pilot’s responsibility to report only at ATC waypoints.

F. Non-Receipt of a Scheduled Position Report: If a scheduled position report is not received via CPDLC, the use of voice communication by the controller is not mandatory. The controller may obtain the report by uplinking message REQUEST POSITION REPORT.

G. CPDLC Report at FIR Entry Position: When an ATSU has nominated the use of ADS-C reporting only within the associated FIR, a CPDLC position report at the FIR entry position is still required to confirm that the ATSU holds the status of current ATC Authority. Following the initial CPDLC report at the boundary, no further CPDLC or voice position reports will be required for operations within the FIR.

H. If a scheduled CPDLC position report is not received, the controller may request the report by uplinking message REQUEST POSITION REPORT.

C.9.1 Conditional Clearances

A. Conditional clearances require special attention by the flight crew. Each flight crewmember will independently read the uplinked clearance and conduct briefings with augmented crews. In addition, each flight crewmember will independently review and then discuss downlink messages prior to sending them to comply with the clearance.

Note: If there is any confusion resulting from conflicting CPDLC and voice clearance instructions, flight crews will obtain clarification using voice.

B. The Director of Aviation will ensure that the DLC training and qualification program clearly addresses use of words “AT” or “BY” as used in conditional clearances.

C.9.2 “EXPECT” Uplinks

A. ATC may uplink an EXPECT message when responding to a flight crew request (e.g., “*WHEN CAN WE EXPECT*”) or when procedurally required to advise the crew of an upcoming modification to the crew’s clearance or connection. However, the use of “EXPECT” does not constitute a clearance.

B. The Director of Aviation should ensure that crews are trained not to execute an *EXPECT* message as if it were a clearance. The training should include procedures, consistent with ICAO standards, for handling *EXPECT* messages in the event of a total communication failure (loss of data and voice).

C.9.3 Weather Deviations and Offsets

A. The flight crew may use CPDLC to request a weather deviation clearance or an offset clearance. The difference between a weather deviation and an offset are portrayed in Figure 1 below.

- A weather deviation clearance authorizes the flight crew to deviate up to the specified distance at their discretion in the specified direction from the route in the flight plan.

  Entry: *REQUEST WEATHER DEVIATION UP TO* [direction] [distance offset].

- An offset clearance authorizes the flight crew to operate at the specified distance in the specified direction from the route in the flight plan. A clearance is required to deviate from this offset route.

  Entry: *REQUEST OFFSET* [direction] [distance offset]

  Note: CPDLC offers more timely coordination of weather deviation clearances. However, the flight crew may deviate due to weather under the provisions of ICAO Doc 4444, paragraph 15.2.3. The extent to which weather deviations are conducted may be a consideration when applying reduced separations.

B. Flight crews should use the correct message element when requesting an off route clearance.

Note: The difference between a weather deviation and an offset affects how ATC separate aircraft.

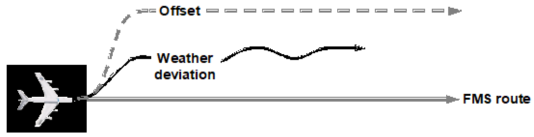


Figure 1 - Offset and Weather Deviation

C. Weather Deviation Requests and Offsets: When requesting a weather deviation or offset clearance, the flight crew should specify the distance off route with respect to the cleared route of the aircraft. If the flight crew has received an off-route clearance and then requests and receives a subsequent off-route clearance, the new clearance supersedes the previous clearance (i.e. only the most recent clearance is valid).

D. Deviations Either Side of Route: When requesting a deviation on either side of route, the crew should request a weather deviation left and right of the route using *LATD-2 REQUEST WEATHER DEVIATION UP TO* [lateral deviation] *OF ROUTE*.

E. Reduced Lateral Spacing: Crews must be aware of reduced lateral separation that may be applied in airspace where CPDLC has been implemented. For example, some NAT Tracks apply half-degree spacing, which will become a standard for the entire NAT region. Rapid communication must be made so that ATC can notify traffic on parallel tracks of deviations.

Note: Weather deviations in reduced lateral separation environments (e.g., NAT Tracks) requires strict adherence to the procedures posted in ICAO Doc 4444 Chapter 15, *Procedures Related to Emergencies, Communication Failure, and Contingencies*.

C.9.3.1 Reporting Back on Route

A. When the flight crew no longer needs the deviation clearance and is back on the cleared route, the flight crew should send the report *LATD-4 BACK ON ROUTE*.

B. If during the weather deviation, the flight crew receives a clearance to proceed direct to a waypoint, and the flight crew accepts this clearance, the aircraft is considered to be on a cleared route. Therefore, the flight crew should send the *LATD-4 BACK ON ROUTE* report after they execute the “direct to” clearance.

C. If the aircraft is off route on a weather deviation clearance and proceeding direct to a waypoint on the cleared route, the flight crew should not send the *LATD-4 BACK ON ROUTE* report until they have sequenced the waypoint on the cleared route.

Note: If a *LATD-4 BACK ON ROUTE* report is received while the aircraft is still off-route, the incorrect information provided to ATC may affect the separation standards in use. Alternatively, the flight crew may consider requesting a clearance direct to the waypoint upon receipt of the uplink clearance.

C.9.4 Report of Turbulence Information by CPDLC

A. When reporting turbulence information via CPDLC, aircraft should downlink in the following form by free text message: “[MOD or SEV] TURB [location of observation] [altitude of observation] [time of observation] Z”

B. The aircraft should report location of observation in the following form. When observing turbulence continuously, the aircraft is able to report location of observation in the following form: "[*beginning location of observation*] [*end location of observation*]".

- FIX, e.g., "NIPPI" ;
- Distance and radial from FIX, e.g. "20NM SW NIPPI";
- Latitude and longitude, e.g. "4020N14532E";
- When observing turbulence continuously, e.g. "RIPKI GARRY."

C. When observing turbulence while cruising, the aircraft is able to report by omitting altitude of observation. When observing turbulence continuously while climbing or descending, aircraft should report altitude of observation in the following form: "[lower limit altitude of observation] [upper limit altitude of observation]", e.g. "*FL330 FL350*."

D. When reporting turbulence information within five (5) minutes after observing, aircraft is able to report by omitting time of observation.

E. Examples of downlink messages:

- "SEV TURB 35N160E FL330 0924Z"
- "MOD TURB 20NM N ASEDA 35NM S ASEDA FL350 1152Z"
- "MOD TURB NIPPI 2114Z"
- "SEV TURB 3530N15451E FL370 FL390 0304Z"
- "SEV TURB POXED FL320"
- "MOD TURB CELIN"

C.9.5 Operational Differences Between Voice Communications and CPDLC

A. Development, testing, and operational experience have highlighted fundamental differences between CPDLC and voice communications. These differences need to be considered when developing or approving flight crew procedures involving the use of CPDLC.

B. For example, when using voice communications, each flight crewmember hears an incoming or outgoing ATS transmission. With voice, the natural ability for each flight crewmember to understand incoming and outgoing transmissions for their own aircraft has provided a certain level of situational awareness among the flight crew.

Note: With CPDLC, flight crew procedures need to ensure that the flight crew has an equivalent level of situational awareness associated with understanding the content and intent of a message in the same way.

C. Each flight crewmember [e.g. Pilot Flying (PF) and Pilot Monitoring (PM) – communicating] will independently review each CPDLC uplink prior to responding and/or executing a clearance that it may contain and each CPDLC downlink message prior to transmission.

D. When using augmented crews, procedures include instructions to flight crew carrying out ‘handover’ briefings. The flight crewmember carrying out the ‘handover’ briefing will thoroughly brief the ‘changeover’ flight crew or flight crewmember on the status of ADS-C and CPDLC, including a review of stored uplink and downlink CPDLC messages.

E. Uplink messages require special attention to prevent the flight crew from accepting a clearance but not complying with that clearance.

- When ATC sends an uplink message to an aircraft that is ACCEPTED by the flight crew, ATC expects the flight crew to comply with the clearance.

  Note: ACCEPT is displayed in lines 1R, 2R, or 3R when a response to the uplink message is required and WILCO, ROGER, or AFFIRM are valid responses. The uplink message status must not be ACCEPTED, REJECTED, or ABORTED in order for the ACCEPT prompt to be displayed. Selection of ACCEPT results in a downlink response message reflecting a positive response.

- An effective method for minimizing errors for CPDLC uplink messages is for each flight crewmember to read the uplinked message independently (silently) before initiating a discussion about whether and how to act on the message.
- Reading a message independently is a key element to ensure that each flight crewmember does not infer any preconceived intent different from what is intended or appropriate. Use of this method can provide a flight crew with an acceptable level of situational awareness for the intended operations.

F. In a similar manner, CPDLC downlink messages should typically be independently reviewed by each applicable flight crewmember before the message is sent.

Note: Having one flight crewmember (e.g. the Pilot Monitoring) input the message and having a different flight crewmember (Pilot Flying) review the message before it is sent promotes an adequate level of situational awareness, comparable to or better than when using voice transmissions.

G. The flight crew should coordinate uplink and downlink messages using the appropriate flight deck displays. Unless otherwise authorized, the flight crew should not use printer-based information to verify CPDLC messages as printers are not usually intended for this specific purpose.

Note: Printers may be used for other purposes in CPDLC operations, such as for archiving CPDLC messages.

C.9.5.1 When to Use Voice and When to Use CPDLC

A. When operating within airspace where CPDLC is available and local ATC procedures do not state otherwise, CPDLC should be the primary means of communication. Voice should be used as the backup communication medium (e.g. direct VHF, direct HF, third party HF, Satellite voice).

B. While the CPDLC message set provides for ATC communications, voice may be a more appropriate means depending on the circumstances.

C. During an emergency, the flight crew would normally revert to voice communications. However, the flight crew may use CPDLC for emergency communications if it is either more expedient or if they are unable to establish voice contact.

D. The response to a CPDLC message should be via CPDLC, and the response to a voice message should be via voice.

E. If a conflicting CPDLC and voice clearance / instructions is received, the flight crew should obtain clarification using voice.

F. If the intent of an uplinked message is uncertain, the flight crew should reject (UNABLE) the message. The flight crew may use either CPDLC or voice to confirm the intent of the message.

G. Regardless of whether CPDLC is being used as the primary means for communication, the flight crew should continuously monitor VHF guard frequency.

H. In addition, the flight crew should continuously maintain a listening or SELCAL watch on the specified backup or secondary frequency (frequencies).

C.10.0 Regional and / or State Differences

Flight crews must reference ICAO Doc 7030, *Regional Supplementary Procedures*, as well as any applicable State AIPs for any regional and/or state differences for DLC operations. The information provided in this section is for general reference and does not reflect an exhaustive list of all possible region-specific procedures.

C.10.1 Voice Communication Procedures – North Atlantic Region

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

B. Prior to or upon entering each NAT oceanic CTA, the flight crew should contact the appropriate radio station.

C. If the flight enters an oceanic CTA followed by another oceanic CTA, the flight crew should on initial contact:

- Not include a position report;

- After the radio operator responds, request a SELCAL check and state the next CTA; and
- The radio operator will assign primary and secondary frequencies, perform the SELCAL check and designate the position and frequencies to contact the radio station serving the next CTA.

  Note: If the communications instructions are not issued at this stage, the crew should assume that the frequencies to use prior or upon entering the next CTA will be delivered at a later time by CPDLC or voice.

D. If the flight enters an oceanic CTA followed by ATS surveillance airspace, the flight crew should follow the procedures described above with the exception that the next CTA should not be stated.

E. Depending on which DLC services are offered in the CTA and the operational status of those services, the radio operator will provide appropriate information and instructions to the flight crew.

F. In the event an onboard systems failure prevents CPDLC or ADS-C or if any of these services is terminated, the flight crew should:

- Resume normal voice communications, including providing all subsequent position reports via voice;
- Not inform the radio station that the service has been terminated; and
- Inform AOC in accordance with established problem reporting procedures.

G. For ADS-C flights, the flight crew should not submit position reports via voice to reduce frequency congestion, unless requested by the radio station or ATC.

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

I. For any inquiries regarding the status of ADS-C connections, the flight crew should use CPDLC. Should the ATSU fail to receive an expected position report, the controller will follow guidelines for a late or missing ADS-C report.

J. When leaving DLC airspace, the flight crew should comply with all communication requirements applicable to the airspace being entered.

K. If the flight crew does not receive its domestic frequency assignment by ten (10) minutes prior to the flight's entry into the next CTA, the flight crew should contact the radio station and request the frequency, stating the current CTA exit fix or coordinates.

C.10.2 "Set Max Uplink Delay Value" Prompts

A. Some aircraft may not have FMSs with latency monitoring capability, or otherwise do not meet the latency monitoring requirements to comply with PBCS. For this reason, in areas where PBCS is or will be implemented, the potential exists for pilots to act on a CPDLC uplink message that has been delayed in the network (e.g., to execute a clearance that is no longer valid).

B. As a means of mitigating risk, ATC may send the message "*SET MAX UPLINK DELAY VALUE TO* [delayed message parameter] *SEC.*" After receiving this message, the crew will:

1. Send a positive response to ATC as prompted by the avionics (e.g., "*ACCEPT*"), **regardless of whether or not the aircraft supports the latency monitor**.

   Note 1: It is important that pilots respond to this message to avoid having open unanswered CPDLC messages in the system. This also applies to aircraft that have deficient message latency monitor functionality or no such functionality at all.

   Note 2: Crews should append the response downlink with the free text message "*TIMER NOT AVAILABLE*" when the message latency monitor function is not available.

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

   Note: If an aircraft is instructed to log off and then log on again mid-flight, ATC may send the message again once the logon is completed.

C. If the crew receives a CPDLC uplink message with an indication that the message has been delayed, the crew will:

1. Revert to voice communications to notify the ATS unit of the delayed message received and to request clarification of the intent of the CPDLC message; and
2. Respond appropriately to close the message as per the instructions of the controller.

   Note 1: The pilot must not act on the delayed uplink message until clarification has been received from the controller.

   Note 2: If a random clearance (e.g., a change in FL) is received without requesting one, crews should check the time stamp in the message to ensure it is logically relevant.

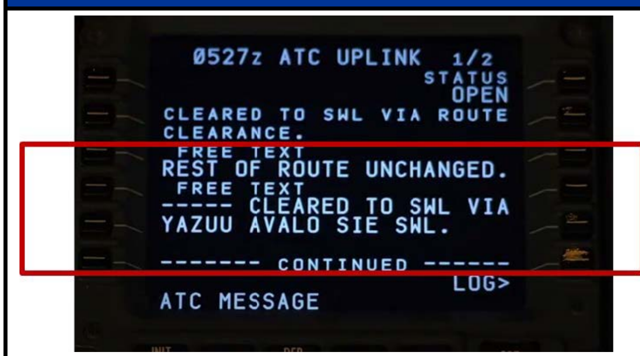
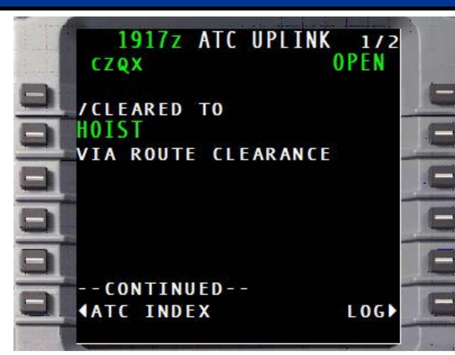
D. The "*SET MAX UPLINK DELAY VALUE*" message has been implemented throughout the NAT, and each ANSP will send the message. Crews may receive this message multiple times when transiting multiple OCAs.

Note: In all NAT OCAs, the delay value is specifically requested as 300 seconds.

C.10.3 US Domestic En Route CPDLC

A. Operators who wish to utilize CPDLC en route in US continental airspace must be aware of the additional equipment and trial participation requirements described in Appendix C.6.1.

B. Crews also need to be aware that the FAA's domestic flight data processing systems automatically add free text messages containing the entire cleared route to all route clearance change messages. This allows pilots to more readily see and understand the given change. This is in contrast to oceanic systems, which will display a clearance change but may have the full details of the cleared route under a separate screen or menu. Refer to the example below:

US Domestic Uplink With Free Text Automatically Appended	Oceanic Uplink Without Free Text
	
Note that the full route clearance is readily visible ("*CLEARED TO SWL VIA YAZUU AVALO SIE SWL*").	Note that the message indicates "*VIA ROUTE CLEARANCE*" but does not specify the route. This message is not a clearance to proceed direct to HOIST. Instead the pilot must advance to the next screen and select the "*ATC CLNC*" prompt to view the full route clearance details.

Source: FAA (Advisory Circular 91-70C)

C.11.0 Non-Routine Procedures

C.11.1 ADS-C

A. In the event an onboard systems failure prevents ADS WPR or if the service is terminated proceed with the following:

1. If the failure/termination occurs prior to initial contact with the aeradio station, do not use the phrase "A-D-S", after the aircraft callsign;
2. Resume normal voice communications, including providing all subsequent position reports via voice; and
3. Do not inform aeradio that the service has been terminated.

B. Should ATC fail to receive an expected ADS WPR they will request a voice.

C. Flight crews should not insert non-ATC waypoints (e.g. mid-points) in cleared oceanic flight legs, as it will result in transmission of unwanted ADS reports. Non-ATC waypoints may prevent the provision of proper ETA data in the ADS reports required for ATC purposes.

C.11.2 CPDLC

A. When the Next ATC Authority delivery has not been successful, the controller should send a second Next ATC Authority message. If this is also unsuccessful, the controller should then instruct the flight crew to manually terminate the CPDLC connection and then initiate an AFN logon with the subsequent ATSU. An END SERVICE message is not needed in this case.

B. The controller should use the following messages via CPDLC. When using voice, use the equivalent voice phraseology:

Controller	CONTACT [unit name] [frequency] SELECT CPDLC OFF then LOGON TO [facility designation]
Flight crew	WILCO

Note 1: The [facility designation] is the relevant four character ICAO code.

Note 2: Instructing the flight crew to select CPDLC OFF will result in loss of CPDLC connectivity. This procedure should only be applied approaching the FIR boundary with the next ATSU.

C. If the controller at the ATSU initiating the transfer receives indication that the AFN logon to the Next ATC Authority is not successful, the controlling ATSU should reinitiate address forwarding with the next ATSU. The controlling ATSU should not re-send the Next ATC Authority message regarding related ATC automation

D. The controlling ATSU should:

- Coordinate with the next ATSU, establishing clearly when or where the address forwarding will have to occur.
- Time the AFN contact advisory to allow the next ATSU to establish an active CPDLC connection prior to the aircraft's crossing the common boundary.

E. If an ATSU requires confirmation that they are the active center, then the ATSP should develop procedures to ensure that this confirmation can be obtained if no CDPLC downlink is received from the aircraft as it crosses the common boundary. This confirmation may take the form of:

- Receipt of a ROGER in response to a [free text] uplink message; or
- Receipt of a position report in response to a REQUEST POSITION REPORT message.

C.12.0 Emergency Operation

C.12.1 Emergency Procedures - ADS-C

A The emergency mode can only be activated by the pilot and is normally cancelled by the pilot. While it is possible for some ground systems to cancel the emergency mode status, most ground systems do not have this capability although some ground systems can control the “display” of the emergency mode status to the controller.

B. When the ADS emergency mode is activated without a voice confirmation, and the demand contract report appears to indicate that the aircraft is maintaining normal operations (e.g. the aircraft is not in descent or involved in abrupt maneuvers), the aircraft may be subject to unlawful interference.

C. To check for covert or inadvertent activation of the ADS emergency mode the free text uplink “Confirm ADS” shall be appended to a “Confirm Speed” data or voice request:

Data or Voice	
Controller	Confirm Speed
	Confirm ADS
Pilot	ADS Reset

C.12.2 Emergency Procedures - CPDLC

A. In accordance with established procedures, the ATSU within whose airspace the aircraft is operating remains in control of the flight. If the flight crew takes action contrary to a clearance that the controller has already coordinated with another sector or ATSU and further coordination is not possible in the time available, then the flight crew performs this action under their emergency command authority.

B. The flight crew will use whatever means are appropriate, i.e., CPDLC and/or voice, to communicate during an emergency.

C. During an emergency, a controller would normally expect the flight crew to revert to voice communications. However, the flight crew may use CPDLC for emergency communications if it is either more expedient to do so or if they are unable to establish voice contact.

C.12.3 Voice Communications

A. When CPDLC fails and the flight crew reverts to voice communications, they should consider all open messages not delivered and re-commence any dialogues involving those messages by voice.

B. The flight crew should use the standard voice phraseology, as required.

C. Voice communication procedures related to DLC operations are not standardized among the regions.

<u>Note:</u> As part of the preflight planning process, flight crews will reference regional / state-specific information in Appendix E of the Global Operational dataLink Document (GOLD).

C.12.4 DLC System Failures

A. The flight crew should inform the ATSU for aircraft failure resulting in degraded performance below what is required, e.g. RCP 240, as well as SATCOM failure.

B. When the flight crew has been notified that the DLC service has shut down, they should terminate the CPDLC connection and use voice until informed by the ATSU that the DLC system has resumed normal operations.

C. <u>DLC Status Description</u>

NOCOMM	The CMF indicates that all DLC paths have failed.

FAILED	Communications between the FMS and CMF have failed.
VOICE	The only link available is VHF and the VHF is currently in voice mode.

D. In the event of an aircraft DLC system failure, the flight crew should inform the ATSU of the situation using the following voice phraseology:

Flight crew	DATA LINK FAILED. SELECTING CPDLC OFF. CONTINUING ON VOICE
Controller	ROGER. CONTINUE ON VOICE

Note: The flight crew should continue to use voice until the functionality of the aircraft system can be re-established.

E. If only the ADS-C service is terminated, then during that time period, the flight crew should conduct position reporting (via CPDLC, if available, or via voice).

F. If the ATSU cannot establish ADS-C contracts with an aircraft, or if ADS-C reporting from an aircraft ceases, the flight crew may have inadvertently switched ADS-C off. If CPDLC is still available and the flight crew receives the free text message, "CONFIRM ADS-C ARMED," they should check to ensure that ADS-C is not switched off and respond to the controller.

C.12.4.1 Reporting of System Failure for NAT PBCS Airspace

A. Since DLC is a required system for operations in NAT PBCS airspace, crews must be aware that a failure of the CPDLC system also constitutes non-compliance with NAT PBCS.

B. If the system fails prior to departure, crews must remain clear of NAT PBCS airspace.

C. If the system fails after departure, but prior to entry in NAT PBCS airspace, crews must notify ATC and request a revised clearance to remain clear of NAT PBCS airspace.

D. If the system fails after entering NAT PBCS airspace, crews must notify ATC immediately. ATC will either re-clear the flight to exit NAT PBCS airspace or allow the flight to remain in the airspace based on tactical considerations.

C.13.0 DLC Event Reporting and PBCS Monitoring

A. ISPACG maintains a web portal at http://www.fans-cra.com/ that is intended to be used as the central DLC event reporting platform. Target Corporation has an account on this website and will primarily utilize this account for event reporting as well as monitoring of aircraft PBCS performance.

B. The Director of Aviation will send any DLC non-normal event reports to the applicable Data Link Monitoring Agency (DLMA). Primarily this will be accomplished via the web portal noted above; however, if necessary, an alternate means of reporting will be completed using the sample form in Appendix C.13.2 and the contact information in Appendix C.13.3 or ICAO Doc 10037.

C. In addition to ISPACG's web portal, the Director of Aviation will ensure that Target Corporation participates in any other DLC and PBCS monitoring and reporting programs that may apply.

D. If any substandard performance is reported, regardless of the agency that has reported it, the Director of Aviation will coordinate efforts with the Director of Maintenance and/or flight crews (as needed) to address such a report and ensure mitigating actions are taken.

E. The event identification and resolution process, as it applies to an individual problem, consists of a data collection phase, followed by problem analysis and coordination with affected parties to secure a resolution, and recommendation of interim procedures to mitigate the problem in some instances.

F. DLC-Specific Reports

1. Upon query from ATC, or after an inadvertent deviation from an ATC clearance, make radio communications as appropriate to report the event. Refer to the Aeronautical Information Manual (*Section 4, ATC Clearances*) for guidance regarding recommended phraseology.
2. Reports concerning DLC anomalies, procedural difficulties, or system failures typically are made through one or more of the following methods:
   - Pilot/observer questionnaire;
   - Logbook entry;
   - ACARS; or
   - Other formats preferred by individual pilots.
3. Any exceptional DLC-related events regarding NAS performance should be reported to the FAA.
4. Special DLC Events (defined below) should be reported to the FAA as soon as possible.
5. In addition, any DLC Event Report will be forwarded to the appropriate DLMA as soon as possible.

   Note: The web portal at http://www.fans-cra.com/ can be used to submit event reports online. The Director of Aviation will submit all reports and will share any news or updates to crews. If required, unique operational considerations will be incorporated into this manual in accordance with the procedures in Appendix C.6.0.

G. Reports Incidental to DLC.

1. Near Mid-Air Collision (NMAC) Reports: Flight crews should continue to submit NMAC reports in accordance with existing policies and procedures.

   Note: There is no requirement to submit an NMAC report due solely to a DLC event.
2. Aviation Safety Reporting System (ASRS) Reports: ASRS Reports may be filed at the discretion of the flight crew in accordance with the procedures described in Section 2 of this *International Operations Procedures Manual*.
3. Maintenance Reports: Maintenance department personnel should make DLC-related reports as necessary. Reports of frequent or systematic DLC problems that may relate to system performance, manufacturers, and/or DLC vendors should be submitted to the FAA, as appropriate.

C.13.1 Special DLC Events

A Special DLC Event is one or more of the following occurrences or situations related to DLC operations:

- In-flight traffic conflicts or potential conflicts as determined by a flight crew member in which use of a DLC service is suspected to be contributing cause.
- Near Mid-Air Collisions (NMAC) in which the use of a DLC service is suspected to be a contributing cause.
- DLC system performance below that of normal operation or required by the operational procedure (e.g., RCP 240).
- ATC operational error involving the use of DLC associated with a DLC procedure or operation.
- Other occurrences or situations in which use of a DLC service is suspected to compromise continued operational safety. Loss of standard ATC separation resulting from a procedure or maneuver where a DLC transaction, failure, or unmonitored error is suspected to be a factor.
- Use of the DLC service that caused excessive crew workload.

- A DLC service that provides reasonable information but is subsequently verified to be erroneous.
- An excursion of 500 feet or more from an assigned flight level / altitude, or a lateral / longitudinal deviation exceeding ATC minimum separation criteria in which use of a DLC service is suspected to be a contributing cause.

C.13.2 Sample DLC Event Reporting Information

Reference Number			
Title			
Date		**Time (UTC)**	
Registration		**Flight Identifier**	
Departure and Arrival Airports		**Aircraft Type**	
Active Center		**Next Center**	
Position			
Describe the Event:			

C.13.3 Contact Information

Group	Contact Information
Central Reporting Agency Website (Used by NAT, SOPAC, NOPAC, and Asian DLC Monitoring Agencies)	http://www.fans-cra.com/
EUROCONTROL Data Link Central Reporting Office Website (European DLC Monitoring Agency)	https://ext.eurocontrol.int/WikiLink/index.php/Main_Page
NAT Communications, Navigation and Surveillance Group (CNSG) – General	**Elkhan Nahmadov** Phone: +33 1 4641 8529 Fax: +33 1 4641 8500 Email: icaoeurnat@icao.int mailto:icaoeurnat@paris.icao.int

Group	Contact Information
NAT CNSG – Operations	**Shelley Bailey** Operational System Requirements Phone: +1-709-651-5240 Fax: +1(709) 651 5235 Email: bailesh@navcanada.ca **Pedro Vicente** Operational System Requirements – Domestic Phone: +1(613) 248 -6965 Email: vicentpe@navcanada.ca
NAT CNSG – Engineering	**Tim Murphy** Team Leader, Engineering Operations Support Phone: +44 1292 692 772 Fax: +44 1292 692 640 Email: tim.murphy@nats.co.uk
Informal South Pacific ATC Coordinating Group (ISPACG)	**Paul Radford** Manager Oceanic Systems, Airways New Zealand Phone: +64 9 256 8078 Fax: +64 9 275 3106 Email: paul.radford@airways.co.nz
EUROCONTROL DLC Services Central Reporting Office	**Soren Dissing** Coordination Manager Phone: +32 2729 3446 Email: soren.dissing@eurocontrol.int

C.14.0 Data Link Performance Improvement Options

A. Crews should consult NAT Ops Bulletin #2019-003 via the URL below (Navigate to the "NAT Documents" folder and then "NAT Ops Bulletins") for a detailed list of recommendations to address known and common data link system deficiencies:

https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx

B. Although this Bulletin was prepared with NAT operations in mind, the recommendations will help to ensure smooth data link operations worldwide. Therefore, these recommendations still apply in non-NAT oceanic airspace as well.

C. A general summary of the Bulletin's recommendations is provided below:

Problem / Issue	Solution / Recommendation
Next-on-busy (HFDL): Some avionics contain a feature called "next-on-busy" which sends a downlink HF message when outside of VHF coverage and SATCOM is busy, instead of waiting for SATCOM to finish. In most cases, this will actually reduce performance, as it will be faster to send both messages via SATCOM.	1. Set the HF to "Voice-Only" mode, if available. 2. Discuss a software update with the manufacturer to disable "Next-on-busy" or provide an option to turn it off.

Problem / Issue	Solution / Recommendation
VHF to SATCOM Transition: Performance can be reduced when transitioning from VHF to SATCOM, especially when repeated transitions occur in a short period of time, due to ACARS protocols being designed to maximize the use of VHF.	1. Disable VHF data link just prior to entering oceanic airspace (e.g., place VHF radio into voice-only mode) and re-enable upon exiting oceanic airspace. Caution: In the event of an oceanic diversion, crews may need to re-enable VHF to provide ACARS functionality. 2. In avionics that offer the ability to prioritize specified subnetworks in defined geographic regions, implement more precise VHF region definitions that exclude areas with intermittent VHF coverage. (Known problematic areas include: North Pacific near Aleutian Islands and Kamchatka Peninsula, South Pacific near New Caledonia and Vanuatu, North Atlantic near Bermuda and Azores.) 3. Install the ARINC 618 RAT1 timer, if cost- and time-effective.
Ack-and-toss: Some avionics will, for various reasons, acknowledge receipt of a FANS uplink but then fail to deliver the message.	Check with the manufacturer for any applicable FMS and/or CMU software updates that may prevent this behavior.
Insufficient HF Performance: HF datalink performance has not been demonstrated to meet RCP240 and RSP180, although for various reasons the avionics may send FANS downlink messages via HF rather than SATCOM or VHF.	Disable HF data link (e.g., place the HF radio into voice-only mode).
Internetworking: Some problems can be caused by ineffective internetworking when different CSPs are used for different subnetworks (e.g., VHF and SATCOM).	When possible, use the same global CSP for both VHF and SATCOM.
Large Pilot Operational Response Time (PORT) Values: PORT refers to the human portion of the transaction time involved in equipment performance. Large PORT values reduce overall performance.	Ensure crews are responding to CPDLC messages with "*STANDBY*" when appropriate (Refer to Appendix C.8.3.1).
Maximizing access to Classic Aero Ground Earth Station (GES) Services: In the Inmarsat SATCOM system, there are multiple paths available via ground stations and satellites. If one path fails, the aircraft may be able to switch to another path.	Ensure the Operator Requirement Table (ORT) for the aircraft's SATCOM avionics is properly setup to optimize accessibility to GES resources. Consult the SATCOM manufacturer for more information.

Problem / Issue	Solution / Recommendation
Unknown Causes	Submit a problem report to the DLMA at www.fans-cra.com in accordance with the procedures in Appendix C.13.0.
Software Updates: Various performance issues are progressively addressed via FMS and/or CMU software updates.	Check with the manufacturer for any available software updates and ensure the avionics are updated at least to the levels recommended in NAT Ops Bulletin #2019-003.

C.15.0 ICAO and ADNS FIR/OCA Addresses

Note: ICAO and seven-character (ADNS) FIR/OCA addresses are listed in the following table. An individual FIR/OCA may issue multiple ADS contracts. This table includes known operational systems, but may not include all operating regions.

FIR	Country	ATS Provider	Applications Available	AFN Logon	ADNS Address
Abidjan	Cote d'Ivoire	ASECNA	CPDLC, ADS	DIII	
Accra	Ghana		CPDLC, ADS	DGAC	
Alger ACC	Algeria	ENNA	Trial CPDLC, ADS	DAAA	
Amazon FIR	Brazil	DECEA	CPDLC	SBAZ	
Anchorage / Anch. Arctic	USA	FAA	CPDLC	PAZA	ANCXFXA
Anchorage Continental	USA	FAA	CPDLC, ADS	PAZN	ANCATYA
Antananarivo	Madagascar	ASECNA	CPDLC, ADS	FMMM	
Antofagasta	Chile	DGAC Chile	Trial CPDLC, ADS	SCEZ	
Atlantico	Brazil	DECEA	CPDLC	SBAO	
Auckland	New Zealand	ACNZ	CPDLC, ADS	NZZO	AKLCDYA
Bangkok	Thailand	Aerothai	CPDLC, ADS	VTBB	BKKGWXA
Barcelona UIR	Spain		CPDLC	LECB	
Beijing	China	CAAC	CPDLC, ADS	ZBAB	BJSGWYA
Bodo	Norway	Avinor	ADS	ENOB	DDLCVXA
Bordeaux UAC	France		CPDLC	LFBB	
Brasilia FIR	Brazil	DECEA	CPDLC	SBBS	
Brazzaville	Congo	ASECNA	CPDLC, ADS	FCCC	
Brest UA			CPDLC	LFRR	

FIR	Country	ATS Provider	Applications Available	AFN Logon	ADNS Address
Brindisi FIR	Italy		CPDLC	LIBB	
Brisbane	Australia	Air Svcs Aus	CPDLC, ADS	YBBB	BNECAYA
Bucuresti FIR	Romania		CPDLC	LRBB	
Budapest FIR	Hungary		CPDLC	LHCC	
Cairo	Egypt	EHAC	CPDLC, ADS	HECC	CAICDYA
Canary Is	Spain	AENA	CPDLC	GCCC	LPAFAYA
Capetown	South Africa	S Africa ATNS	CPDLC, ADS	FACT	
Cayenne	French Guyana	DGAC DSNA	CPDLC, ADS	SOOO	
Chengdu	China	CAAC	CPDLC, ADS	ZUUU	CTUGWYA
Chennai	India	AAI	CPDLC, ADS	VOMF	MAACAYA
Colombo	Sri Lanka	AASL	CPDLC, ADS	VCCC	CMBCAYA
Curitiba FIR	Brazil	DECEA	CPDLC	SBCW	
Dakar	Senegal	ASECNA	CPDLC, ADS	GOOO	
Delhi	India	AAI	ADS	VIDF	
Edmonton	Canada	NAV Canada	ADS	CZEG	YEGCDYA (ADS) YEGE2YA (CPDLC)
Finland UIR	Finland		CPDLC	EFIN	
Fukuoka	Japan	JCAB	CPDLC, ADS	RJJJ	FUKJJYA
Gander Domestic	Canada	NAV Canada	CPDLC	CDQX	YQXD2YA
Gander Oceanic	Canada	NAV Canada	CPDLC, ADS	CZQX	YQXE2YA
Geneva ACC	Switzerland	Skyguide	CPDLC	LSAG	
Guanzhou	China	CAAC	CPDLC, ADS	ZGGG	CANGWYA
Harbin	China	CAAC	CPDLC, ADS	ZYHB	HRBGWYA
Hellas	Greece		CPDLC	LGGG	
Ho Chi Minh	Vietnam		CPDLC, ADS	VVTS	SGNGWXA
Hong Kong	HK China	CAD	CPDLC, ADS	VHHH	HKGCCYA
Honiara	Australia	Air Svcs Aus	CPDLC, ADS	YBBB	BNECAYA
Isla de Pascua	Chile	DGAC Chile	Trial CPDLC, ADS	SCEZ	
Jakarta	Indonesia	APII	CPDLC, ADS	WIII	JAKGWXA

FIR	Country	ATS Provider	Applications Available	AFN Logon	ADNS Address
Johannesburg	South Africa	ATNS	CPDLC, ADS	FAJO	JNBCAYA
Karlsruhe	Germany	DFS Deutsche	CPDLC	EDUU	
Kobenhavn	Denmark		CPDLC	EKDK	
Kolkata	India	AAI	CPDLC, ADS	VECF	CCUCBYA
Kuala Lumpur	Malaysia	DCA Malaysia	CPDLC, ADS	WMFC	
Kunming	China	CAAC	CPDLC, ADS	ZPPP	KMGGWYA
Lanzhou	China	CAAC	CPDLC, ADS	ZLLL	LHWGWYA
Lhasa	China	CAAC	CPDLC, ADS	ZULS	LXAGWYA
Lisboa UIR	Portugal		CPDLC	LPPC	LISACYA
Ljubljana FIR	Slovenia		CPDLC	LJLA	
London UIR	England		CPDLC, ADS	EGTT	SOUCAYA
Maastricht	Netherlands / Belgium	Eurocontrol	CPDLC, ADS	EDYY	MSTEC7X
Madrid UIR	Spain		CPDLC	LECM	
Magadan	Russia	Russia FAA	CPDLC, ADS	GDXB	GDXGWXA
Malta UIR	Malta		CPDLC	LMMM	
Manila	Philippines	ATO	CPDLC, ADS	RPHI	MNLCBYA
Marseille UAC	France		CPDLC	LFMM	
Mauritius	Mauritius	DCAM	CPDLC, ADS	FIMM	MRUCAYA
Melbourne	Australia	Air Svcs Aus	CPDLC, ADS	YMMM	MELCAYA
Memphis	USA	FAA	Trial CPDLC, ADS	KMEM	
Milano ACC	Italy		CPDLC	LIMM	
Moncton	Canada	NAV Canada	CPDLC	CZQM	YQME2YA
Montreal	Canada	NAV Canada	CPDLC	CZUL	YULE2YA
Mumbai	India	AAI	CPDLC, ADS	VABF	BOMCAYA
N'Djamena	Chad	ASECNA	CPDLC, ADS	FTTT	
Nadi	Fiji	Apts Fiji Ltd	CPDLC, ADS	NFFF	NANCDYA
Nairobi	Kenya	KCAA	CPDLC, ADS	HKNA	
Nauru	Nauru	Air Svcs Aus	CPDLC, ADS	YBBB	BNECAYA
New York	USA	FAA	CPDLC, ADS	KZWY	NYCODYA

FIR	Country	ATS Provider	Applications Available	AFN Logon	ADNS Address
Newark	USA	FAA	Trial CPDLC, ADS	KEWR	
Niamey	Niger	ASECNA	Trial CPDLC, ADS	DRRR	
Nicosia FIR	Cyprus		CPDLC	LCCC	
Oakland	USA	FAA	CPDLC, ADS	KZAK	OAKODYA
Oslo FIR	Norway		CPDLC	ENOS	
Padova ACC	Italy		CPDLC	LIPP	
Papeete	French Polynesia	STNA, SEAC	CPDLC, ADS	NTTT	
Paris UAC	France		CPDLC	LFFF	
Praha FIR	Czech Republic		CPDLC	LKAA	
Puerto Monit	Chile	DGAC Chile	Trial CPDLC, ADS	SCEZ	
Punta Arenas	Chile	DGAC Chile	Trial CPDLC, ADS	SCEZ	
Recife FIR	Brazil	DECEA	CPDLC	SBRE	
Reims UAC	France		CPDLC	LFEE	
Reykjavik	Iceland	ICAA	CPDLC, ADS	BIRD	REKCAYA
Rhein UIR	Germany		CPDLC	EDUU	
Riga UIR	Latvia		CPDLC	EVRR	
Riyadh	Saudi Arabia	GACA	CPDLC, ADS	OERK	
Roma FIR	Italy		CPDLC	LIRR	
Santa Maria	Portugal	NAV Portugal	CPDLC, ADS	LPPO	SMACAYA
Santiago	Chile	DGAC Chile	Trial CPDLC, ADS	SCEZ	
Scottish UIR	Scotland		CPDLC, ADS	EGPX	PIKCAYA
Seoul	Korea	KAA	CPDLC, ADS	RKTT	SELCAXH
Seychelles	Seychelles	Seychelles	CPDLC, ADS	FSSS	
Shanghai	China	CAAC	CPDLC, ADS	ZSSS	SHAGWYA
Shannon UIR	Ireland	IAA	CPDLC, ADS	EISN	
Shanwick	UK	UKNATS	CPDLC, ADS	EGGX	PIKCPYA
Singapore	Singapore	CAAS	CPDLC, ADS	WSJC	SINCXYA

FIR	Country	ATS Provider	Applications Available	AFN Logon	ADNS Address
Sofia FIR	Bulgaria		CPDLC	LBSR	
South Atlantic	Cabo Verde	ASA Cabo	CPDLC, ADS	GVSC	
Sweden UIR	Sweden		CPDLC	ESAA	
Tahiti	Tahiti	STNA	CPDLC, ADS	NTTT	PPTCDYA
Tallinn UIR	Estonia		CPDLC	EETT	
Tashkent	Uzbekistan		CPDLC, ADS	UTTT	TASCAXH
Ujung Pandang	Indonesia	PAP-I	Trial CPDLC, ADS	WAAF	UPGCAYA
Ulan Bataar	Mongolia	DCA	CPDLC, ADS	ZMUA	ULNGWXA
Urumqi	China	CAAC	CPDLC, ADS	ZWWW	URCGWYA
Vancouver	Canada	NAV Canada	CPDLC	CZVR	YVRE2YA
Vilnius UIR	Lithuania		CPDLC	EYVC	
Warszaw FIR	Poland		CPDLC	EPWW	
Wien FIR	Germany		CPDLC	LOWW	
Winnipeg	Canada	NAV Canada	CPDLC	CZWG	YWGE2YA
Yangon	Myanmar	DCA Myanmar	Trial CPDLC, ADS	VYYF	
Zagreb FIR	Croatia		CPDLC	LOZO	
Zurich ACC	Switzerland	Skyguide	CPDLC	LSAZ	

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Appendix D: North Atlantic RCL Procedures

Introduction

A. The abbreviation RCL was formerly used as shorthand for a "Request for Clearance," i.e., a request for an Oceanic Clearance prior to entering the North Atlantic.

B. Although an Oceanic Clearance is no longer required to enter the North Atlantic, crews must still provide their ETA, intended Flight Level, and speed to ATC prior to oceanic entry.

C. This transmission, whether by voice or ACARS, will continue to be known as an "RCL."

Prior to Oceanic Entry

A. Send the RCL message prior to the OEP as follows:

OCA	Prior to OEP
Gander	90-60 minutes
Shanwick	90-30 minutes
Santa Maria	At least 40 minutes
Bodo	At least 20 minutes
Reykjavik	No earlier than 20 minutes
New York	N/A – RCL Not Required

Note 1: (Gander) Flights departing from airports less than 45 minutes flying time from the OEP should send the RCL 10 minutes prior to start-up.

Note 2: (Reykjavik) Due to coverage limitations, aircraft equipped with Inmarsat data link won't be able to send an RCL message via ACARS data link when north of 82 N. Aircraft equipped with Iridium and/or HF ACARS should be able to send the RCL via ACARS regardless of location.

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

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

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

    Example: Requesting FL360 – enter free text *MAX F360*

C. Voice must be used to submit an RCL message if:

- The aircraft is not capable of ACARS data link;
- ACARS is not operational;
- ETA for OEP is less than 30 minutes (other than Reykjavik);
- The aircraft receives the message *RCL REJECTED*; or
- No response to the RCL is received within 15 minutes of sending it.

D. The following response message to the RCL will be generated automatically and delivered to the aircraft via ACARS or voice, as appropriate:

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

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

Note 1: There will be no clearance sent via the traditional ACARS method. Flight crew must fly the current flight plan or as amended by ATC (what is loaded in the FMS).

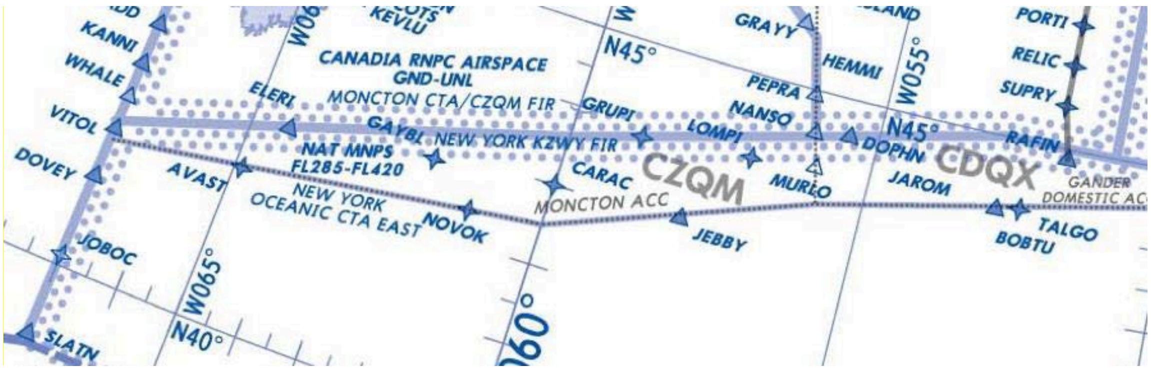
Note 2: If ATC cannot accept the requested OEP altitude, the closest oceanic FL to the one requested (RCL) will be determined and a clearance to climb or descend issued prior to the OEP. The "MAX FL" will never be violated.

Note 3: Flight crews are reminded that a change in FL, Speed or Route can be requested at any time after the OEP.

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

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

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



Source: ICAO NAT Doc #007, Version 2024-1

Oceanic Route Change Prior to the OEP

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

B. Route amendments are the number one scenario leading to GNEs. Pilots must be particularly cautious when receiving a route amendment.

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

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

Shanwick

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

1. An oceanic route different from the current flight plan (what is loaded in the FMS) is necessary due to traffic; or

2. Shanwick ATC considers it appropriate to do so, to ensure the most efficient oceanic route and Flight Level.

   Note: Instruction to contact by voice will be no later than 30 minutes prior to the OEP.

Route Conformance Checking (After Passing OEP)

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

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Appendix E: Overwater Calculations

Equal Time Points

ETP is a geographical position along the route of flight where the time to return to the departure / last suitable airport with an emergency is equal to the time required to proceed to the destination / first suitable airport. The ETP for loss of pressurization may not be the same as the ETP for one engine failed. The ETP is used during the flight as a quick reference to determine which way to go in the event of an engine failure or loss of pressurization.

- A failure prior to the ETP would require a return to the departure / last suitable airport to arrive at an airport of landing in the shortest amount of time.
- A failure after the ETP would indicate a landing at destination / first suitable airport is better in terms of time and fuel usage.

The worst possible point for an engine failure / loss of pressurization is at the ETP. Fuel / oxygen considerations should be referenced during preflight planning. It is important to note that electing to return or continue from the ETP is based on one-engine-out performance at a lower altitude. Engine-out TAS and altitudes (winds) must be used in calculating the ETP.

Distance from the last suitable airport along your route to the ETP is found from:

CR-3

$$\frac{\text{ETP}}{\text{GS(R)}} = \frac{\text{TD}}{\text{GS(R)} + \text{GS(C)}}$$

OR

Electronic Calculator Method

$$\text{ETP} = \frac{\text{TD} \times \text{GS(R)}}{\text{GS(R)} + \text{GS(C)}}$$

- **TD** is total distance for the flight from departure / last suitable airport to destination / first suitable airport.
- **GS(R)** is the groundspeed from the ETP back to the departure point / last suitable airport based on winds and TAS at best one-engine-inoperative / loss-of-pressurization altitude.
- **GS(C)** is the groundspeed from the ETP to the destination / first suitable airport based on winds and TAS at best one-engine-inoperative / loss-of-pressurization altitude.

The time to return to departure point / last suitable airport and the time to continue to destination / first suitable airport can be found from:

CR-3

$$\frac{\text{ETP (NM)}}{\text{Time to ETP (Min)}} = \frac{\text{GS(R)}}{60}$$

On the North Atlantic oceanic routes, the aircraft may be closer to a third airport, for example, Reykjavik, Iceland - BIRK rather than Gander, Canada - CYQX or Shannon, Ireland - EINN. When a third airport is involved (Figure A1), the ETP between the departure (last suitable airport - CYQX) and the third airport (BIRK) and between the third airport and the arrival (first suitable airport - EINN) should be calculated.

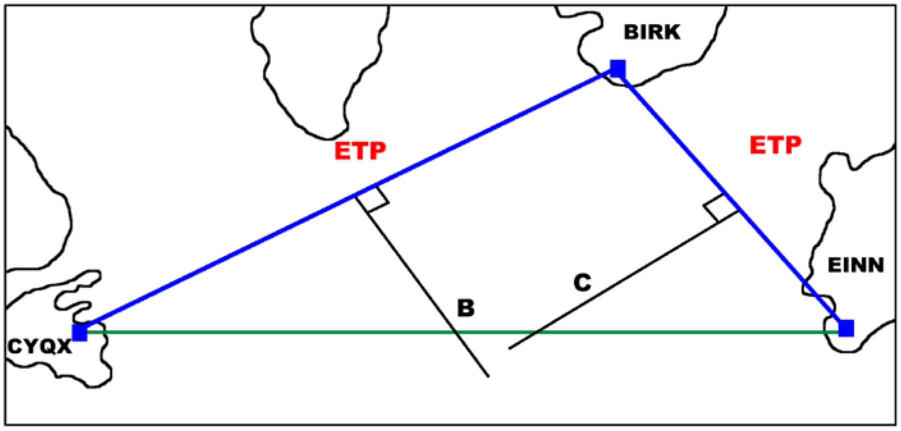

Figure A1 Third Usable Airport

1. Plot the Great Circle (straight line) route between CYQX and BIRK and also between BIRK and EINN.
2. Plot both ETPs and draw perpendicular lines through the course line.
   - If the perpendicular lines cross the course line before they intersect, then CYQX is closer (Fig. A1).
   - Also between Point B and Point C, BIRK is closer, and between Point C and EINN, EINN is closer.
   - If the perpendicular lines cross prior to reaching the course line (Fig. A2), the aircraft is never closer to BIRK.

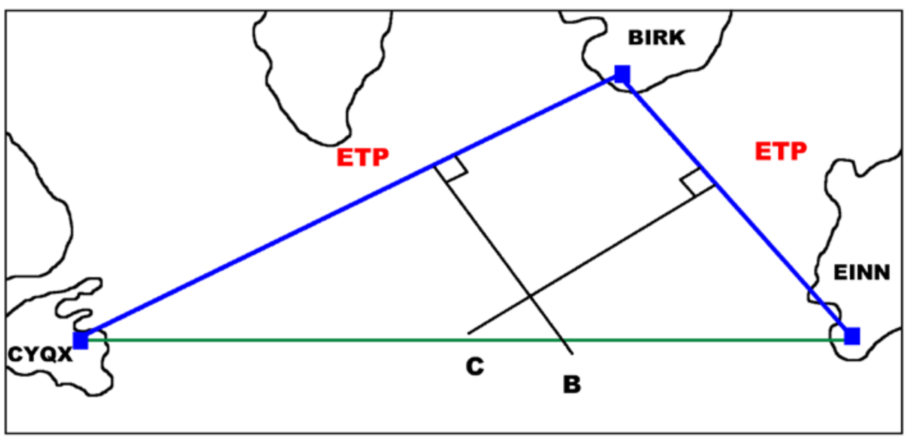

Figure A2 Third Unusable Airport

Note: Although the above example references the North Atlantic Region, other areas, such as the North Pacific Region, can also benefit from the evaluation of a third usable airport.

Point of Safe Return (PSR)

The Point of Safe Return is the farthest point to which the aircraft can go and return safely to the departure point with holding, departure alternate, and approach and landing fuel remaining.

The time and distance to the PSR can be found from:

CR-3

$$\frac{GS(R)}{t} = \frac{GS(R) + GS(C)}{T}$$

OR

Electronic Calculator Method

$$t = \frac{GS(R) \times T}{GS(R) + GS(C)}$$

- **GS(C)** is groundspeed outbound to PSR.
- **GS(R)** is groundspeed returning from PSR.

- **T** is the total actual takeoff fuel in minutes minus the safety fuel described above.
- **t** is time to PSR in minutes.

Note: GS(C) + GS(R) is sometimes written as 2 x TAS since the wind factors cancel each other out.

The distance to the PSR is found from:

$$\frac{\textbf{PSR (NM)}}{\textbf{T}} = \frac{\textbf{GS(C)}}{\textbf{60}}$$

Determining If a Flight Qualifies as EDTO / ETOPS

Extended Diversion Time Operations (EDTO), known in the US as “Extended Operations” (ETOPS), refers to flight operations in which the flight time to an alternate airport exceeds the threshold(s) permitted by aviation authorities, and for which specific aircraft capability and crew authorization is required. The threshold varies depending on the definitions set by the authorities. For example, a flight under US CFR Part 135 is designated as ETOPS if the aircraft will be more than 180 minutes from an adequate airport, as calculated per the airplane’s one-engine-inoperative cruise speed under standard conditions in still air.

Target Corporation will not conduct EDTO / ETOPS flights. The process below can be used to calculate whether or not a route would fall under the category of EDTO / ETOPS, using the example threshold of 180 minutes defined by US CFR Part 135.

Note: US CFR Part 91 does not prescribe a definition for EDTO / ETOPs, nor is such an authorization available. As such, EDTO / ETOPS does not apply. However, crews should still take this process into consideration during flight planning to ensure the safest route is used.

1. Determine the one-engine inoperative cruise speed for aircraft.
   - Assume departing at max gross weight and normal fuel burn to SE ETP still air and standard temperatures. Use aircraft weight at this point to determine max one-engine inoperative altitude and cruise speeds from AFM drift down and SE cruise speed tables.
   - Note that one-engine-inoperative cruise speed will vary greatly based on weight so take into account the reduction in weight and increase in speed over the 180 minute cruise to calculate the average KTAS.
2. Determine number of miles the aircraft can fly in 180 minutes at the speed calculated above.
   - Calculate this by multiplying speed in KTAS by 3 to get distance in NM.
3. Create a world map by drawing a ring around all suitable airports where the NM radius from each airport is the number of miles calculated in step two above. This will show all areas that the aircraft may operate without requiring ETOPS authority (i.e., the non-ETOPS operational area for that airplane).
4. For a specific routing, draw a ring around the departure, any en-route, and arrival airports where the radius is the number of miles calculated in step two above.

Example: KBFI - PHOG, using KSTS as diversion airport

5. Ensure that flight routing will remain at all times within areas drawn in step three above.

   Note: If during preflight planning it is found that the airplane will be greater than 180 minutes from an adequate airport due to winds (or other non-standard conditions), you may still conduct the flight without ETOPS authorization under Part 135.364. ETOPS applies when the planned flight calculation, at one-engine inoperative cruise speed under standard conditions with still air, exceeds 180 minutes. You may continue to fly the flight as non-ETOPS provided you meet all other applicable regulations for which the flight is being conducted.

Example of ETOPS: KBFI – PHOG (Direct)

The flight just barely falls outside of the areas drawn within the rings.

Example of Correction to Avoid ETOPS: KBFI – AXELE - PHOG

By adjusting the routing to include an additional waypoint, the flight remains within the rings.

Appendix F: Altimetry Considerations

Altimetry Procedures in the QFE Environment

Russia and the states of the CIS currently use QFE altimetry below the Transition Level. Flight crews will adhere to the following guidelines when operating below the Transition Level in a QFE environment. All applicable conversion charts will be available on the flight deck when operating in the QFE environment.

Note:

- Flight crews will use QNH for all barometric pressure settings at airports where QNH is in routine use.
- At airports where QFE is primarily used, flight crews will use QFE for all barometric pressure settings.
- When QFE is used, the three (3) altimeters will be set to the following references:
  - Two (2) primary altimeters must be set to QFE;
  - One (1) standby altimeter must be set to QNH.

Standard Pressure Setting Procedures

Vertical position of the aircraft at or above the Transition Level will be expressed in terms of FLs in meters (e.g., “Flight Level 7200 m”). The conversion tables can be referenced in Appendix T.

QFE Procedures

An altimeter set to QFE indicates the aircraft height above the ARP or the runway. During the arrival phase, the height is referenced to the ARP; during the approach phase, the height is referenced to the runway. A QFE altimeter setting will be lower than normally experienced when flying QNH.

- When flying an arrival or approach, and below the transition level, the heights to be flown are those indicated **inside the parentheses**.
- Aircraft levels are referenced by the use of the word “height.”
- An altimeter set at QFE reads zero when the aircraft is on the ground at the referenced airport.
- Crews are cautioned to be aware that QFE is sometimes given in millimeters and is frequently followed by QFE in millibars / hectopascals and then QNH in millibars. However, if no QNH is offered, it is sometimes available upon request.

QNH Procedures

- When flying an arrival or approach using QNH setting, the altitudes to be flown are those indicated **outside the parentheses**.
- If assigned an off-route height below the transition level, the field elevation must be added to the assigned height to arrive at the correct QNH altitude to fly.
- Levels must be reported to ATC referenced in meters to the applicable QFE height, not the indicated QNH altitude.
- A QNH altimeter setting may be derived, if necessary, from the Hectopascals / Millibar / Inches Tables in Appendix T.

  Note: Flight crews must understand that QNH altimeter settings are provided for convenience only; local ATCs do not adjust their procedures (instructions) to compensate for QNH operation. Strict adherence to local procedures and regulations is required.

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ICAO Cold Temperature Error Table

It is assumed that the aircraft altimeter reading on crossing the fix is correlated with the published altitude, allowing for altitude error and altimeter tolerances. (See table below.)

Note 1: Pressure altimeters are calibrated to indicate true altitude under International Standard Atmosphere (ISA) conditions. Any deviation from ISA will therefore result in an erroneous reading on the altimeter. In the case when the temperature is higher than ISA, the true altitude will be higher than the figure indicated by the altimeter; and the true altitude will be lower when the temperature is lower than ISA. The altimeter error may be significant under conditions of extremely cold temperatures.

Note 2: When operating at Cold Temperature Restricted Airports in the US, crews must comply with the procedures described in Appendix M.

Values to be Added to Published Approach Altitudes

Airport Temp °C	Height Above the Elevation of the Altimeter Setting Source (Feet)													
	200	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1,000**	**1,500**	**2,000**	**3,000**	**4,000**	**5,000**
+10°	10	10	10	10	20	20	20	20	20	30	40	60	80	90
0°	20	20	30	30	40	40	50	50	60	90	120	170	230	280
-10°	20	30	40	50	60	70	80	90	100	150	200	290	390	490
-20°	30	50	60	70	90	100	120	130	140	210	280	420	570	710
-30°	40	60	80	100	120	140	150	170	190	280	380	570	760	950
-40°	50	80	100	120	150	170	190	220	240	360	480	760	970	1,210
-50°	60	90	120	150	180	210	240	270	300	450	590	970	1,190	1,500

Example: When flying an approach with an MDA of 500 ft and an airport temperature of -30°, your indicated altitude at minimums would be 600 ft.

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Appendix G: Inflight Forms and Checklists

Oceanic Operations Checklist

Crew Training / Reference Documents	
☐	Applicable CFRs / TSRs, Latest Revs of Advisory Circulars (91-70, 90-105, 91-85, 90-96, 120-42), Orders
☐	Applicable ICAO documents (4444, 7030, 9574, 9613, Annex 2, Annex 6, NAT Doc 007, OESB, GOLD)
☐	Websites (Appendix A of International Operations Procedures Manual)
	☐ Special emphasis: http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx (ICAO site for North Atlantic / Europe, including GOLD and OESB)
☐	Applicable regional guidance (NOTAMs, AIPs, Jeppesen Airway Manual)

Flight Planning	
☐	Verify ICAO flight plan is correct (Emphasis on Item 10 and 18 equipment codes)
☐	Plotting Chart / Software – plot route from coast out to coast in
☐	Equal Time Points (ETP) - plot
☐	EDTO / ETOPS – Verify alternates meet appropriate limitations (120, 180, etc.) and identify EDTO entry / exit points
☐	Track message (current copy available for all crossings)
	☐ Note nearest tracks on plotting chart
☐	Weather Analysis – Note en route temperature / turbulence forecasts as well as ETP airport weather
☐	Review possible navigation aids for accuracy check prior to coast out
☐	Review cabotage requirements
☐	Ensure all applicable operational authorizations have been issued for aircraft for all required operations (e.g., RVSM, NAT HLA, RNP, DLC, etc.)

Preflight	
☐	Master Clock for all ETAs / ATAs
☐	Maintenance Log / Equipment – check for any nav / comm / surveillance or RVSM issues
☐	Altimeter checks (tolerance)
☐	Windshear or turbulence forecast
☐	Crosscheck Master Document vs. ICAO flight plan vs. en route chart vs. plotting chart vs. FMS
	☐ Routing, fuel load, times, and groundspeeds for all routes and reroutes

Preflight	
	☐ Equal Time Points (ETPs) / Point of Safe Return (PSR) and reduced fuel
☐	Dual Long Range NAV System (LRNS) for remote oceanic operations
☐	LRCS check (HF and/or CPDLC, as applicable)
☐	SATVOICE / SATCOM operability check
☐	Verify SELCAL on flight plan
☐	Confirm Present Position Coordinates (best source)
☐	Master Document markup (symbols: O, √, \, X)
☐	Groundspeed check
☐	Total distance check

LRNS Programming	
☐	Check FMS database currency and software version
☐	Independent verification of FMS programming
☐	Check expanded coordinates of all oceanic waypoints
☐	Check leg course and distance (+/- 2° and +/- 2 NM)
☐	Upload winds, if applicable

Taxi and Prior to Takeoff	
☐	Groundspeed Check / Present Position Check

Climb Out	
☐	Transition altitude – set altimeters to 29.92 in (1013.2 hPa)
☐	Calculate / Update ETAs on Master Document as duties permit (above FL180)

In Flight	
☐	Ensure continued compliance with RNP (10/5/4/1) and SAO (RNP, HF/SATCOM, SELCAL) requirements: NAT High Level, WAT, Pacific Rim, AMU/Polar, ETOPS, Europe and Canada
☐	Equipment / capability requirements (CPDLC and RNP-4) for NAT PBCS
☐	Awareness of signs of volcanic ash
☐	Comply with regional transponder ops requirements

Prior to Oceanic Entry	
☐	If entering the NAT: send RCL message prior to oceanic entry (Appendix D)
☐	If route amendment received: Verify and crosscheck amendment independently and confirm cleared route is properly programmed into FMS
☐	Ensure aircraft performance capabilities for maintaining assigned altitude / assigned Mach
☐	Navigation accuracy check – record results
☐	Voice LRCS (HF) check, if not done during preflight
☐	SATVOICE callback check with aeronautical radio station, if applicable
☐	Confirm SATCOM data link is operational, if applicable
☐	Log on to CPDLC or ADS-C 10 to 25 minutes prior, if equipped, unless otherwise specified in relevant AIP
☐	Verify RNP value is set
☐	Advise ATC When Able Higher (WAH)
☐	Revised clearance – update LRNS, Master Document, and plotting chart / plotting software
	☐ Check course and distance for new route
	☐ Check expanded coordinates, course, and distance for new route
☐	Altimeter checks - record readings on Master Document
☐	Compass heading check – record readings

After Oceanic Entry	
☐	Set transponder, as applicable
	☐ In NAT HLA: Squawk 2000 – 10 minutes after entry
	☐ PAC (General): Upon entering Oakland OCA, and after radar service is terminated, set transponder to code 2000 and maintain until otherwise instructed by ATC
	☐ PAC (Departing Hawaiian Islands): Remain on the last assigned code until crossing one of the following fixes and entering KZAK airspace, then switch to 2000: ZOULU, AUNTI, CEBEN, ELOYI, FAPIS, SAYTO, BARKR, MCFLY, AJINK, BRIUN, CRESP, DOGIF, ECEDO, FLYHM, GENCO, or the common boundary between PHZH and KZAK
☐	Maintain assigned Mach or resume normal speed if cleared, as applicable
☐	Maintain assigned FL
☐	VHF radios set to air-to-air (123.45) and guard frequencies (121.5)
☐	SLOP – Apply as SOP (Fly cleared route, 2 NM, 1 NM, or micro-SLOP in increments of 0.1 NM to the **right** of cleared track)

After Oceanic Entry	
☐	Hourly altimeter checks (Recommended: Record on Master Document or Altimeter Accuracy Log)
☐	Routine monitoring – assign tasks

Approaching Waypoints	
☐	Confirm coordinates of subsequent waypoints
	☐ Verify the active FMS waypoint as well as the next and subsequent (next plus 1) waypoints match currently effective route clearance
	☐ Confirm the expanded coordinates (full latitude / longitude) of the next plus 1 waypoints as well as course/heading and distance to waypoints agree with currently effective route clearance
☐	Confirm lateral navigation (LNAV) / navigation (NAV) is engaged

Overhead Waypoints	
☐	Confirm aircraft transitions to next waypoint
	☐ Check magnetic heading and distance against Master Document
☐	Confirm time to next waypoint (Note: When the crew is reporting via voice (HF), an ETA change in excess of 2 minutes requires ATC notification)
☐	Make position report
☐	Record fuel remaining and current time on Master Document

10-Minute Plot (Approximately 2° of Longitude After Waypoint)	
☐	Crosscheck navigational performance and course compliance via one of following methods:
	☐ Record time and latitude/longitude from non-steering FMS on plotting chart, then use the steering FMS to verify that next waypoint is consistent with currently effective route clearance
	☐ Check FMS-generated cross-track deviation from programmed route of flight and use the steering LRNS to verify the “TO” waypoint is consistent with currently effective route clearance
☐	Investigate / take corrective action to address anomalies or unexpected deviations
☐	Verify autopilot steering mode is in LNAV/VNAV or other appropriate mode to ensure steering to next intended waypoint

Midway Between Waypoints	
☐	Crosscheck winds between Master Document, LRNS, and winds aloft charts
☐	Confirm time to next waypoint

Coast In	
☐	Compare ground-based NAVAID to LRNS
☐	Discontinue Strategic Lateral Offset prior to oceanic exit point
☐	Confirm routing beyond oceanic airspace

Descent	
☐	Transition level – set altimeters to QNH

Destination / Block In	
☐	Navigation Accuracy Check
☐	Altimetry system write-ups
☐	CPDLC problem reports
☐	Printout from electronic plotting software, if used

Accident / Incident	
☐	Comply with applicable incident / accident reporting requirements as required by regulation. (e.g., 49 CFR NTSB 830)

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LRNS Performance Log

Aircraft ______________________________ Date ______________________________

Flight Plan Position	Time Past (10-Minute Check)	FMS 1 Position	FMS 2 Position*	FMS 3 Position*	IRS 1 Miles FR FMS Drift Rate	IRS 2 Miles FR FMS Drift Rate	IRS 3 Miles FR FMS Drift Rate
		-----------------	-----------------	-----------------	/	/	/
		-----------------	-----------------	-----------------	/	/	/
		-----------------	-----------------	-----------------	/	/	/
		-----------------	-----------------	-----------------	/	/	/
		-----------------	-----------------	-----------------	/	/	/

* Note: A check mark indicates that the reading is the same as FMS 1.

Flight Plan Position	Time Past (10-Minute Check)	GNSSU 1 Miles From FMS Position	GNSSU 1 Status (Degrade / Warning / None?)	GNSSU 2 Miles From FMS Position	GNSSU 2 Status (Degrade / Warning / None?)

Note: When appropriate, the information on this form may be recorded on the Master Document and/or the plotting chart / software instead.

Altimeter Accuracy Log

If the Master Document format provides for the following information, the Master Document may be used in lieu of this form.

Note 1: Regardless of whether the flight is domestic or international, or whether the flight will be conducted over water, the altimeter readings at Departure, Level-Off, and Destination must be recorded.

Note 2: On preflight, the two (2) primary altimeters should agree within 75 feet of the field elevation and within limits specified by the aircraft operating manual.

Note 3: In flight, at least two (2) primary altimeters must agree at all times within 200 ft.

Altimeter	Departure Field Elev: ________	Level-Off	Oceanic Boundary (Coast Out)	Oceanic Boundary (Coast In)	Destination Field Elev: ________
#1					
Standby					
#2					

Appendix H: Postflight Forms and Checklists

Crew Change Checklist

Inbound Crew Duties

1. Call inbound with ETA and aircraft service requirements.
2. Confirm all aircraft equipment on and operating.
3. Clean flight deck and organize manuals (appropriate charts, DPs, etc.).
4. Prepare cabin and crew bags accessible.
5. Complete flight logs and all required forms and documents.
6. Brief outbound crew:
   a. Aircraft discrepancies;
   b. Itinerary;
   c. Passenger arrangements;
   d. Requests.

Outbound Crew Duties

1. Preflight ground preparation:
   a. Fuel;
   b. Lavatory;
   c. Catering / dishes;
   d. Pay landing / parking / NAV / ATC fees (if required).
2. Confirm that all required forms and documents (Customs / agriculture / immigration) are on board the aircraft.
3. Arrange transportation for inbound crew.
4. Receive a crew briefing from the inbound crew (see item 6 above).
5. Review logs.
6. Check latest weather and hardcopy of filed flight plan.
7. Initialize navigation system (confirm ramp position).
8. Insert flight plan.
9. Copy ATC clearance.
10. Complete aircraft checklist.

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European Union Ramp Inspection Program Checklist

The following is only a general overview of EU RIP (formerly “SAFA”) criteria. Expanded guidance on each criteria, including examples of potential findings, can be found in EASA’s program overview via the following URLs:

https://www.easa.europa.eu/sites/default/files/dfu/Ramp inspection manual (RIM) Issue 1.0.pdf

https://www.easa.europa.eu/easa-and-you/air-operations/ramp-inspection-programmes-safa-saca

Note: Although this checklist may not always apply, crews should be familiar with these items as a ramp inspection can be carried out anywhere, not just in EASA states. In addition, the EU RIP framework for ramp inspections is sometimes used in non-EASA countries as well (e.g., Canada).

A. Flight Deck

A01	General Condition
A02	Emergency Exit
A03	Equipment
A04	Manuals
A05	Checklists
A06	Radio Navigation / Instrument Charts
A07	Minimum Equipment List
A08	Certificate of Registration
A09	Noise Certificate
A10	AOC or Equivalent
A11	Radio License
A12	Certificate of Airworthiness
A13	Flight Preparation
A14	Mass and balance calculation
A15	Hand Fire Extinguishers
A16	Life Jackets / Flotation Device
A17	Harness
A18	Oxygen Equipment
A19	Independent portable light
A20	Flight Crew Licenses
A21	Journey Log Book
A22	Maintenance Release
A23	Defect Notification and Rectification
A24	Preflight Inspection

B. Safety / Cabin

B01	General Internal Condition
B02	Cabin Crew Stations / Crew Rest Area
B03	First Aid Kit / Emergency Medical Kit
B04	Hand Fire Extinguishers

B05 Life Jackets / Flotation Devices

B06 Seat Belt and Seat Condition

B07 Emergency Exit Lighting and Marking

B08 Slides / Life Rafts / ELT

B09 Oxygen Supply

B10 Safety Instructions

B11 Cabin Crew Members

B12 Access to Emergency Exits

B13 Stowage of Passenger Baggage

B14 Seat Capacity

C. Aircraft Condition

C01 General External Condition

C02 Doors and Hatches

C03 Flight Controls

C04 Wheels, Tires, and Brakes

C05 Undercarriage / Skids / Floats

C06 Wheel Well

C07 Powerplant and Pylon

C08 Fan Blades, propellers, rotors

C09 Obvious Repairs

C10 Obvious Unrepaired Damage

C11 Leakage

D. Cargo

D01 General Condition of Cargo Compartment

D02 Dangerous Goods

D03 Cargo stowage

E. General

E01 General

Note: It is recommended that crews prepare a “Ramp Inspection Binder” to assist with expediting possible ramp inspections. A Ramp Inspection Binder should contain, at a minimum, tabbed photocopies of the following items for ease of reference:

- All crew licenses and medical certificates;
- Aircraft registration, airworthiness, and noise certificates;
- All current operational authorizations;
- Insurance certificates;
- Radio Licenses.

The Ramp Inspection Binder should be kept in a readily-accessible location and presented along with copies of this *International Operations Procedures Manual* and the Airplane Flight Manual.

Appendix I: Weather / NOTAM Procedures

METAR Formatting and Decoding

Surface weather observations must be taken into account during preflight and inflight planning. Although the METAR / SPECI / TREND coding is used worldwide, each country is allowed to make modifications or exceptions to the code for use in their particular country. A METAR report includes the airport identifier, time of observation, wind, visibility, runway visual range, present weather phenomena, sky conditions, temperature, dew point, and altimeter setting. In addition, coded and/or plain language information may be appended to the end of the METAR in a section coded as "Remarks." The contents of the "Remarks" section vary with the type of reporting. The METAR may be abridged at some designated stations only including a few of the mentioned elements.

Below is a breakdown of a METAR with the corresponding individual field explanations:

METAR LOWW 211650Z AUTO 04003KT 9999 FEW040CB 23/17 Q1018

Code Name: The report will be labeled as METAR by default, but may be labelled SPECI or TREND as follows:

- *SPECI*: A special weather report that may be issued when there is significant deterioration or improvement in airport weather conditions, such as significant changes of surface winds, visibility, cloud base height and occurrence of severe weather
- *TREND*: Sometimes labeled as TTF (Trend Type Forecast), this is appended to a METAR or SPECI and is a forecast covering a period of 2 hours from the time of observation. It is concise statement of expected significant changes in the meteorological conditions at the aerodrome.

Location: The ICAO 4 letter indicator of the reporting station.

Date/Time of Report: The day of the month and the time of the observation in hours and minutes UTC.

AUTO: The optional code word AUTO indicates that the report has been generated using data from an automated observing system. In the event of a corrected METAR or SPECI, the report modifier, COR, is substituted for AUTO.

Surface Wind: The mean wind direction in degrees true to the nearest 10 degrees, from which the wind is blowing and the mean wind speed in knots over the 10-minute period immediately preceding the observation. If gusts exceed the mean wind speed by 10kts or more in the 10 minutes preceding the time of the report, a letter G and 2 more figures are added to indicate the maximum wind speed. For example: "23018G30KT" means 230 degrees true/18 kts gusting to a maximum of 30 kts. Reports may express wind speed in knots (KT), meters per second (MPS), or kilometers per hour (KPH). Winds greater than 100 kts or more shall be preceded by the letter P and reported as P99KT or P99MPS or P199KPH.

Visibility: Reported in either statute miles or meters

- *Statute Miles:* The visibility group ends with SM. For example, a visibility of one and a half statute miles is coded 1 1/2SM. When the visibility is greater than 6 statute miles, it is expressed as P6SM.
- *Meters:* Expressed as a four-figure group (e.g. 0400 = 400 meters; 8000 = 8 km) up to but excluding 10 km. In other words, "9999" means 10km or more, and "0000" means less than 50 meters visibility.

Ceiling (sky condition): Sky condition is a description of the appearance of the sky. It is coded as: sky condition, vertical visibility, or clear skies. The observation is based on the amount of sky cover (the first three letters) followed by the height of the base of the sky cover (final three digits). The height of the layer is recorded in feet Above Ground Level (AGL).

Weather Phenomena: Weather is indicated by up to 3 groups comprising symbols and letters (Refer to the METAR and TAF Decoding Table later in this Appendix.)

Temperature / Dew Point: The degree of hotness or coldness of the ambient air. Dew point is the temperature to which a given parcel of air must be cooled at constant pressure and constant water vapor content for the air to become fully saturated. Temperature and dew point are coded as two digits rounded to the nearest whole degree Celsius. For example, a temperature of 0.3º C would be coded at 00. Sub-zero temperatures and dew points are prefixed with an "M".

Altimeter Setting (QNH): Expresses the current pressure at elevation. This setting is then used by aircraft altimeters to determine the true altitude above a fixed plane of mean sea level. It is expressed in a four-digit group representing the pressure in tens, units, tenths, and hundredths of inches of mercury

Runway Visual Range (RVR) -*not pictured*

Airports may include a letter indicator R followed by the runway designator, a forward slash, and the touchdown zone RVR in meters, e.g., "R06/0400." If the RVR is assessed on two or more runways simultaneously then the RVR group will be repeated. Below are some notes to take in account:

- Parallel runways will have L, C, or R added to the runway designator e.g. R24L/1100.
- If the RVR is greater than the maximum value that can be measured, "P" will precede this value e.g. R24L/P1500.
- If the RVR is less than the minimum value that can be measured, "M" will precede this value e.g. R24L/M0050.
- If RVR trends can be measured then "U", "D", or "N" will follow the RVR value to indicate increasing, decreasing or no change respectively.

Wind Shear –*not pictured*

In a METAR, airports may include wind shear if reported along the take-off or approach paths in the lowest 1600 ft with reference to the runway. The code "WS" is used to begin the group, for example "WS TKOF RWY20". If the wind shear is affecting all runways, "WS ALL RWY" is reported.

TAF Considerations

- An aerodrome forecast (or TAF) consists of a concise statement of the expected meteorological conditions at an aerodrome for a specified period. Similarly to METARS, aerodrome forecasts are issued in the TAF code form and include the following information in the order indicated:
  a) Code name TAF/TAF AMD (amendment)
  b) Location indicator (ICAO 4-letter code);
  c) Date and time of origin of forecast;
  d) Date and period of validity of forecast;
  e) Surface wind (including strength, direction, gusting, low level wind shear);
  f) Visibility;
  g) Weather (including amount, type of precipitation, and extreme weather e.g. thunderstorm, tropical revolving storm, mountain waves, sand storm, volcanic ash, etc.
  h) Cloud coverage, and;
  i) Expected significant changes to one or more of these elements during the period of validity
- TAFs are typically issued four times a day, at six-hour increments. The US National Weather Service publishes TAFs based on the following issuance schedule

Scheduled Issuance	Valid Period	Issuance Window
00:00 UTC	00:00 to 24:00 UTC	23:20 to 23:40 UTC
06:00 UTC	06:00 to 06:00 UTC	05:20 to 05:40 UTC
12:00 UTC	12:00 to 12:00 UTC	11:20 to 11:40 UTC
18:00 UTC	18:00 to 18:00 UTC	17:20 to 17:40 UTC

METAR / TAF Decoding Table

Code	Translation	Code	Translation	Code	Translation
$	Maintenance check indicator	FZ	Freezing	RVR	Runway Visual Range
-	Slight	FZRANO	Freezing rain sensor not available	RY	Runway
+	Heavy	G	Gust	SA	Sand
BC	Patches	GR	Hail	SCT	Scattered
BKN	Broken	GS	Small Hail	SFC	Surface
BL	Blowing	HLSTO	Hailstone	SG	Snow Grains
BR	Mist	HZ	Haze	SH	Shower
CB	Cumulonimbus	IC	Ice Crystals	SKC	Sky clear
CBMAM	Cumulonimbus Mamatus	INCRG	Increasing	SLP	Sea Level Pressure
CC	Cloud-Cloud Lightning	INTMT	Intermittent	SN	Snow
CG	Cloud-Ground Lightning	LTG	Lightning	SNINC	Snow increasing rapidly
CHINO	Sky condition at secondary location not available	MI	Shallow	SP	Snow Pellets
CIG	Ceiling	OCNL	Occasional	SQ	Squall
CLR	Clear	OVC	Overcast	SS	Sand Storm
CONS	Continuous	PCPN	Precipitation	SW	Snow shower
COR	Correction to previous observation	PK WND	Peak Wind	TCU	Towering Cumulonimbus
DR	Low Drifting	PL	Ice Pellets	TS	Thunderstorm
DS	Dust Storm	PNO	Precipitation amount not available	UNKN	Unknown
DSIPTG	Dissipating	PO	Dust Devils	UP	Unknown Precipitation
DU	Widespread Dust	PRES	Pressure	V	Variable
DZ	Drizzle	PR	Partial	VA	Volcanic Ash
FG	Fog	PRESFR	Pressure falling rapidly	VC	In the Vicinity (nearby)
FC	Funnel Cloud	PRESRR	Pressure rising rapidly	VIS	Visibility

Code	Translation	Code	Translation	Code	Translation
FEW	Few Clouds	PY	Spray	VR	Visual Range
FRQ	Frequent	RA	Rain	VRB	Variable
FROPA	Frontal Passage	RE	Recent	WND	Wind
FU	Smoke	RTD	Routine delayed (late) observation	WSHIFT	Wind shift

Further decoding can be found using the NWS ADDS Website: https://www.aviationweather.gov/taf

US / International Differences

Crews are cautioned to be alert to differences between US METAR / TAF and international METAR / TAF data. Some key differences follow.

Altimeter Setting

The US reports the altimeter setting in inches of mercury (e.g., **A2992**). Internationally, it is reported in hectopascals (millibars) (e.g., **Q1013**).

Windshear

Low level windshear, not associated with convective activity (e.g., **WS015/30045KT, see TAF**) will appear in TAFs in the US, Canada, and Mexico only.

Visibility

- Internationally, visibility is reported in 4 digits using meters with the direction of the lowest visibility sector (e.g., 6000SW – meaning that visibility is lowest at 6,000 m to the southwest). The US reports visibility using prevailing visibility in statute miles, not the lowest visibility, so the same conditions would be reported differently.
- International visibility reports also contain a trend such as:

  D Down

  U Up

  N No change

  V Variable

Other

- Remarks (RMK) included in US METARs are transmitted only to Canada and Mexico and to no other international stations.
- Pilots may also see “**CAVOK**“ noted on International METARs/TAFs. This means **C**eiling **A**nd **V**isibility **OK** and is used to replace weather and clouds if visibility is 10 kilometers or more, there are no clouds below 1,500 m (5,000 ft) or below the highest minimum ATC sector altitude, whichever is greater. Also, there must be no other significant weather. **NSC** means **N**o **S**ignificant **C**louds.

Notice to Airmen (NOTAM)

A notice to airmen (NOTAM) is a notice containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations. Full details concerning the content and distribution of NOTAMs are contained in *ICAO Annex 15, AIM Services Chapter 6*. NOTAMs are issued by national authorities for a number of reasons, such as:

- Hazards, including air-shows, parachute jumps and glider or micro-light flying;
- Flights by VIP travelers such as heads of state and government personnel;
- Closed runways, taxiways, etc;
- Unserviceable radio navigational aids;
- Military exercises with resulting airspace restrictions;
- Unserviceable lights on tall obstructions;
- Temporary erection of obstacles near airfields (e.g. cranes).

For reasons of conciseness and precision, NOTAMs are encoded, although the code is usually sufficiently self-evident to allow the user to identify a hazard.

Distribution

NOTAMs are communicated by the issuing agency using the fastest available means to all addressees of direct operational significance, and who would not otherwise have at least seven days' prior notification.

Briefings

Crew are strongly encouraged to review to current NOTAMS during preflight planning which may be via airport flight briefing facilities, aviation software providers (such as ARINC Direct, UV, Jeppesen, etc.), or publicly available web resources (such as DINS https://www.notams.faa.gov/). It is important to be aware that distribution of NOTAMs is not always accurate (i.e., expired / missing NOTAMs). Therefore crews should check at least two sources (i.e., DINS and your trip support provider).

Additional Types of NOTAMs

- Trigger NOTAMs serve to alert that specific changes will be effective soon, usually at the next AIRAC date. A trigger NOTAM contains a brief description of the contents of the amendment or supplement, the effective date and the reference number of the amendment or supplement. It is usually valid for 14 days.
- GNSS NOTAMs are issued both locally and internationally and serve to alert of any GNSS outages. However, the full extent of an outage on the intended operation cannot be determined unless the pilot has a RAIM availability prediction program which allows excluding a satellite which is predicted to be out of service based on the NOTAM information.
- FIR NOTAMs provide specific airspace information for the selected Flight Information Region.
- SNOTWAMs provide information concerning the snow conditions at a specific airport. Similarly, volcanic ash is notified as a special message known as an ASHTAM.
- BIRDTAMs advise airspace users of a passage of a nearby flock of birds through an airspace.

Decoding

A common list of NOTAM abbreviations compiled by the FAA can be found here:

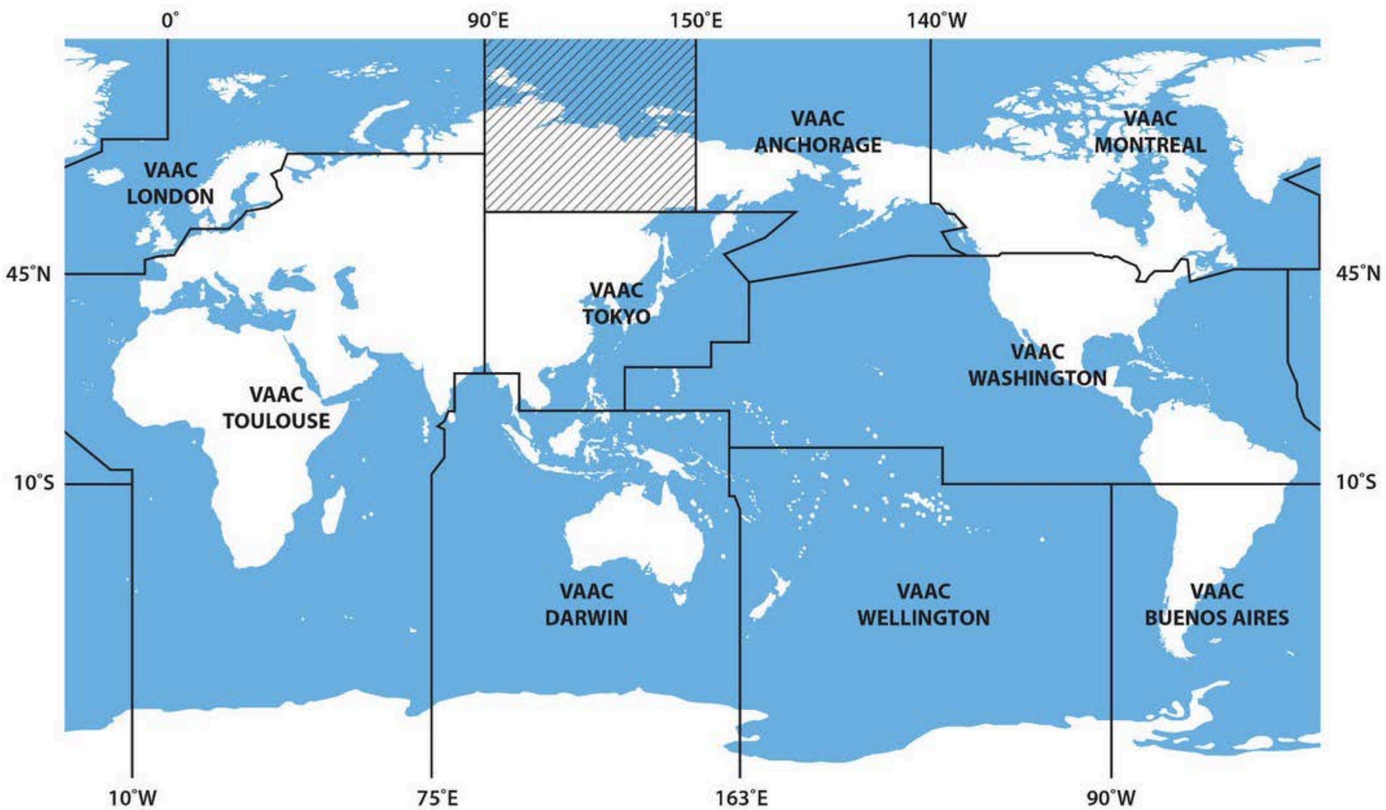
https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/fs/alaskan/alaska/fai/notam/media/cntrns.pdf

Volcanic Ash

Volcanic Ash

Volcanic ash is a serious hazard to aviation worldwide. (Refer to Section 3.7.3 in this manual for more information.) Nine Volcanic Ash Advisory Centers (VAACs) have been established worldwide to monitor volcanic activity and disseminate advisories and guidance to pilots. Prior to flight, crews should review any applicable advisories released by the VAACs applicable to the intended region(s) of operation.

Worldwide VAAC Map



Source: Civil Aviation Authority of New Zealand (http://vaac.metservice.com/)

Summary of VAACs and Monitoring Areas

Name	Region(s) Monitored	Website
Anchorage VAAC	Alaska, Northeast corner of Pacific Ocean	https://www.weather.gov/vaac/
Buenos Aires VAAC	South America, West half of southern Atlantic Ocean	http://www.smn.gov.ar/vaac/buenosaires/productos.php
Darwin VAAC	Southeast Asia, Australia, East half of Indian Ocean	http://www.bom.gov.au/info/vaac/
London VAAC	Iceland, Northeast corner of NAT	http://www.metoffice.gov.uk/aviation/vaac/
Montreal VAAC	Greenland, Northwest corner of NAT	http://weather.gc.ca/eer/vaac/index_e.html

Name	Region(s) Monitored	Website
Tolouse VAAC	Africa, Middle East, West Asia, Southeast corner of NAT, East half of Southern Atlantic Ocean, West half of Indian Ocean	http://www.meteo.fr/vaac/
Tokyo VAAC	East Asia, Northwest corner of Pacific Ocean	http://ds.data.jma.go.jp/svd/vaac/data/index.html
Washington VAAC	US, Central America, Central Pacific Ocean, Southwest corner of NAT	http://www.ssd.noaa.gov/VAAC/messages.html
Wellington VAAC	New Zealand, Southern Pacific Ocean	http://vaac.metservice.com/

Volcanic Eruptions in the North Atlantic Region (NAT)

The North Atlantic Region includes areas of volcanic activity, particularly in Iceland. The United Kingdom and Iceland have agreed upon a contingency plan to take account of this activity. The plan sets out standardized guidelines for alerting aircraft when eruptions occur and procedures to be followed by the United Kingdom and Iceland when planning routings around the ash cloud. Flight crews can access and download the NAT Contingency Plan (NAT Doc. 006) via the following link:

http://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx

The Aviation Color Code

The Alaskan Volcano Observatory (AVO) uses a color code system to summarize a volcano's status and hazard to aviation. A similar system is used for volcanoes in Kamchatka and the Kurile Islands.

Color	Description
GREEN	Volcano is in typical background, non-eruptive state, or after a change from a higher level, volcanic activity has ceased and volcano has returned to non-eruptive state.
YELLOW	Volcano is exhibiting signs of elevated unrest above known background level or, after a change from a higher level, volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
ORANGE	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, or eruption is underway with no or minor volcanic ash emissions.
RED	Eruption is imminent with significant emission of volcanic ash into the atmosphere likely, or eruption is underway or suspected with significant emission of volcanic ash into the atmosphere.

Pilot Reports of Volcanic Activity

Pilot reports of volcanic activity are of great assistance in detecting unrest at unmonitored volcanoes, accurately describing remote eruptions, and evaluating hazards to aviation. Flight crews are to report all volcanic activity immediately to ATC, following procedures contained in the AIM. Reference the Jeppesen Airway Manual (*Air Traffic Control*) for additional information.

Windshear PIREPS

Because unexpected changes in wind speed and directions can be hazardous to aircraft operations at low altitudes on approach to and departing from airports, pilots are urged to volunteer reports to controllers of windshear conditions they encounter. An advance warning of this information will assist other pilots in avoiding or coping with a windshear on approach or departure.

When describing conditions, use of the terms "negative" or "positive" windshear should be avoided. PIREPs of "negative windshear on final," intended to describe loss of airspeed and lift, have been interpreted to mean that no windshear was encountered. The recommended method for windshear reporting is to state the loss / gain of airspeed and altitude(s) at which it was encountered.

Examples are: "*DENVER TOWER, CESSNA NOVEMBER 1234 ENCOUNTERED WINDSHEAR, LOSS OF 20 KNOTS AT 400 FEET*"; "*TULSA TOWER, AMERICAN 721 ENCOUNTERED WINDSHEAR ON FINAL, GAINED 25 KNOTS BETWEEN 600 AND 400 FEET FOLLOWED BY LOSS OF 40 KNOTS BETWEEN 400 FEET AND SURFACE*." Pilots who are not able to report windshear in these specific terms are encouraged to make reports in terms of the effect upon their aircraft. For example: "*MIAMI TOWER, GULFSTREAM NOVEMBER 403 CHARLIE ENCOUNTERED AN ABRUPT WINDSHEAR AT 800 FEET ON FINAL, MAX THRUST REQUIRED*." Pilots using Inertial Navigation Systems should report the wind and altitude both above and below the shear layer.

Volcanic Activity Reporting Form

Date ____

Section 1 – Transmit to ATC via Radio	(PRIVATE) 1. Aircraft identification	
	2. Position	
	3. Time (UTC)	
	4. Flight Level or altitude	
	5. Position / location of volcanic activity or ash cloud	
	6. Air temperature	
	7. Wind	
	8. Supplementary information (Brief description of activity including extent of the ash cloud, horizontal movement, rate of growth, etc., as available)	

Mark the Appropriate Box(es)

Section 2 – Complete and Forward as Directed	9. Density of ash cloud	☐ wispy	☐ moderately dense	☐ very dense
	10. Color of ash	☐ white ☐ black	☐ light gray	☐ gray
	11. Eruption	☐ continuous	☐ intermittent	☐ not visible
	12. Position of activity	☐ summit ☐ multiple	☐ side ☐ not observed	☐ single
	13. Other observed features of eruption	☐ lightning ☐ ash fallout	☐ glow ☐ mushroom cloud	☐ large rocks ☐ none
	14. Effect on aircraft	☐ communications ☐ pitot static windows ☐ none	☐ nav. system ☐ windscreen	☐ engines ☐ other
	15. Other effects	☐ turbulence ☐ ash deposits	☐ St. Elmo's fire	☐ fumes

16. *Other information deemed useful*

Forward completed form via mail to:	Global Volcanism Program National Museum of Natural History - Rm E-421 MRC 0119, P.O. Box 37012 Smithsonian Institution Washington, DC 20013-7012	**Or Fax to:** Global Volcanism Program 202-357-2476

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Appendix J: Intercept Procedures

General

The PIC, when intercepted, shall comply with the Standards in Appendix 2, Sections 2 and 3, of ICAO Annex 2, interpreting and responding to visual signals as specified in Appendix 1, Section 2.

Action by Intercepted Aircraft

A. An aircraft, which is intercepted, by another aircraft shall immediately:

1. Follow the instructions given by the intercepting aircraft interpreting and responding to visual signals in accordance with the specifications in Appendix 1;
2. Notify, if possible, the appropriate air traffic services unit;
3. Attempt to establish radio communication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 121.5 MHz, giving the identity of the intercepted aircraft and the nature of the flight;

   Note: If no contact has been established and if practicable, repeating this call on the UHF emergency frequency 243 MHz;
4. Select Mode A, Code 7700, unless otherwise instructed by the appropriate air traffic services unit.

B. If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual signals, the intercepted aircraft shall request immediate clarification while continuing to comply with the visual instructions given by the intercepting aircraft.

C. If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by radio, the intercepted aircraft shall request immediate clarification while continuing to comply with the radio instructions given by the intercepting aircraft.

Signals for Use in the Event of Interception

Signals Initiated by Intercepting Aircraft and Responses by Intercepted Aircraft				
Series	**INTERCEPTING Aircraft Signals**	**Meaning**	**INTERCEPTED Aircraft Responds**	**Meaning**
1	DAY or NIGHT – Rocking aircraft and flashing navigational lights at irregular intervals (and landing lights in the case of a helicopter) from a position slightly above and ahead of, and normally to the left of, the intercepted aircraft (or to the right if the intercepted aircraft is a helicopter) and after acknowledgement, a slow level turn normally to the left (or to the right in the case of a helicopter) on the desired heading. Note 1 – Meteorological conditions or terrain may require the intercepting aircraft to reverse the positions and direction of turn given above in Series 1. Note 2 – If the intercepted aircraft is not able to keep pace with the intercepting aircraft, the latter is expected to fly a series of race-track patterns and to rock the aircraft each time it passes the intercepted aircraft.	You have been intercepted. Follow me.	DAY or NIGHT – Rocking aircraft, flashing navigational lights at irregular intervals and following. Note – Additional action required to be taken by intercepted aircraft is prescribed in Chapter 3, 3.8.	Understood, will comply.

Signals Initiated by Intercepting Aircraft and Responses by Intercepted Aircraft				
Series	**INTERCEPTING Aircraft Signals**	**Meaning**	**INTERCEPTED Aircraft Responds**	**Meaning**
2	DAY or NIGHT – An abrupt break-away maneuver from the intercepted aircraft consisting of a climbing turn of 90 degrees or more without crossing the line of flight of the intercepted aircraft.	You may proceed.	DAY or NIGHT – Rocking the aircraft.	Understood, will comply.
3	DAY or NIGHT – Lowering landing gear (if fitted) showing steady landing lights and overflying runway in use or, if the intercepted aircraft is a helicopter, overflying the helicopter landing area. In the case of helicopters, the intercepting helicopter makes a landing approach coming to hover near to the landing area.	Land at this airport.	DAY or NIGHT – Lowering landing gear, (if fitted), showing steady landing lights and following the intercepting aircraft and, if, after overflying the runway in use or helicopter landing area, landing is considered safe, proceeding to land.	Understood, will comply.

Signals Initiated by Intercepted Aircraft and Responses by Intercepting Aircraft				
Series	**INTERCEPTED Aircraft Signals**	**Meaning**	**INTERCEPTING Aircraft Responds**	**Meaning**
4	DAY or NIGHT – Raising landing gear (if fitted) and flashing landing lights while passing over runway in use or helicopter landing area at a height exceeding 300 m (1,000 ft) but not exceeding 600 m (2,000 ft) (in the case of a helicopter, at a height exceeding 50 m (170 ft) but not exceeding 100 m (330 ft) above the airport level, and continuing to circle runway in use or helicopter landing area. If unable to flash landing lights, flash any other lights available.	Airport you have designated is inadequate.	DAY or NIGHT – If it is desired that the intercepted aircraft follow the intercepting aircraft to an alternate airport, the intercepting aircraft raises its landing gear (if fitted) and uses the Series 1 signals prescribed for intercepting aircraft.	Understood, follow me.
			If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Series 2 signals prescribed for intercepting aircraft.	Understood, you may proceed.
5	DAY or NIGHT – Regular switching on and off of all available lights but in such a manner as to be distinct from flashing lights.	Cannot comply.	DAY or NIGHT – Use Series 2 signals prescribed for intercepting aircraft.	Understood.
6	DAY or NIGHT – Irregular flashing of all available lights.	In distress.	DAY or NIGHT – Use Series 2 signals prescribed for intercepting aircraft.	Understood.

Radio Communication During Interception

If radio contact is established during interception but communication in a common language is not possible, attempts shall be made to convey instructions, acknowledgement of instructions and essential information by using the phrases and pronunciations in Table A2-1 and transmitting each phrase twice:

Phrases for use by INTERCEPTING Aircraft			Phrases for use by INTERCEPTED Aircraft		
Phrase	**Pronunciation[1]**	**Meaning**	**Phrase**	**Pronunciation[1]**	**Meaning**
CALL SIGN	KOL SA-IN	What is your call sign?	CALL SIGN (call sign)[2]	KOL SA-IN (call sign)	My call sign is (call sign)
FOLLOW	FOL-LO	Follow me	WILCO Will comply	VILL-KO	Understood
DESCEND	DEE-SEND	Descend for landing	CAN NOT	KANN NOTT	Unable to comply
YOU LAND	YOU LAAND	Land at this airport	REPEAT	REE-PEET	Repeat your instruction
PROCEED	PRO-SEED	You may proceed	AM LOST	AM LOSST	Position unknown
			MAYDAY	MAYDAY	I am in distress
			HIJACK[3]	HI-JACK	I have been hijacked
			LAND (place name)	LAAND (place name)	I request to land at (place name)
			DESCEND	DEE-SEND	I require descent

1. In the second column, syllables to be emphasized are underlined.
2. The call sign required to be given is that used in radio telephony communications with air traffic services units and corresponding to the aircraft identification in the flight plan.
3. Circumstances may not always permit, nor make desirable, the use of the phrase “HIJACK”

Note: During preflight planning, flight crews will review the state's published differences to ICAO for intercept procedures (per state AIP) for the states in which they intend to overfly or land.

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Appendix K: Reporting Forms

Altitude Deviation Reporting Instructions

A. Reports of altitude deviations of 300 ft or more, including those due to Traffic Alert and Collision Avoidance System (TCAS), turbulence, and contingency events, should be sent to the monitoring organizations as follows:

1. The Central Monitoring Agency (CMA) for the NAT or WAT areas;
2. The Asia-Pacific Approvals Registry and Monitoring Organization (APARMO) for the Pacific Region;
3. The Middle East Regional Monitoring Agency (MIDRMA) for the Middle East; and
4. The North American Approvals Registry and Monitoring Organization (NAARMO) for Northern Canadian Airspace (NCA).

B. The report should include, at a minimum, the following information:

1. Report of an altitude deviation of 300 ft or more
2. Reporting agency
3. Date and time
4. Location of deviation
5. North Pacific (NOPAC) / Central Pacific (CENPAC) / Central East Pacific (CEP) / South Pacific (SOPAC) / Japan-Hawaii[1] / WAT or Random / OTS for the NAT, Northern Canadian Airspace (NCA) or Middle East Region (ME) [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, if any, when notified
13. Remarks.[3]

[1] State one of the two choices for the appropriate region.

[2] In the case of turbulence, state extent of deviation from the Cleared Flight Level.

[3] In the event of contingency action, indicate whether prior clearance was given and if contingency procedures were followed.

C. When complete, please return to the following address:

PAC Region (APARMO) NCA / SDRVSM (NAARMO)	**NAT and WAT Regions**	**Middle East Region (ME)**
William J. Hughes Technical Center (WJHTC) Aviation Systems Analysis and Modeling Branch (ACT-520) Atlantic City International Airport Atlantic City, NJ 08045 Tel: +1 609 485 6263 Fax: +1 609 485 5117 Email: aparmo@admin.tc.faa.gov	North Atlantic Central Monitoring Agency c/o National Air Traffic Services Room G41 Scottish and Oceanic Area Control Centre, Sherwood Road, Prestwick, Ayrshire - KA9 2NR Email: natcma@nats.co.uk	Middle East Regional Monitoring Agency (MIDRMA) P.O. Box 50468 Kingdom of Bahrain Tel: +973 17 329150 Fax: +973 17 329160 Email: midrma@midrma.com

D. If the organization has not provided a specific report format, the form on the reverse side of this page may be used.

Altitude Deviation Report Form - General

1. Description of Deviation		**2. Reporting Agency**

3. Date	**4. Time (UTC)**	**5. Name of ATS Unit and Sector**	**6. Geographical Location of Occurrence**

7. ATS Route	**8. Flight Identification**	**9. Aircraft Type**
10. Cleared Flight Level	**11. Observed Flight Level**	**12. Time Spent Deviating from Cleared Flight Level (express in seconds)**
13. Cleared Flight Level after deviation if different from Cleared Flight Level before deviation (Box 10)	**14. Cause of Deviation**	**15. Other Traffic if Loss of Separation Occurred**

16. Crew comments, if any, when notified of an altitude deviation

17. Additional Remarks

Altitude Deviation Report Form - Europe

This form should be sent to EUROCONTROL to report altitude deviations of 300 ft (90 m) or more from the cleared Flight Level which occur above FL245. The information provided will form part of the data collection used by EUROCONTROL for European RVSM Safety Assessment purposes.

<table>
<tr><th>1. Date</th><th>2.Time (UTC)</th><th>3. Name of ATS Unit and Sector</th><th>4. Geographical Location of Occurrence</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><th colspan="2">5. ATS Route</th><th>6. Flight Identification</th><th>7. Aircraft Type</th></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><th colspan="2">8. Cleared Flight Level</th><th>9. Observed Flight Level</th><th>10. Time Spent Deviating from Cleared Flight Level (express in seconds)</th></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><th colspan="2">11. Cleared Flight Level after deviation if different from Cleared Flight Level before deviation (Box 8)</th><th>12. Cause of Deviation</th><th>13. Other Traffic if Loss of Separation Occurred</th></tr>
<tr><td colspan="2"></td><td></td><td>Minimum Vertical Separation (ft.)
Minimum Horizontal Separation (nm)</td></tr>
<tr><th colspan="4">14. Crew comments, if any, when notified of an altitude deviation</th></tr>
<tr><td colspan="4"></td></tr>
<tr><th colspan="4">15. Additional Remarks</th></tr>
<tr><td colspan="4"></td></tr>
</table>

Insert in Box 10 the overall deviation time until the aircraft:

a. Returned to its Cleared Flight Level (as inserted in Box 8); or

b. Was cleared to a different Flight Level (as inserted in Box 11), if applicable.

When complete, submit the form to:

User Support Cell DAP/APN EUROCONTROL Rue de la Fusée, 96 B-1130 Brussels, Belgium Fax: +32 2 729 4634 Email: Eurocontrol	Or, use the Internet application available in Eurocontrol OneSky Online portal: www.eurocontrol.int Select the option: OneSky Online Sign In (if registered) Under Online Services, select Altitude Deviation Report (For registration, please enter into Eurocontrol OneSky Online portal)

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CARSAMMA Navigation Deviation Investigation Form

Caribbean / South American Monitoring Agency (CARSAMMA)

<table>
<tr><th colspan="5">CARSAMMA Navigation Deviation Investigation Form</th></tr>
<tr><td colspan="5">Type of Report: ☐ PILOT – Flight
☐ CONTROLLER – ATC Unit</td></tr>
<tr><td>Date/Time (UTC):</td><td colspan="4">Type of Deviation: ☐ LATERAL ☐ Type (A to G)*
☐ VERTICAL ☐ Type (A to O)</td></tr>
<tr><td colspan="5">Causes: ☐ WEATHER (See 3.2-G on Reverse)
☐ OTHERS (Specify)</td></tr>
<tr><td colspan="5">Conflict Alert Systems:</td></tr>
<tr><th>Details of Aircraft</th><th colspan="2">First Aircraft</th><th colspan="2">Second Aircraft (For Vertical)</th></tr>
<tr><td>Aircraft Identification:</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Name of Owner / Operator:</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Aircraft Type:</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Departure Point:</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Destination:</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Route Segment:</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td rowspan="2">Flight Level:</td><th>Cleared</th><th>Actual</th><th>Cleared</th><th>Actual</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Cleared Track:</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Extent of Deviation – Magnitude and Direction:
(NM for Lateral; Feet for Vertical)</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Amount of Time at Incorrect:
Flight Level / Tracks</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Position Where Deviation Was Observed:
(BRG/DIST from Fixed Point or LAT / LONG)</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="5">Action Taken by ATC / Pilot:</td></tr>
<tr><td colspan="5">Other Comments:</td></tr>
</table>

* See Deviation Classification.
Email: carsamma@cgna.gov.br
Tel: +55 (12) 39 13 32 06
Fax: +55 (12) 39 21 23 06

Explanations About Notification Form of Deviation in Navigation

1. The ATC / Pilot should fill as many items as possible.
2. Complementary data can be attached.
3. The notification of any deviation (vertical or lateral) has to be classified, when possible, according to the following types:

   3.1 For large height deviations (vertical deviation):

   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 / descend without ATC clearance.
   F. Entry airspace at an incorrect level.
   G. ATC FL re-clearance resulting in loss of lateral or longitudinal separation.
   H. Deviation due to TCAS.
   I. Aircraft unable to maintain level.
   J. Other.

   3.2 For lateral deviations:

   A. Committed by aircraft not certified for operation in the RNP airspace.
   B. ATC system loop error.
   C1. Equipment control error including inadvertent waypoint error.
   C2. Waypoint insertion error due to the correct entry of incorrect position.
   D. Other with failure notified to ATC in time for action.
   E. Other with failure notified to ATC too late for action.
   F. Other with failure notified / received by ATC.
   G. Lateral deviations due to weather when unable to obtain prior ATC clearance.

   Notes:

   1. There are data that must be announced by the pilots.
   2. When one must execute the Contingency Procedures and “NO” was filled in the field “Execute Other Contingency Procedure?” the reason(s) must be explained in the field “Other Comments.”

      * <u>Errors during communication/coordination process in the ATC system</u>: Any error caused by a misunderstanding between the pilot and the air traffic controller related to assigned Flight Level, the MACH number, or the route to be followed. Such errors can result from errors of coordination between ATC facilities or from a pilot misunderstanding related to a clearance or an update of clearance *(Doc 9689-NA/953, Manual on Airspace Planning Methodology for the Determination of Separation Minima).*

South Atlantic Navigation Deviation Investigation Form

SATMA Navigation Deviation Investigation Form

Type of Report: ☐ PILOT – Flight
☐ CONTROLLER – ATC Unit

Date/Time (UTC):

Type of Deviation: ☐ LATERAL ☐ Type (A to G)*
☐ VERTICAL ☐ Type (A to O)

Causes: ☐ WEATHER (See 3.2-G on Reverse)
☐ OTHERS (Specify)

Conflict Alert Systems:

Details of Aircraft	First Aircraft		Second Aircraft (For Vertical)	
Aircraft Identification:				
Name of Owner/Operator:				
Aircraft Type:				
Departure Point:				
Destination:				
Route Segment:				
Flight Level:	**Cleared**	**Actual**	**Cleared**	**Actual**
Cleared Track:				
Extent of deviation - Magnitude and Direction: (NM for Lateral; Feet for Vertical)				
Amount of Time at Incorrect Flight Level/Track:				
Position Where Deviation Was Observed: (BRG/DIST from Fixed Point or LAT/LONG)				

WAS ATC Clearance Obtained: ☐ YES ☐ NO

If ATC Clearance NOT Obtained:
WERE Contingency Procedures Followed: ☐ YES ☐ NO

Action Taken by ATC/Pilot:

Other Comments:

* See Deviation Classification.

Expanded Guidance for the SATMA Navigation Deviation Investigation Form

1. The ATCO / Pilot should fill as many items as possible.
2. Complementary data can be attached.
3. The notification of any deviation (vertical or lateral) has to be classified, when possible, according to the following types:

   3.1 For large height deviations (vertical deviation):

   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 / descend without ATC clearance.
   F. Entry airspace at an incorrect level.
   G. ATC FL re-clearance resulting in loss of lateral or longitudinal separation.
   H. Deviation due to TCAS.
   I. Aircraft unable to maintain level.
   J. Other.

   3.2 For lateral deviations:

   A. Committed by aircraft not certified for operation in the RNP airspace.
   B. ATC system loop error.
   C1. Equipment control error including inadvertent waypoint error.
   C2. Waypoint insertion error due to the correct entry of incorrect position.
   D. Other with failure notified to ATC in time for action.
   E. Other with failure notified to ATC too late for action.
   F. Other with failure notified / received by ATC.
   G. Lateral deviations due to weather when unable to obtain prior ATC clearance.

   Note that there are data that have to be notified by pilot.

   Remarks:

   1. As contingency procedures have to be followed, if a NO is included in "WERE Contingency Procedures Followed," an explanation (WHY) has to be included in "Other Comments."
   2. The EUR/SAM corridor includes the FIR/UIR/ Recife (Atlantico), Dakar Oceanic, Sal Oceanic and Canaries (South and West).

Send to SATMA
Fax: +34 928 577052
Email: satma@aena.es
Aircraft: ____________________
Date: ______________________

Africa RVSM Monitoring Agency Reporting Form

Navigation Deviation Investigation Form				
Type of Report: ☐ PILOT – Flight ☐ CONTROLLER – ATC Unit				
Date/Time (UTC):	Type of Deviation: ☐ LATERAL ☐ Type (A to G)* ☐ VERTICAL ☐ Type (A to O)			
Causes: ☐ WEATHER (See 3.2-G on Reverse) ☐ OTHERS (Specify)				
Conflict Alert Systems:				
Details of Aircraft	**First Aircraft**		**Second Aircraft (For Vertical)**	
Aircraft Identification:				
Name of Owner / Operator:				
Aircraft Type:				
Departure Point:				
Destination:				
Route Segment:				
Flight Level:	**Cleared**	**Actual**	**Cleared**	**Actual**
Cleared Track:				
Extent of Deviation - Magnitude and Direction: (NM for Lateral; Feet for Vertical)				
Amount of Time at Incorrect Flight Level Track:				
Position Where Deviation Was Observed: (BRG/DIST from Fixed Point or LAT/LONG)				
WAS ATC Clearance Obtained: ☐ YES ☐ NO	If ATC Clearance NOT Obtained: WERE Contingency Procedures Followed: ☐ YES ☐ NO			
Action Taken by ATC / Pilot:				
Other Comments:				

* See deviation classification.

Africa Reporting Form – Expanded Information

1. The ATCO/Pilot should fill as many items as possible.
2. Complementary data can be attached.
3. The notification of any deviation (vertical or lateral) has to be classified, when possible, according to the following types:

   3.1 For large height deviations (vertical deviation):

   - 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 / descend without ATC clearance.
   - F. Entry airspace at an incorrect level.
   - G. ATC FL re-clearance resulting in loss of lateral or longitudinal separation.
   - H. Deviation due to TCAS.
   - I. Aircraft unable to maintain level.
   - J. Other.

   3.2 For lateral deviations:

   - A. Committed by aircraft not certified for operation in the RNP airspace.
   - B. ATC system loop error.
   - C1. Equipment control error including inadvertent waypoint error.
   - C2. Waypoint insertion error due to the correct entry of incorrect position.
   - D. Other with failure notified to ATC in time for action.
   - E. Other with failure notified to ATC too late for action.
   - F. Other with failure notified / received by ATC.
   - G. Lateral deviations due to weather when unable to obtain prior ATC clearance.

   Note that there is data that has to be notified by the pilot.

   Remarks:

   1. As contingency procedures have to be followed, if a NO is included in “WERE Contingency Procedures Followed,” an explanation (WHY) has to be included in “Other Comments.”
   2. The EUR/SAM corridor includes the FIRs/UIRs: Recife (Atlantico), Dakar Oceanic, Sal Oceanic and Canaries (South and West).

P-RNAV Incident Reporting Form

P-RNAV Incident Reporting Form			
Date / Time (UTC):	Tracking Number:		
PIC:	SIC:		
Aircraft Registration:	Aircraft Type:		
Name of Owner / Operator:			
Base of Operations:			
Avionics Manufacturer: Navigation Database Provider:			
Date of Last Database Update:			
Departure Point:	Destination:		
Route Segment / SID / STAR:			
Altitude:			
Describe aircraft system malfunction:			
Were the navigation errors attributed to incorrect data or a navigation database coding error?		☐ Yes	☐ No
Were there unexpected deviations in lateral or vertical flight path not caused by pilot input?		☐ Yes	☐ No
Was there significant misleading information without a failure warning?		☐ Yes	☐ No
Was there a total loss or multiple navigation equipment failure?		☐ Yes	☐ No
Was ATC notified?		☐ Yes	☐ No
What was the extent of deviation – Magnitude and Direction?			
Remarks:			

FORM SENT TO:	DATE	CONTACT	ACTION REQUIRED	
☐ Avionics Manufacturer			☐ Yes	☐ No
☐ Navigation Database Provider			☐ Yes	☐ No

Note: Reverse side may be used for expanded descriptions of the incident and / or follow-up actions.

Expanded Description / Follow-Up Actions:

Wake Turbulence Report Form

For use by pilots involved in Wake Vortex incidents that occur in the NAT, WAT, PAC RVSM airspace, NCA, EUR RVSM, CAR/SAM or the ME RVSM airspace. The information will be forwarded for inclusion in the appropriate Wake Vortex database.

SECTION A

Date of Occurrence	Time (UTC) *Day / Night	Operator	Flight Number
Aircraft Type and Series		Registration	Aircraft Weight (KG)
Origin and Destination	Position in Lat and Long	Cleared Track Coordinates	
Flight Levels	Speed / Mach No.	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 / km / °c		Degree of Turbulence *Light/Moderate/Severe
Other Significant Weather?			

** Circle the appropriate reply only.*

SECTION B

1. What made you suspect Wake Vortex as the cause of the disturbance?

2. Did you experience vertical acceleration? * Yes / No If yes, please describe briefly
3. What was the change in attitude? (Please estimate angle)
   *Pitch______________ *Roll____________ *Yaw___________ *Increase / Decrease
4. What was the change in height, if any?____________________________________
5. Was there buffeting? *Yes / No
6. Was there stick shake? *Yes / No
7. Was the autopilot engaged? *Yes / No
8. Was the autothrottle 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 TCAS? *Yes / No

If yes to any question 10-12, what type of aircraft was it?______________________________

Where was it relative to your position?______________________________

____

(Estimated separation distances)______________________________

Were you aware of the preceding aircraft before the incident? *Yes / No

OTHER INFORMATION

13. Do you have any other comments that you think may be useful?______________________________

Signed ______________________________

Name (BLOCK LETTERS)______________________________Date______________________________

** Circle the appropriate reply only.*

When complete, please send this form to:

NAT / WAT (CMA)	**PAC Region (APARMO) NCA/SDRVSM (NAARMO)**	**EUR Region (Eurocontrol)**	**Middle East Region (ME)**
North Atlantic Central Monitoring Agency c/o National Air Traffic Services Room G41 Scottish and Oceanic Area Control Centre, Sherwood Road, Prestwick, Ayrshire - KA9 2NR Email: natcma@nats.co.uk	William J. Hughes Technical Center (WJHTC) Aviation Systems Analysis and Modeling Branch (ACT-520) Atlantic City International Airport Atlantic City, NJ 08045 Tel: +1 609 485 6263 Fax: +1 609 485 5117 Email: aparmo@admin.tc.faa.gov Email: naarmo@faa.gov	RVSM Programme Support Office - EUROCONTROL Rue de la Fusée, 96 B-1130 Brussels Belgium Tel: +32 (2) 729 3041 Fax: +32 (2) 729 4634 Email: rvsm.office@eurocontrol.int	Middle East Regional Monitoring Agency (MIDRMA) P.O. Box 50468 Kingdom of Bahrain Tel: +973 17 329150 Fax: +973 17 329160 Email: midrma@midrma.com

Note: When experiencing a wake turbulence incident in US DRVSM airspace, flight crews will complete and submit a NASA ASRS form.

DRVSM (U.S.) Wake Turbulence Report Form

(Flight Levels 290-410)

Name____**Date/Time of Occurrence**____________

Instructions

1. Complete the NASA Aviation Safety Reporting System (ASRS) "General Form" (NASA ARC 277B).
2. Annotate the "Type of Event/Situation" block on the NASA ASRS form with the words: "Wake Turbulence."
3. Include comments/narrative in the "Event/Situation" section of the NASA ASRS form.
4. Mail this "Supplemental Information" form with the "General Form" **or** write the information in the "Event/Situation" section of the ASRS form.

Information

Were you aware of the other aircraft before the event? YES ☐ NO ☐

If so, how? Visual ☐ ATC Traffic Advisory ☐ TCAS ☐ Other ☐

What was the position of the **OTHER AIRCRAFT** when you encountered wake turbulence?

☐ Level	Flight Level	
☐ Climbing	☐ Descending	
☐ Opposite direction	Feet above	Miles past
☐ Same direction	Feet above	Miles in front
☐ Converging	Feet above	Miles away
☐ Crossing	Feet above	Miles in front

Briefly characterize the magnitude of the wake turbulence:

Did you experience VERTICAL ACCELERATION? YES ☐ NO ☐

What was the change in ALTITUDE? __________ Feet up __________ Feet down ____________

What was the change in aircraft ATTITUDE? Estimate angle of change in:

PITCH __________ ROLL __________ YAW __________

Was there buffeting? YES ☐ NO ☐

Was there stick shake? YES ☐ NO ☐

Was the autopilot engaged? YES ☐ NO ☐

Was the autothrottle engaged? YES ☐ NO ☐

Website Addresses

1. NASA ASRS Website: http://asrs.arc.nasa.gov/
2. Electronic submission of Aviation Safety Reporting System: http://asrs.arc.nasa.gov/report/electronic.html

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Appendix L: IATA Inflight Broadcast Procedures

African and Indian Ocean (AFI) Region

The IFBP in AFI

- In many FIRs in the AFI Region, communications both fixed and mobile have either not been implemented or operate well below the required reliability. This has an impact on the proper provision of Air Traffic Services, especially flight information service.
- Consequently, the AFI Regional Technical Conference has decided that the IATA Inflight Broadcast Procedure (IFBP) should be used within designated FIRs in the region as an interim measure until such time as communications facilities affecting the FIRs in question have been improved.

Designated Frequency in AFI

In the AFI Region, the designated frequency for the IFBP is 126.9 MHz.

Continuous Air / Ground Communication Watch (Listening Watch)

A continuous air-ground communication watch should be maintained on the designated frequency (126.9MHz in AFI), 10 minutes before entering the designated airspace until leaving this airspace. For an aircraft taking off from an airport located within the lateral limits of the designated airspace, continuous air-ground communication watch should start as soon as appropriate and be maintained until leaving the airspace.

Time of Broadcast

A broadcast should be clearly pronounced in English:

- 10 minutes before entering any FIR within the IFBP region;
- Upon entering any FIR within the IFBP region;
- For a pilot taking off from an airport located within the IFBP region, as soon as practical;
- 10 minutes prior to crossing or joining an ATS route or crossing an airway or waypoint;
- Every 20 minutes;
- Before a change in FL;
- Upon reaching the intended FL; and
- At any other time considered necessary by the pilot.

  Note 1: In the interest of reducing congestion on the IFBP frequency, pilots may exercise discretion to omit closely spaced repetitive IFBP reports. However, broadcast intervals should not exceed 20 minutes.

  Note 2: The IFBP frequency must be closely monitored at all times when in the region (i.e., do not turn off or reduce volume levels on the transmitting / receiving frequency).

Broadcast Procedure

A broadcast message should be structured as follows:

- "*ALL STATIONS*"
- "*THIS IS* (flight number) *IN THE* (name of FIR) *FIR*"
- "*POSITION* (current position) *AT* (HH:MM) *UTC FL* (altitude maintaining)"
- "(Direction) *BOUND ON* (airway)"
- "*ESTIMATING* (next position; waypoint or crossing airway if no waypoint) *AT* (HH:MM)"
- "(Subsequent position; waypoint or crossing airway if no waypoint) *NEXT*"

Operating Procedures

A. Changes of Cruising Level

- Changes of Cruising Level are considered necessary by pilots to avoid traffic conflicts, for weather avoidance, or for other valid operational reasons;
- When cruising level changes are unavoidable, all available aircraft lighting that would improve the visual detection of the aircraft should be displayed while changing levels.

B. Collision Avoidance: If, on receipt of a traffic information broadcast from another aircraft, a pilot decides that immediate action is necessary to avoid an imminent collision risk to the aircraft, and this cannot be achieved in accordance with the right-of-way provisions of Annex 2, the pilot should:

- Unless an alternative maneuver appears more appropriate, climb or descend immediately 500 ft;
- Display all available aircraft lighting that would improve the visual detection of the aircraft;
- As soon as possible reply to the broadcast advising action being taken;
- Notify the action taken on the appropriate ATS frequency; and
- As soon as situation has been rectified, resume normal FL, notifying the action on the appropriate ATS frequency.

C. Normal Position Reporting Procedures: Normal position reporting procedures should be continued at all times, regardless of any action taken to initiate or acknowledge a traffic information broadcast.

D. Operation of Transponders

- Pilots should ensure that transponder procedures as contained in ICAO PANS-OPS Doc 8168 are complied with and in the absence of other directions from ATC, operate the transponder on Mode A and C Code 2000.
- Pilots are advised to ensure operation of transponders even with outside radar coverage in order to enable TCAS equipped aircraft to identify conflicting traffic.

E. Use of TCAS

- In accordance with ICAO Doc 7030, ACAS II will be carried and operated in the AFI Region by all civil fixed-wing turbine-engined aircraft with a maximum takeoff mass exceeding 5,700 kg or maximum approved passenger seating configuration of more than 19.
- IATA promotes the use of working TCAS for aircraft when operating within the AFI Region; and pilots shall select TA/RA mode at maximum range.

F. Use of SLOP: SLOP is promoted in the AFI Region.

Area of Application

In the AFI Region, the IFBP should be applied in the following FIRs and airspaces:

Asmara	HHAA FIR	Lusaka	FLFI FIR
Brazzaville Note 1	FCCC FIR	Mogadishu	HCSM FIR
Kano	DNKK FIR	Niamey	DRRR FIR
Khartoum	HSSS FIR	N'Djamena	FTTT FIR
Kinshasa	FZZA FIR	Tripoli Note 2	HLLL FIR
Luanda	FNAN FIR	Dakar Note 3	GOOO FIR

Note 1: Brazzaville, Niamey and N'djamena FIR provide CPDLC service, however these FIRs are maintained in IFBP area of applicability to accommodate users' requirement for linear boundaries to the extent feasible.

Note 2: Tripoli FIR has mandated IFBP within their entire FIR. Therefore the IFBP region has been extended from North of latitude 30 N to cover the entire Tripoli FIR.

Note 3: Dakar Terrestrial and Dakar Oceanic FIRs apply IFBP only in the case of the activation of their contingency plans.

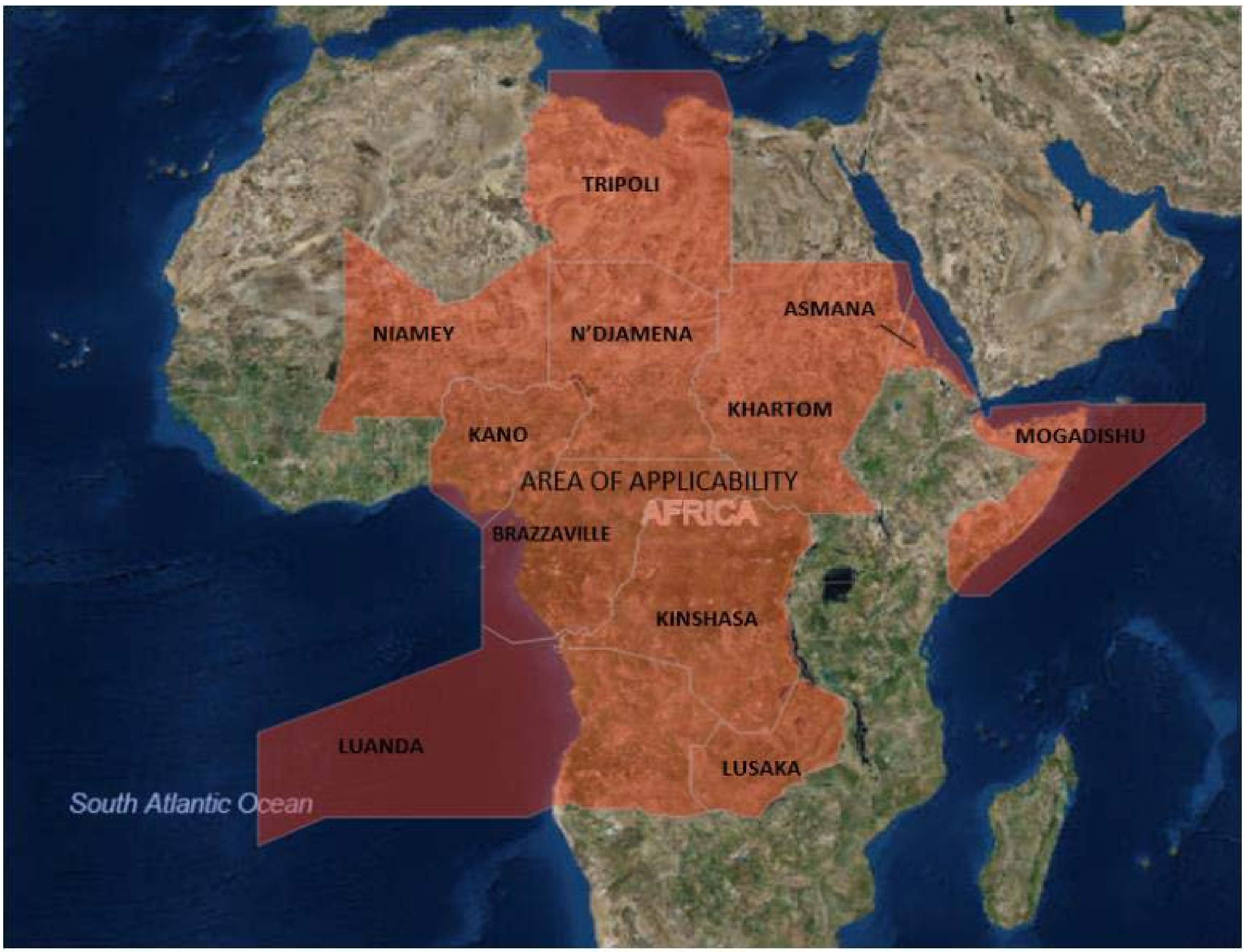
Enforcement

A. Aircraft operating in the AFI region are requested to:

- Ensure that their air crews are fully briefed on the procedure and area of application described; and
- Ensure that their charts and flight documentation are fully amended to reflect the foregoing.

B. Attention is drawn to the fact that during the Haj Pilgrimage period the number of east-west flights in the North-Central part of the AFI Region increases dramatically and with it the risk of ATS incidents and the importance of the IFBP.

Map



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Appendix M: United States Supplementary Information

RVSM Mandate

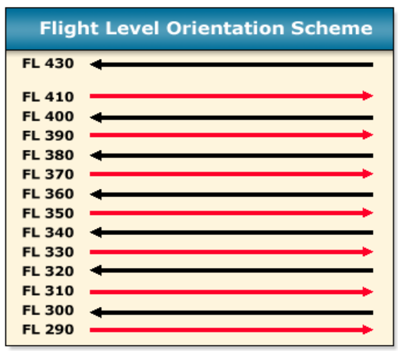
A. RVSM has been implemented between FL290 - FL410 (inclusive) in the following airspace: The airspace of the lower 48 states of the US, Alaska, Atlantic and Gulf of Mexico High Offshore Airspace and the San Juan FIR, Canada, Mexico, the Caribbean, and South America. To harmonize North American RVSM policy / procedures to the maximum extent possible, the guidance information presented in this manual has been coordinated with Canadian and Mexican authorities.

B. Aircraft that are fitted with a 91.227 compliant ADS-B Out system, and which are transmitting appropriate ADS-B information, are considered to be automatically authorized for RVSM operations in US airspace as long as crews are trained, all maintenance tasks required for continued RVSM airworthiness are complete, and height monitoring requirements are complied with.

   Note: Any operators who will operate in RVSM airspace outside of the US must still apply for a formal RVSM authorization; at this time, the automatic authorization in the US is not recognized internationally.

Flight Level Orientation Scheme

Altitude assignments for direction of flight will follow the odd altitude assignment for magnetic courses 000-179 degrees and even altitudes for magnetic courses 180-359 degrees for flights up to and including FL410 as indicated in the chart below:



Guidance on Mountain Wave Activity (MWA) and Severe Turbulence in Domestic Airspace

A. General: MWA is generally experienced in the months between late fall and early spring. It often occurs in western states in the vicinity of mountain ranges. It may occur when strong winds blow perpendicular to mountain ranges, resulting in up and down or wave motions in the atmosphere.

B. Wave action can also produce altitude excursions and airspeed fluctuations accompanied by only light turbulence. Severe turbulence causes large, abrupt changes in altitude and / or attitude usually accompanied by large variations in indicated airspeed. Aircraft may be momentarily out of control. Encounters with severe turbulence must be remedied immediately in any phase of flight.

   Note: Wave activity is not necessarily limited to the vicinity of mountain ranges. MWA is difficult to forecast and can be highly localized and short lived.

C. For both MWA and severe turbulence encounters in RVSM airspace, an additional concern is the sensitivity of collision avoidance systems when one or both aircraft operating in close proximity receive TCAS advisories in response to disruptions in altitude hold capability.

D. Pilots experiencing wave activity that significantly affects altitude-keeping may follow the guidance provided below.

Preflight Planning Actions

Sources of observed and forecast information are: Forecast Winds and Temperatures Aloft (FD), Graphical Forecast for Aviation (GFA), SIGMETS, PIREPS, AIREPS (ICAO).

Inflight MWA Indicators

- Altitude excursions and airspeed fluctuations with or without associated turbulence.
- Pitch and trim changes required to maintain altitude with accompanying airspeed fluctuations.
- Light to severe turbulence depending on the magnitude of the MWA.
- When the pilot experiences weather induced altitude deviations of approximately 200 ft, the pilot will contact ATC and state *"UNABLE RVSM DUE (STATE REASON, E.G., TURBULENCE, MOUNTAIN WAVE)."*

  Note: Flight crews should review Turbulence Reporting Criteria table (AIM).

Encountering MWA

A. Pilot:
   1. Pilot will contact ATC and report the magnitude and location of the MWA to ATC. When ATC makes a merging targets traffic call, the pilot may request a vector to avoid flying directly over or under the traffic.
   2. If controller calls approaching or converging traffic at adjacent FL and the aircraft is experiencing MWA that significantly affects altitude-keeping, the pilot may request vector for traffic avoidance.
   3. Pilot requests for vectors for traffic avoidance when encountering MWA or pilot reports of *"UNABLE RVSM DUE TURBULENCE"* are considered first priority aircraft separation and sequencing responsibilities.

      Note: Until the pilot reports clear of MWA, the controller will apply merging target vectors to one or both passing aircraft to prevent their targets from merging.

      Pilot: "[aircraft ID]*, FL310, UNABLE RVSM DUE SEVERE TURBULENCE*."

      Controller: "[aircraft ID] *FLY HEADING 290; TRAFFIC TWELVE O'CLOCK, 10 MILES, OPPOSITE DIRECTION; EASTBOUND MD-80 AT FL320*" (or the controller may issue a vector to the MD-80 traffic to avoid the aircraft).

B. Controller will:
   1. Advise pilot of conflicting traffic at adjacent FL.
   2. *"VECTOR AIRCRAFT TO AVOID MERGING TARGETS WITH TRAFFIC AT ADJACENT FLIGHT LEVELS, TRAFFIC PERMITTING."* The term "traffic permitting" is not intended to imply that merging target procedures are not a priority duty.
   3. Issue FL change or reroute, traffic permitting.
   4. Issue PIREP to other aircraft.

      Note: If necessary, the pilot may request an FL change and / or reroute or leave airspace where MWA or severe turbulence is being encountered.

Wake Turbulence

Pilots should be aware of the potential for wake turbulence encounters following DRVSM implementation. Experience gained since 1997, however, has shown that such encounters in RVSM airspace are generally moderate or less in magnitude.

Encountering Wake Turbulence

A. Pilots should be alert for wake turbulence when operating:
   - In the vicinity of aircraft climbing or descending through their altitude.
   - Approximately 10-30 miles after passing 1,000 ft below opposite-direction traffic.
   - Approximately 10-30 miles behind and 1,000 ft below same-direction traffic.

B. Pilot Actions: Pilot should contact ATC and request:
   - Vector;
   - FL change; or, if capable,
   - A lateral offset.

Note: Offsets of approximately a wingspan upwind generally can move the aircraft out of the immediate vicinity of another aircraft's wake vortex.

C. Controller should issue vector, FL change, or lateral offset clearance, traffic permitting.

Weather Encounters

Initial Pilot Actions:

- Notify ATC and request assistance as detailed below.
- Maintain the CFL, to the extent possible, while evaluating the situation.
- Watch for conflicting traffic both visually and by reference to TCAS.
- Alert nearby aircraft by illuminating exterior lights (commensurate with aircraft limitations).

Severe Turbulence

A. Pilot will:
   1. Contact ATC and state "*UNABLE RVSM DUE TURBULENCE*."
   2. Request vector clear of traffic at adjacent FLs.
   3. Request FL change or reroute, if desired.

B. Controller will:
   1. Advise pilot of conflicting traffic.
   2. Provide lateral or longitudinal separation from aircraft at adjacent FLs, traffic permitting.
   3. Issue FL change or reroute, traffic permitting.

Strategic Lateral Offsets

Application of Strategic Lateral Offset Procedures (SLOP) is prohibited in U.S. Domestic Airspace. Flight crews must request permission from ATC for offsets of more than one wingspan.

Summary MWA / Turbulence

Circumstance	Pilot	Controller
Severe Turbulence and / or Mountain Wave Activity (MWA) Induced Altitude Deviations of Approximately 200 ft	• When experiencing severe turbulence and / or MWA induced altitude deviations of approximately 200 ft or greater, pilot will contact ATC and state *"UNABLE RVSM DUE (STATE REASON, E.G., TURBULENCE, MOUNTAIN WAVE)"* • If not issued by the controller, request vector clear of traffic at adjacent FLs • If desired, request FL change or reroute • Report location and magnitude of turbulence or MWA to ATC	• Vector aircraft to avoid merging target with traffic at adjacent FLs, traffic permitting • Advise pilot of conflicting traffic • Issue FL change or reroute, traffic permitting • Issue PIREP to other aircraft

Circumstance	Pilot	Controller
Mountain Wave Activity (MWA) Encounters – General Note: MWA encounters do not necessarily result in altitude deviations on the order of 200 ft	• Contact ATC and report experiencing MWA • If so desired, pilot may request an FL change or reroute • Report location and magnitude of MWA to ATC	• Advise pilot of conflicting traffic at adjacent FL • If pilot requests, vector aircraft to avoid merging target with traffic at adjacent RVSM FLs, traffic permitting • Issue FL change or reroute, traffic permitting • Issue PIREP to other aircraft
Wake Turbulence Encounters	• Contact ATC and request vector, FL change or, if capable, a lateral offset	• Issue vector, FL change, or lateral offset clearance, traffic permitting

Failure of Aircraft Systems

A. Failure of Autopilot, Altitude Alerter, or All Primary Altimeters

- Pilot will:
  1. Contact ATC and state "*UNABLE RVSM DUE EQUIPMENT*."
  2. Request clearance out of RVSM airspace unless operational situation dictates otherwise.
- Controller will:
  1. Provide 2,000 ft vertical separation or appropriate horizontal separation.
  2. Clear aircraft out of RVSM airspace unless operational situation dictates otherwise.

B. One Primary Altimeter Remains Operational

A. Pilot will:
  1. Crosscheck standby altimeter.
  2. Notify ATC of operation with single primary altimeter.
  3. If unable to confirm primary altimeter accuracy, follow actions for failure of all primary altimeters.

B. Controller will acknowledge operation with single primary altimeter.

Summary Failure of Aircraft Systems

Circumstance	Pilot	Controller
Failure of Automatic Altitude Control System, Altitude Alerter, or All Primary Altimeters	• Contact ATC and state *"UNABLE RVSM DUE EQUIPMENT"* • Request clearance out of RVSM airspace unless operational situation dictates otherwise	• Provide 2,000 ft vertical separation or appropriate horizontal separation • Clear aircraft out of RVSM airspace unless operational situation dictates otherwise
One Primary Altimeter Remains Operational	• Cross check standby altimeter • Notify ATC of operation with single primary altimeter • If unable to confirm primary altimeter accuracy, follow actions for failure of all primary altimeters	• Acknowledge operation with single primary altimeter

Transponder Failure	• Contact ATC and request authority to continue to operate at CFL • Comply with revised ATC clearance, if issued	• Consider request to continue to operate at CFL • Issue revised clearance, if necessary

RVSM Monitoring Requirements

A. Operators are required to conduct height monitoring every two (2) years or within intervals of 1,000 flight hours per aircraft, whichever period is longer, in accordance with the aircraft categories as presented in the current version of the (North American) RVSM Minimum Monitoring Requirements chart. The RVSM Minimum Monitoring Requirements Chart will be posted to the www.faa.gov website in the RVSM documentation section "Monitoring Requirements / Procedures."

B. Operators found not in compliance will be required to show cause for not meeting the requirements including flight hour data to justify the 1,000 flight hour provision if the last successful monitoring exceeds a two-year period. Operators found not in compliance risk suspension of their RVSM authorization. Reinstatement of RVSM authorization will only be granted upon the operator demonstrating they have met the minimum monitoring requirements.

RVSM Monitoring Procedures

A. Initial Height Monitoring: Initial height monitoring flights will be conducted for the approved aircraft within six (6) months of RVSM approval (date of signed Letter of Authorization). Either documentation from the monitoring agency (AGHME or GMU) for the initial height monitoring will be provided to the FAA, or appropriate ADS-B Out data will be transmitted per the requirements of Part 91, Appendix G, Section 9.

B. Recurrent Height Monitoring: Recurrent height monitoring will be conducted every two (2) years thereafter or within intervals of 1,000 flight hours per aircraft, whichever period is longer. The number of aircraft monitored will be determined by using the chart listed on the FAA RVSM website, or other FAA referenced document as it is developed and distributed.

C. Recording and Tracking of RVSM Height Monitoring: The date and current flight hours at the time of the initial height monitoring should be entered into the computerized maintenance tracking software (e.g., CAMP). Thereafter, the software will be used to track recurrent height monitoring flights. The date and flight hours at the time of completion of any recurrent height monitoring will be entered into the Aircraft Maintenance Records with the following statement:

   "*Recurrent Height Monitoring was completed on _________ (Date). The aircraft flight hours at the time of the monitoring were ____________.*"

D. This requirement may also be met through ADS-B Out height monitoring data that will be collected by the FAA automatically during RVSM flights. However, if for any reason this ADS-B data is insufficient, the aircraft will overfly one of the operational US Domestic AGHME sites or conduct a GMU flight with an approved vendor.

General Customs Procedures

A. Crews should be familiar with the US CBP Private Flyers Guide, 19 CFR Part 122, and AIP Section GEN 1.3 *Entry, Transit and Departure of Passengers and Crew* to be informed of US Customs procedures and requirements.

B. For flights entering or exiting the US, the submission of an eAPIS form (Electronic Advanced Passenger Information System) is mandatory. Specific procedures for this can be found below.

C. Pilots must provide advance notice of estimated time of arrival (ETA) to Customs. Applicable contact information for ports of entry in the US can be found at https://www.cbp.gov/contact/ports. Contact information for ports of entry outside the US is located in the corresponding AIP under Section 3, *Aerodromes*.

D. Non-US citizens flying to the US may be exempt from visa requirements for up to 90 days if the flight department applies for and is approved to join the US CBP Visa Waiver Program (VWP). Passengers must be from a country that is participating in the VWP with the United States to be eligible for this exemption. Approval for the program must be renewed every seven years and is issued to operators rather than to specific individuals or aircraft.

- The following countries are participating in the VWP: Andorra, Australia, Austria, Belgium, Brunei, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Republic of Korea, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Portugal, San Marino, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, and United Kingdom.
- Refer to the US CBP website for more detail and application instructions: https://www.cbp.gov/travel/international-visitors/visa-waiver-program
- Operators who are not participating in the VWP may still bring non-US citizens to the US as normal, but those passengers will be required to obtain a visa in advance.

US Advance Passenger Information System (APIS) Requirements

Introduction

A. Pilots of all private aircraft arriving in the US from a foreign port or place, or departing the US for a foreign destination, are required to submit APIS manifest information *and* a notice of arrival / departure electronically to US Customs and Border Protection (CBP) for each individual traveling onboard the aircraft.

B. APIS manifest submissions can be transmitted through CBP's Electronic Advance Passenger Information System (eAPIS) web portal or another CPB-approved electronic system. eAPIS can be accessed via the following website: https://eapis.cbp.dhs.gov

Note: eAPIS submissions to CBP comply with *only* US APIS requirements. Any additional applicable APIS reporting requirements for foreign areas (e.g., Mexico) are independent from CBP and must be complied with via a separate transmission to the applicable authority. Consult applicable AIPs for more information.

C. Telephone calls, faxes, emails, and other transmissions do *not* meet APIS requirements unless specifically authorized by CBP.

D. APIS submission are *not* required for flights that overfly foreign airspace, but which depart and land in the US.

Applicability to Non-Continental US Territories

A. Flights between the continental US and Alaska, Hawaii, Puerto Rico, Guam, and the Northern Mariana Islands are *not* subject to APIS transmission requirements.

B. Flights between the continental US and the US Virgin Islands *are* subject to APIS transmission requirements.

Timeline Submission Requirements

Complete APIS transmissions must be submitted no later than:

Flights originally destined for the US departing from a foreign place	60 minutes prior to departure
Flights not originally destined for the US, but diverted to a US port due to an emergency	30 minutes prior to arrival
Flights departing the US	60 minutes prior to departure

Manifest Transmission Procedures

A. Pilots transmit the APIS manifest through eAPIS or another approved service provider. It is recommended that a printed copy of the manifest be kept.

B. When an APIS manifest is received by CBP, an email receipt is generated and sent to the email address associated with the sender's eAPIS account. The receipt will indicate whether travelers are cleared for arrival / departure or if additional steps are necessary. It is recommended that a printed copy of this receipt be kept as well.

C. After the receipt is received, pilots must follow all instructions contained within the response email / receipt. The instructions will assist in the completion of any additional arrival / departure and/or landing rights procedures that may be required.

D. If an individual on the No-Fly watch list is identified on the manifest, the Department of Homeland Security (DHS) will conduct a risk-based analysis and make a determination whether to grant, restrict, or deny landing rights. If landing rights are restricted, the pilot will be provided with appropriate instructions and contact information.

Making Modifications to an APIS Transmission

A. If changes to an already submitted manifest are necessary, the PIC is responsible for ensuring that an updated and amended manifest is resubmitted to CBP. If an updated manifest is submitted, approval from CBP for the amended manifest must be obtained before the aircraft may depart.

B. If additional travelers are added to an already-submitted manifest, an updated manifest submission with the new traveler information is required. When a traveler on an already-submitted manifest does not travel on the flight, current CBP policy does not require submission of an updated manifest.

C. Certain changes to an already-submitted manifest do not require electronic resubmission. The following may be submitted by telephone, radio, or through existing processes:

- Flight cancellations;
- Changes in Expected Time of Arrival (ETA) / Departure (ETD); or
- Changes in arrival / departure location.

D. On a limited case-by-case basis, CBP may permit a pilot to submit or update notice of arrival or departure and manifest information by telephone when unforeseen circumstances preclude submission of the information via eAPIS. Under such circumstances, CBP will manually process the information provided by the pilot; the pilot is required to wait for CBP screening and approval to depart. In these cases, the pilot should contact the CBP airport of arrival / departure for assistance.

E. Changes in ETA and arrival location must be coordinated with the CBP arrival location to ensure that resources are available to inspect the arriving aircraft.

Advance Passenger Information System (APIS) Required Data Elements

A. Aircraft Information

- Aircraft tail number;
- Type of Aircraft;
- Aircraft Colors;
- *Callsign* (if available);
- CBP issued decal number (if available);
- Name of aircraft operator;
- Address of aircraft operator;
- Owner / Lessee name;
- Owner / Lessee address.

B. Flight Details – Arrival to the US

- Date of aircraft arrival;
- Name of Intended US airport of first landing;
- Place of last departure (ICAO airport code, when available);

- Complete itinerary;
- Estimated Time of Arrival (ETA);
- Estimated time and location of crossing U.S. border / coastline;
- 24-hour Emergency point of contact (e.g., broker, dispatcher, repair shop, or other third party contact, or individual who is knowledgeable about this particular flight) name (last, first, and, if available, middle) and phone number.

C. Flight Details – Departures from the US

- Date of aircraft departure;
- Name of intended foreign airport of first landing (ICAO airport code, when available);
- Place of last departure;
- Complete itinerary;
- Estimated Time of Departure (ETD);
- Estimated time and location of crossing U.S. border / coastline;
- 24-hour Emergency point of contact (e.g., broker, dispatcher, repair shop, or other third party contact, or individual who is knowledgeable about this particular flight) name (last, first, and, if available, middle) and phone number.

D. Traveler Information

- Full name (last, first, and, if available, middle);
- Status on board the aircraft;
- Gender (F=female; M=male);
- Date of birth;
- Country of residence;
- Country of citizenship;
- Permanent address of the PIC of the aircraft;
- Passenger address while in the US;
- Passenger document information (DHS-approved travel document):
  - Document type (e.g., passport; alien registration card);
  - Document number, if a DHS-approved travel document is required;
  - Country of issuance, if a DHS-approved travel document is required;
  - Expiration date, where applicable.

Additional Resources

Pilots can consult the following websites for additional information on APIS requirements:

- APIS Overview: http://www.cbp.gov/travel/travel-industry-personnel/apis2
- CBP Private Air APIS Guide: http://www.cbp.gov/sites/default/files/documents/CBP Private Air Guide 3 0 (Jan 2015).pdf

US Preclearance Procedures

A. US Customs and Border Protection (CBP) has entered into agreements in six countries, with plans to expand to additional locations, to allow for preclearance procedures at foreign airports. Preclearance will allow operators departing from a foreign location to the US to avoid further CBP processing or security screening upon arrival.

B. A current list of foreign locations that offer preclearance can be found on the CBP website below:

http://www.cbp.gov/border-security/ports-entry/operations/preclearance

Cold Temperature Restricted Airports

A. A list of Cold Temperature Restricted Airports (CTRA) has been published by the FAA. These airports are indicated by a "snowflake" icon and a full list can be found at:

http://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/search/

B. Crews operating to any of these airports must make an altitude correction to the published "at," "at or above," and "at or below" altitudes on all designated segment(s), for all published procedures and runways, when the reported airport temperature is at or below the published airport cold temperature restriction on the approach plate. Pilots must advise ATC when correcting on any segment of the approach other than the final segment.

Note: Crews may use Real Time Mesoscale Analysis (RTMA): *Alternate Report of Surface Temperature* for computing altitude corrections when airport temperatures are not available via normal reporting. The RTMA website is: http://nomads.ncep.noaa.gov/pub/data/nccf/com/rtma/prod/airport_temps/

C. Pilots **without** temperature compensating aircraft must calculate and make a manual cold temperature altitude correction in accordance with the ICAO Cold Temperature Error Table (Appendix F), using one of the methods specified below.

Note: No extrapolation above the 5,000 ft column is required. Pilots should use the 5,000 ft "height above airport in feet" column for calculating corrections of greater than 5,000 ft above the reporting station. Pilots must add correction(s) from the table to the segment altitude(s) and fly at the new corrected altitude. **Crews must not make an altimeter change** to accomplish an altitude correction.

D. Pilots **with** temperature compensating aircraft must ensure the system is on and operating for each segment requiring an altitude correction. If the system is not operating, or not being used, the pilot must manually calculate and apply a cold weather altitude correction in accordance with the ICAO Cold Temperature Error Table (Appendix F). **Crews must not make an altimeter change** to accomplish an altitude correction.

Note: Some RNAV systems apply temperature compensation only to those altitudes associated with an instrument approach procedure loaded into the active flight plan while other systems apply temperature compensation to all procedure altitudes or user entered altitudes in the active flight plan, including altitudes associated with a STAR. For those systems that apply temperature compensation to all altitudes in the active flight plan, delay activating temperature compensation until the aircraft has passed the last altitude constraint associated with the active STAR.

E. There are two methods to apply a correction: the NTAP Segments Method and the All Segments Method.

F. NTAP Segments Method: Apply temperature altitude corrections to all published altitudes on the affected segments listed in the CTRA list.

- Aircraft **without** temperature compensating equipment / Crews using the ICAO Cold Temperature Error Table:
  1. Intermediate Segment: All altitudes from the FAF/PFAF up to but not including the intermediate fix (IF) altitude. Calculate correction by taking FAF/PFAF altitude and subtracting the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Round this number as applicable and then add to FAF altitude and all step-down altitudes.
  2. Final Segment: Calculate correction by taking the MDA or DA for the approach being flown and subtract the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Use this number or round up. Add this number to MDA or DA/DH, as applicable, and any applicable step-down fixes in the final segment.

3. Missed Approach Segment: Calculate the correction by taking the final missed approach (MA) holding altitude and subtract the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Round this number as applicable and then add to the final MA altitude only.

- Aircraft **with** temperature compensating RNAV equipment: Follow the instructions for applying temperature compensation provided in the AFM or RNAV system operating manual. Ensure that temperature compensation is active on the segment being corrected. Manually calculate an altimetry correction for the MDA or DA. Determine an altimetry correction from the ICAO table based on the reported airport temperature and the height difference between the MDA or DA, as applicable, and the airport elevation.

G. All Segments Method: Apply temperature altitude corrections to all published altitudes from the IAF altitude to the MA final holding altitude.

- Aircraft **without** temperature compensating equipment / Crews using the ICAO Cold Temperature Error Table:

1. All altitudes from the FAF/PFAF up to and including the IAF altitude: Calculate correction by taking FAF/PFAF altitude and subtracting the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Round this number as applicable and then add to all altitudes from the FAF altitude through the IAF altitude.
2. All altitudes in final segment: Calculate correction by taking the MDA or DA for the approach being flown and subtract the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Use this number or round up. Add this number to MDA or DA/DH, as applicable, and any applicable step-down fixes in the final segment.
3. Final holding altitude in the Missed Approach Segment: Calculate the correction by taking the final missed approach (MA) holding altitude and subtract the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Round this number as applicable and then add to the final MA altitude only.

- Aircraft **with** temperature compensating RNAV equipment: Follow the instructions for applying temperature compensation provided in the AFM or RNAV system operating manual. Ensure that temperature compensation is active prior to the IAF and remains active through the entire approach. Manually calculate an altimetry correction for the MDA or DA. Determine an altimetry correction from the ICAO table based on the reported airport temperature and the height difference between the MDA or DA, as applicable, and the airport elevation.

H. Crews must report cold temperature corrected altitudes to ATC whenever applying a cold temperature correction. (Pilots do not need to inform ATC of the final approach segment correction, i.e., new MDA or DA/DH.) This should be done on initial radio contact with the controller issuing approach clearance. ATC requires this information in order to ensure appropriate vertical separation between known traffic. Pilots should ask ATC when vectored altitudes to a segment are lower than the requested corrected altitude. Pilots are encouraged to self-announce corrected altitude when flying into non-towered airfields.

I. Altitudes Not Corrected: ATC will not apply a cold temperature correction to MVAs. Pilots must be cleared by ATC to apply a cold temperature compensation to an ATC assigned altitude or when flying on a radar vector in lieu of a published missed approach procedure. Pilots must not correct altitudes published on SIDs, ODPs, and STARs.

J. Use of Corrected MDA/DA: Pilots must use the corrected MDA or DA/DH as the minimum for an approach. Pilots must meet the requirements in 14 CFR Part 91.175 in order to operate below the corrected MDA or DA. Pilots must see and avoid obstacles when descending below the MDA.

K. Additional Temperature Restrictions on IAP Charts:

- The charted temperature restriction for “uncompensated baro-VNAV systems” on RNP APCH and ANP AR approach plates is independent of the temperature restriction established at a CTRA.

- The charted temperature restriction for an uncompensated baro-VNAV system is applicable when the LNAV / VNAV line of minima is used on an RNAV (GPS) approach.
- The temperature restriction for an uncompensated baro-VNAV system on an RNAV (RNP) AR approach applies to the entire procedure.
- Aircraft without a compensating baro-VNAV system:
  - Aircraft without a compensating baro-VNAV system may not use the LNAV / VNAV line of minima on the RNAV (GPS) approach when the actual temperature is above or below the charted baro-VNAV temperature restriction.
  - The RNAV (RNP) AR approach is not authorized when the actual temperature is above or below the charted baro-VNAV temperature restriction.
- In all cases, a cold temperature altitude correction must be applied when the actual temperature is at or below the cold temperature restricted airport temperature restriction.

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Appendix N: Automatic Dependent Surveillance – Broadcast

Introduction and Overview

A. ADS-B is a next generation surveillance technology that incorporates both air and ground aspects to provide ATC with a more accurate representation of the aircraft's three-dimensional position in the en route, terminal, approach and surface environments.

- Airborne Portion - The aircraft provides the airborne portion in the form of a broadcast of its identification, position, altitude, velocity, and other information.
- Ground Portion - The ground portion is comprised of ADS-B ground stations which receive these broadcasts and direct them to ATC automation systems for presentation on a controller's display.

B. ADS-B In versus ADS-B Out

- ADS-B Out refers to an aircraft broadcasting own-ship information and includes the automatic transmission of the aircraft position to ATC and other users. ADS-B Out performance is required for all aircraft operating within designated classes of airspace within the US National Airspace System (NAS).
- ADS-B In refers to an aircraft's ability to receive ADS-B information, such as ADS-B broadcasts from other aircraft, Traffic Information Services – Broadcast (TIS-B), Automatic Dependent Surveillance – Rebroadcast (ADS-R), and Flight Information Services Broadcast (FIS-B), to improve the pilot's situational awareness of other traffic. Aircraft systems must be approved prior to ADS-B In operations.

C. Currently Target Corporation intends to conduct ADS-B Out operations only. If or when ADS-B In operations will be conducted, this appendix will be revised accordingly.

D. There is no authorization required or available for US operators to conduct ADS-B Out operations. However, it is recommended that US operators carry a copy of FAA Notice 8900.491 on board in lieu of an authorization. This Notice describes the FAA's rationale behind not issuing an authorization, and can be provided to anyone who may ask to see an LOA for ADS-B, should the topic come up.

E. Authorization is required to conduct ADS-B In operations. The following authorization paragraphs are required for ADS-B In operations, as applicable:

A354	*In-Trail Procedures (ITP) Using ADS-B In*
A355	*Automatic Dependent Broadcast – In (ADS-B In), Including CAVS and IM*

System Description and Applications

A. There are two primary methods (ADS-B links) for transmitting messages:

1. 1090 Extended Squitter (1090ES) / Transponder
   - Extended Squitter (ES) is how ADS-B messages are transmitted from a Mode S Transponder. ES is a long message that Mode S transponders transmit automatically to announce the own-ship aircraft's presence to nearby ADS-B aircraft and ground stations. 1090ES equipment operates on 1090 MHz and meets the performance requirements specified in TSO-C166b.
   - As 1090ES-linked aircraft use the Mode S Transponder to transmit ADS-B messages, there should be a single interface to input Mode 3/A codes, IDENT status, and emergency status into both the Transponder and the ADS-B system.
2. Universal Access Transceiver (UAT) / Datalink: UAT is a wideband multipurpose data link intended to operate globally on a single channel. By design, UAT supports multiple broadcast services, including FIS-B and TIS-B in addition to ADS-B. The UAT operates on 978 MHz and meets the performance requirements specified in TSO-C154c.

B. Required Broadcast Elements: Variations in position source performance may affect the following ADS-B Out broadcast elements:

1. Navigation Accuracy Category for Position (NACp); and
2. Navigation Integrity Category (NIC).

   Note: During certain GNSS constellation geometries, some position sources may produce values for NACp and NIC that are less than the regulatory requirement (e.g., CFR 91.227). Refer to "Preflight Considerations" below for procedures to address this potential conflict.

C. ADS-B implementation includes three Broadcast Services:

1. Automatic Dependent Surveillance – Rebroadcast (ADS-R): Because the ADS-B system operates on two separate frequencies (1090 MHz and 978 MHz), there is a need to translate, reformat, and rebroadcast the information from each frequency to enable aircraft operating on the alternate frequency to process and use the other's information. This process is referred to as ADS-R and occurs within the ADS-B ground station.

   Note: Aircraft operating on the same ADS-B frequency exchange information directly and do not require ADS-R translation. Aircraft with ADS-B In capability on both UAT and 1090ES do not require ADS-R service.

2. Traffic Information Service – Broadcast (TIS-B): TIS-B is the broadcast of transponder-based traffic information derived from ATC surveillance systems. TIS-B provides aircraft equipped with ADS-B In with a more complete picture of surrounding traffic in situations where not all aircraft are equipped with ADS-B.
3. Flight Information Service – Broadcast (FIS-B): The FIS-B operates on UAT only and provides aircraft equipped with ADS-B In with a suite of advisory-only aeronautical and weather information products to enhance the user's SA. Additional information on FIS-B and the products available through the service are provided in the Aeronautical Information Manual (AIM).

D. Applications of ADS-B In: ADS-B In equipage is not presently mandatory, but operators of aircraft who have it can receive operational benefits, including the following.

1. CDTI (Cockpit Display of Traffic Information): This is the collective term for input/output devices that make use of ADS-B In to provide the crew with air traffic information. The display may vary from configuration to configuration, but could include nearby ADS-B Out traffic (e.g., TIS-B), aeronautical or weather data (e.g., FIS-B), and a moving map depicting key surface elements of an airport.
2. CAVS (CDTI-Assisted Visual Separation): Assists the crew in maintaining visual separation from other ADS-B Out equipped aircraft using CDTI data. Currently, CAVS may only be used during the approach phase of flight when cleared by ATC to maintain visual separation.
3. ITP (In-Trail Procedure): Allows crews in non-radar oceanic airspace to perform FL changes with reduced separation minima, which provides crews more flexibility to avoid weather or obtain favorable winds / conditions.
4. IM (Interval Management): Provides more efficient spacing between aircraft based on ADS-B data, allowing ATC to more efficiently sequence / clear aircraft for arrival at airports (thus reducing overall fuel burn and avoiding potential delays / holding).

Equipage Requirements

Below is a brief overview of known areas and routes where ADS-B equipage is mandatory. This list should not in any way be understood as comprehensive or complete. Additional regions / countries are implementing ADS-B infrastructure according to their own schedules and availability of resources, and crews must be aware of the potential for new mandates to arise. Flight crews must confirm any relevant ADS-B requirements during preflight planning by reviewing the applicable state AIPs / AICs and other published data.

Region	Link Required	Where Required
Australia	1090ES	At or above FL290
Canada	1090ES[1]	*Currently:* 18,000 feet and above (Class A airspace) *May 16, 2024:* 12,500 feet and above (Class A and B airspace) *2026 or later:* Below 12,500 feet (Class C, D, and E airspace)
China (Taipei FIR)	1090ES	At or above FL290 on all routes
China (Sanya FIR)	1090ES	PBN routes L642 or M771 at or above FL290
Colombia	1090ES	*Beginning April 30, 2022*: All flight levels in Colombia
Europe	1090ES	Required for all aircraft
Hong Kong	1090ES	At or above FL290
India	1090ES	At or above FL290 on the following routes: A201, A347, A465. A474, A791, B211, B466. G450, R457, R460, R461, W15, W19, W20, W29, W41, W43, W45, W47, W56S/N, W67, W111, W112, W114, W115, W118, and W153, as well as any with designators L, M, N, P, Q, and T
Indonesia	1090ES	At or above FL290
Mexico	1090ES	Above 10,000 ft MSL in Class A, B, C, and E airspace
New Zealand	1090ES	All aircraft in all controlled airspace in New Zealand
North Atlantic	1090ES	The western half of ATS surveillance airspace over Greenland
Saudi Arabia	1090ES	All controlled airspace (Classes A, B, C, D, and E)
Singapore	1090ES	Routes N891, M753, L642, M771, L644, and N892 at FL290 and above
South Africa	1090ES	Class A, B, C, and E airspace
Sri Lanka	1090ES	At or above FL290 in Colombo Terminal Control Area
United States	1090ES or UAT[2]	All Class A, B, and C airspace, and above 10,000 ft in Class E airspace[3]
Vietnam (Ho Chi Minh FIR)	1090ES	Routes L625, M771, N892, L642, M765, M768, N500 and L628 at FL290 and above

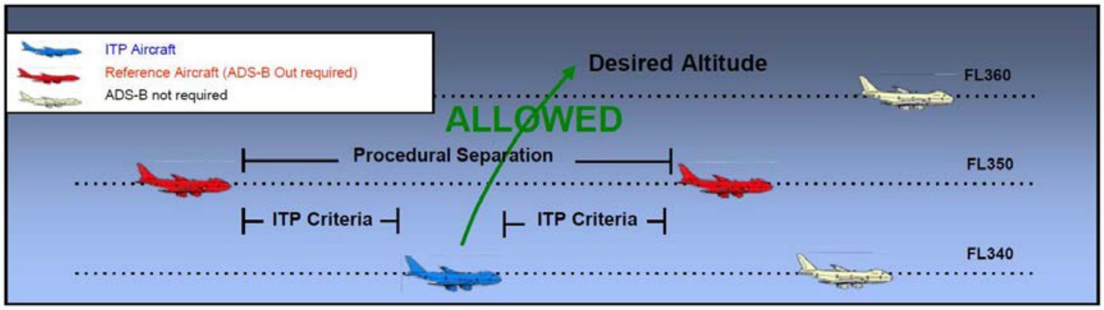
Note 1: Canada makes use of space-based ADS-B via the Aerion satellite network. Accordingly, the 1090ES system must include an antenna that is capable of being directed toward both ground and satellite signals.

Note 2: Aircraft that are equipped with a UAT only as a method of ADS-B compliance may not conduct operations in US Class A airspace.

Note 3: Although many countries will accept ADS-B Out equipment certified to EASA AMC 20-24 standards, that certification alone is not sufficient for use in US airspace. The US requires that ADS-B Out aircraft be compliant with CFR 91.227, unless an appropriate Exemption 12555 has been approved for the aircraft.

In-Trail Procedure (ADS-B In)

A. ITP enables crews to use ADS-B In data to execute FL changes in non-radar oceanic airspace to improve comfort, avoid weather, or obtain more favorable conditions for fuel economy or arrival times. An illustration of ITP is shown in the following diagram, which depicts a hypothetical situation in which the ADS-B In aircraft (blue) can ascend from FL340 to FL360 between two reference aircraft (red), using ADS-B data to ensure safe separation throughout.



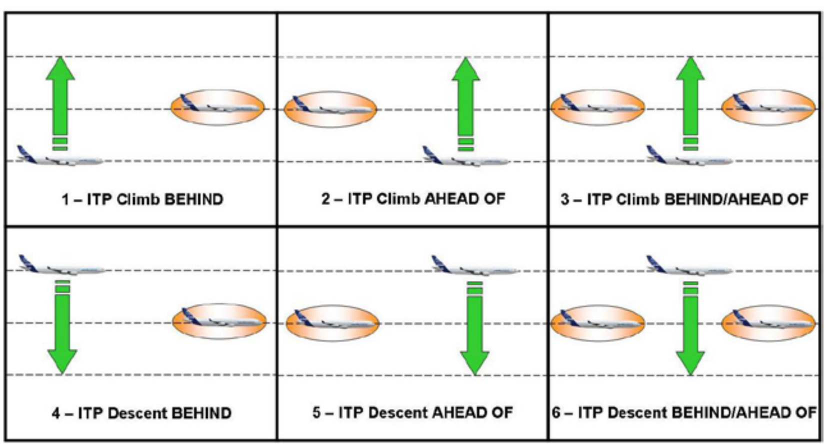
Source: FAA Advisory Circular #90-114

B. Crews must still request permission from ATC to conduct the FL change, and ATC will apply reduced ITP separation for the purpose of this change only if the aircraft is appropriately equipped and authorized.

Note 1: ATC will not issue an ITP clearance if the closing Mach differential (i.e., the difference in Mach between the ITP aircraft and the reference aircraft) is greater than 0.06 Mach. This restriction accounts for potentially unsafe closure rates due to adverse wind conditions.

Note 2: In addition, the ADS-B Out data from the reference aircraft must be of sufficient accuracy and integrity to safely permit the procedure.

C. An ITP maneuver can be performed based on reference data from up to two aircraft ahead or behind of the ITP aircraft's position, or a single aircraft ahead and a single behind, provided that the reference aircraft are no more than 2,000 feet of altitude above or below. (Despite this limitation, there is no restriction on the amount of altitude change that can be requested.) The following diagram illustrates the various ITP types that are available, based on the relative position of the ITP aircraft and the reference aircraft:



Source: FAA Advisory Circular #90-114

D. ITP Display:

- ITP capable avionics will vary from aircraft to aircraft, but will include some form of display indicating other-ship and own-ship ADS-B position data to the crew. This info can then be used to determine when an ITP maneuver is available. Due to differences in displays, crews should be aware of the following when considering an ITP request.
- The ITP distance is not necessarily the same as the direct line distance between two aircraft. ITP software is designed to calculate and display ITP distance information, but crews should be aware that range and ITP distances are different, and crews must be aware of how their avionics display which aircraft are the correct reference aircraft when planning to request an ITP clearance.
- Some ITP avionics incorporate a lateral traffic filter, which is intended to eliminate any targets beyond a predetermined lateral distance from consideration as a potential reference aircraft. This should prevent crews from misidentifying incorrect reference aircraft during an ITP request. If the aircraft has such a filter, crews must be aware of how it is used to ensure that reference aircraft are sufficient for an ITP request.
- Finally, traffic displayed as an ADS-B In target might not be presented as a valid ITP reference aircraft because it does not meet one or more ITP criteria that are not displayed to the crew. In other words, it may appear that the system is “broken” because it does not indicate that a seemingly suitable aircraft can be used as an ITP reference, when in fact there is an underlying factor (such as inadequate ADS-B data integrity) that would make the reference unsuitable.

E. Additional procedures can be found in the “Inflight Procedures” section below beginning at paragraph H.

Interval Management (ADS-B In)

A. IM is a set of procedures and capabilities designed so that ATC can provide more precise aircraft-to-aircraft separation between a lead (reference) ADS-B Out aircraft and a trail IM aircraft, thus increasing the efficiency of continental, terminal, and approach operations. With the implementation of IM, aircraft can expect reduced fuel burn and emissions, reduced noise, fewer ATC communications, and an overall reduction in delays.

B. IM makes use of both ground-based automation support tools that can identify suitable aircraft for which IM can be applied, as well as airborne Flight deck Interval Management (FIM) avionics that provide necessary IM data via ADS-B equipment. Speeds provided by FIM are expected to be flown as if each were individual ATC instructions, and crews will comply with an ATC IM clearance by flying these FIM speeds accordingly.

- When ground-based tools determine that an aircraft is eligible for IM, the software will also identify a desired spacing referred to as an Assigned Spacing Goal (ASG). Based on when ATC requires or recommends the ASG, one of the clearance types described in paragraph D below may be issued.
- FIM avionics include both IM-specific software and CDTI avionics, which will include an input device for clearances as well as a display for traffic, speeds, and FIM indications and alerting. FIM software will include a speed algorithm to determine appropriate IM speeds, which will be limited to prevent overly large speed changes or other changes that would exceed aircraft, regulatory, or procedural limitations.
- To ensure precise spacing, the FIM speed algorithm requires that both the IM aircraft and the reference aircraft be on the same horizontal or near parallel route, or the reference aircraft’s navigation clearance must be provided to the FIM avionics. Accordingly, FIM software will provide indications to the crew if there are any compliance issues with the reference aircraft’s path or speed.

C. Clearance Phraseology:

Disclaimer: At the time of this writing, the situations in which ATC may use IM and the relevant phraseology are still developing. The procedures in this manual are based on the notional phraseology published in FAA Advisory Circular #90-114B. Crews should be aware that future revisions to this AC may indicate newer, preferred phraseology.

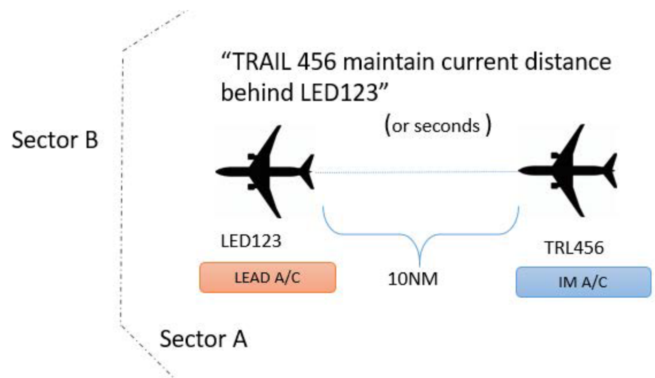
- For all IM clearances, ATC will provide the FLT ID of the reference aircraft along with the clearance type (Paragraph D below). For all clearance types, there is an ASG, which will either be stated explicitly (in units of time or distance) or implied (i.e., current spacing).
- The point on the intended IM flight path at which the crew achieves the ASG is known as the Cross Point (CP), and the point on the intended IM path at which the crew will discontinue IM is known as the Planned Cancellation Point (PCP). The PCP is optional for all clearance types, but the FIM avionics will default the PCP in close proximity to the destination airport if a PCP is not entered.
- Below is a summary of the acceptable element formats to be used in IM clearances:

Clearance Element	Format	Examples
Assigned Spacing Goal (ASG)	Time or distance	90 seconds, 10 NM
Lead A/C planned route	STAR, airway, approach, waypoint, or sequence of waypoints	EAGUL6, J186, ILS 36R
Cross Point (CP)	Navigation fix	SLIDR, PINNG, 10 NM EAST OF SLIDR
Planned Cancellation Point (PCP)	Navigation fix	EAGUL, DRRVR

D. Types of IM Clearances:

Note: These clearance types describe the functions performed by the FIM avionics. However, the exact phraseology may change over time, meaning that the terms used by ATC or which are shown on the CDTI may not perfectly align with the phraseology used here.

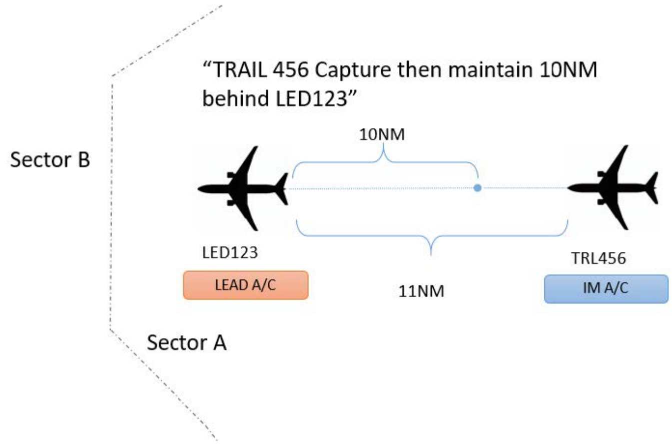
1. *Maintain Current Spacing*: An instruction to maintain spacing expressed in either time or distance.



Source: FAA Advisory Circular #90-114

Examples: "*TRAIL 456 MAINTAIN CURRENT TIME BEHIND LED123*" or "*TRAIL 456 MAINTAIN CURRENT DISTANCE BEHIND LED123*."

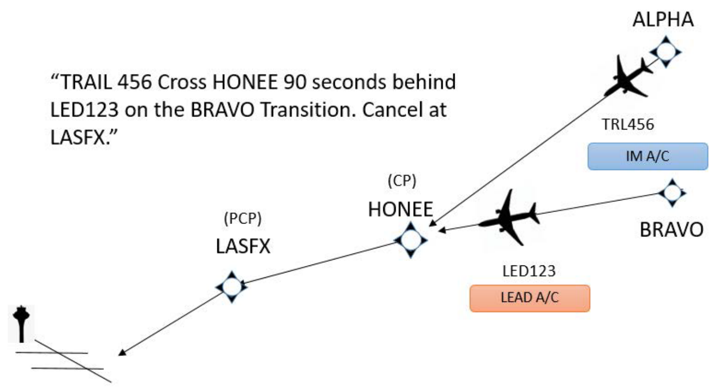
2. *Capture Then Maintain*: Issued when the IM aircraft and the reference aircraft are on similar routes and the FIM avionics provide speeds to move the aircraft to the ASG.



Source: FAA Advisory Circular #90-114

Example: "*TRAIL 456 CAPTURE THEN MAINTAIN 10 MILES BEHIND LED123*."

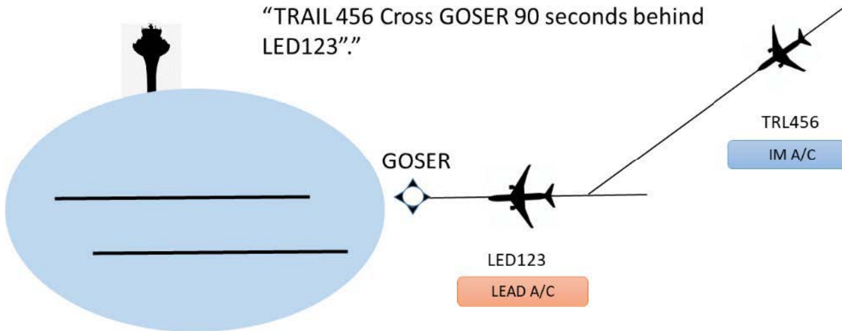
3. *Achieve-by Then Maintain* (Also called "Cross"): When ATC needs the ASG achieved by the time the IM aircraft reaches a particular fix, ATC may issue an Achieve-by Then Maintain clearance. The reference aircraft and IM aircraft may be on different paths at the time of the clearance, but will cross a common fix. The clearance will contain the reference aircraft's planned route and the identification of the fix to cross (i.e., the CP), and optionally the point at which to discontinue IM (i.e., the PCP). The ASG can be expressed in time or distance.



Source: FAA Advisory Circular #90-114

Example: "*TRAIL 456 CROSS HONEE 90 SECONDS BEHIND LED123 ON THE BRAVO TRANSITION. CANCEL AT LASFX.*"

4. *Final Approach Spacing*: ATC may issue a Final Approach Spacing clearance when one or both of the reference aircraft and the IM aircraft will be on the same final approach course. One aircraft can be on an intercept to final if the other aircraft is already established on the final approach course. ATC will include the reference aircraft identification and the ASG.



Source: FAA Advisory Circular #90-114

Example: "*TRAIL 456 CROSS GOSER 90 SECONDS BEHIND LED123.*"

5. IM Turn.

Note: ATC does not currently plan to implement the IM Turn clearance type in the US.

Summary of IM Clearance Types

	Maintain	**Capture Then Maintain**	**Achieve-by Then Maintain (Cross)**	**Final Approach Spacing**
Phraseology	*TRAIL 456 MAINTAIN DISTANCE BEHIND LED123*	*TRAIL 456 MAINTAIN 90 SECONDS BEHIND LED123* or *MAINTAIN 10 MILES*	*TRAIL 456 CROSS HONEE 90 SECONDS BEHIND LED123 ON THE BRAVO TRANSITION. CANCEL AT LASFX.*	*TRAIL 456 CROSS GOSER 90 SECONDS BEHIND LED123*
Clearance Elements	Lead A/C FLT ID	Lead A/C FLT ID	Lead A/C FLT ID	Lead A/C FLT ID
	ASG (Implied)	ASG	ASG	ASG
			CP	
			Lead aircraft planned route if different than the IM aircraft planned route	Lead aircraft planned route if different than the IM aircraft planned route
	PCP (Optional)	PCP (Optional)	PCP	PCP defaulted
Notes	Underlined text indicates clearance type cue. Note 1	Underline indicates clearance type cue.	Lead aircraft is on different route– "BRAVO" transition.	Note 1

Note 1: Not available in the SafeRoute+ branded FIM avionics.

E. Additional procedures can be found in the "Inflight Procedures" section below beginning at paragraph I.

Preflight Considerations

A. ICAO Flight Plan

1. Flight crews should indicate the aircraft's ADS-B Out capability on the flight plan in Item 10 by entering one of the following as appropriate to the aircraft ADS-B ability:

B1	1090ES Out Only	U1	UAT Out Only	V1	VDL Mode 4 Out Only
B2	1090ES Out and In	U2	UAT Out and In	V2	VDL Mode 4 Out and In

2. SSR Mode S: If the Mode S transponder transmits ADS-B messages (i.e., an ADS-B system with 1090ES), an appropriate Mode S designator should also be entered in field 10:
   - E Transponder — Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) capability; or
   - L Transponder — Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability.
3. Item 18
   - The aircraft address should be recorded by first entering the letters "CODE/" followed by the aircraft address in hexadecimal format.

     Example: CODE/7C432B
   - Surveillance (SUR/):
     - If ADS-B capability filed in item 10 is compliant with the current edition of RTCA, Inc. DO-260B, annotate "SUR/260B."
     - If ADS-B capability filed in item 10 is compliant with TSO-C154c, which is compliant with RTCA DO-282B, include the item "SUR/282B."
     - If ADS-B capability filed in item 10 is not compliant with either TSO-C166b or TSO-C154c, do not include ADS-B related information in the "SUR/" field of the flight plan.
4. There are currently no equipment codes indicating specific ADS-B In capabilities (such as ITP or IM). However, crews who plan to make use of ADS-B In capability should be aware that codes are likely to be introduced in the future and, in the meantime, should ensure that the appropriate Item 10 code (paragraph 1 above) is entered.

B. MEL Procedures: Flight crews will ensure that all MEL procedures applicable to ADS-B systems or components are followed prior to departure. Aircraft will not be dispatched with ADS-B equipment unserviceable unless allowed by the MEL procedures.

Note: The aircraft MEL has been revised to address ADS-B systems and components.

C. Upon initialization, flight crews will ensure that the ADS-B system is operational. When ADS-B equipment is initially powered on, the call sign / flight ID must not be blank and should be readily apparent.

D. Call Sign/Flight Identification (FLT ID): The assigned aircraft registration number has been set as the FLT ID during installation of ADS-B in each aircraft.

Note 1: The preset FLT ID will be updated if the aircraft registration number changes.

Note 2: Pilots may be able to enter a new FLT ID into the system during preflight; however, any crewmember that does so must ensure that the FLT ID matches the registration number entered on the flight plan.

E. As part of the preflight planning, Aeronautical Information Publications (AIPs) that apply to any portion of the flight will be reviewed for any surveillance provisions, schedules, or relevant procedures applicable to ADS-B operations.

F. Per ICAO Document 8168-OPS/611 Volume I, if the aircraft is equipped with 1090ES, flight crews should set the aircraft identification into the transponder (Refer to “IDENT” procedures in the “Inflight” section below). This setting is required to correspond to the aircraft identification that has been specified at Item 7 of the ICAO flight plan and consists of no more than seven characters. If the aircraft identification consists of less than seven characters, no zeros, dashes or spaces should be added. If no flight plan has been filed, the setting needs to be the same as the aircraft’s registration, again, up to a maximum of seven characters.

   Note: The shortened format commonly used by airlines (a format used by International Airlines Transport Association (IATA)) is not compatible with ICAO provisions for the flight planning and ATC services used by ATC ground systems.

G. Anonymity Feature: Compliant UAT equipment is permitted to transmit a randomized, temporary 24-bit address and a blank call sign. Crews will only use the anonymity feature if the following requirements are met:

   - A flight plan has not been filed and ATC services are not requested; and
   - A risk analysis has been conducted, taking into account the added risk of losing ADS-B search and rescue capabilities, situational awareness, or other benefits.

     Note: The anonymity feature is not currently permitted for 1090ES equipment.

H. GNSS Outages / Verification of Position Source Performance: When planning a flight through ADS-B airspace, crews must use all available information to ensure that the ADS-B position source performance requirements will be met for the duration of the flight.

   - During interference outages of GNSS (scheduled or unscheduled), ATC may revert to alternate surveillance, as necessary, for affected areas where ADS-B is required. During such outages, ATC may authorize operations in ADS-B Out airspace even though the required performance cannot be met. A NOTAM will be issued that authorizes such operations and identifies the airspace and time periods that the authorization is in effect.
   - GNSS equipment may, at times, produce NACp and NIC values that are insufficient for ADS-B flight. Unless otherwise exempted, crews must monitor and predict GNSS performance by using a tool such as the ADS-B Service Availability Prediction Tool (SAPT): http://sapt.faa.gov

     Note 1: In the US, aircraft fitted with Selective Availability Aware GNSSU receivers (i.e., TSO-C196 compliant or “SA-Aware GPS”) are not required to conduct a preflight ADS-B service availability prediction check. Aircraft fitted with “SA-On” GNSSU receivers (i.e., TSO-C129 compliant) should continue to conduct these preflight checks unless the crew has obtained an exemption otherwise.

     Note 2: Crews flying aircraft equipped with SBAS (TSO-C145 or TSO-C146) receivers do not need to conduct a preflight availability prediction. A NOTAM will be issued whenever SBAS performance is not adequate.
   - Predictions can be used for flight planning as early as 72 hours prior to the planned departure. However, crews should conduct a performance prediction as close to departure time as feasible. The prediction should be reevaluated prior to flight if a new NOTAM identifies an unscheduled GNSS satellite outage.
   - In the event of a predicted loss of performance for any part of the intended flight in the airspace where ADS-B Out is required, the flight must be delayed, canceled, or rerouted to where the requirements can be met.
   - Operators who hold FAA Exemption 12555 may obtain relief from preflight GNSS availability prediction until December 31, 2024.

Inflight Procedures

A. Flight crews will enable ADS-B Out during airport surface movement operations and will operate ADS-B equipment in the transmit mode at all times during flight.

B. Direct controller-pilot communications (HF, VHF, or CPDLC) will be available at all times.

C. Flight crews will remain aware that when there is not an independent flight deck control selection between the ADS-B OUT on/off function and the ATC transponder on/off function, disabling the ADS-B function will also disable transponder and Traffic Alert and Collision Avoidance System (TCAS) functions.

D. All flight crews operating ADS-B equipped aircraft are familiar with the applicable operating handbooks or manuals for the proper operation of the installed ADS-B system and any procedures expected of the pilots for indications of reduced performance or failures within the system.

E. Equipment Performance During Operation:

- Crews must ensure the ADS-B Out system performs accurately throughout the flight. If ADS-B Out performance becomes deficient during flight in ADS-B-required airspace, ATC may require the aircraft to exit the airspace.
- ADS-B Out equipment performance is continuously monitored by ATC. If noncompliant equipment is found during monitoring, aircraft may be denied access to ADS-B-required airspace until the noncompliant equipment is corrected.

  Note: Depending on the nature and scope of the noncompliance, the denial may be for either an individual aircraft's equipment (e.g., for improperly installed equipment on that specific aircraft), or all aircraft equipped with a certain type of equipment (e.g., for a design- or manufacturing-related equipment performance problem, or a problem traced to deficiencies with the installation that may affect multiple aircraft).
- The FAA provides a service that enables crews to verify compliance of ADS-B Out equipment performance requirements. Information on this service can be found at:

  https://www.faa.gov/nextgen/equipadsb/

F. IDENT

- ATC may request an aircraft to "IDENT" to aid controllers to quickly identify a specific aircraft. To comply with this request, flight crews must manually enable the IDENT state, which highlights the aircraft to ATC.
- Aircraft equipped with 1090ES as the ADS-B transmission method should allow a single point of entry into both the transponder and the ADS-B system for the Mode 3/A code, IDENT, and emergency status.

  Note: If the ADS-B equipment sets the emergency status, IDENT, or Mode 3/A code based on entry of these parameters into a separate transponder, the Airplane Flight Manual will be consulted to identify the appropriate transponder interfaces.
- If a single point of entry is not provided, flight crews must ensure that conflicting information is not transmitted from the ADS-B system and the transponder.
- The procedures for activation of the IDENT feature can be found in the AFM.

G. Flight Crew Entry of Required ADS-B Data

Note: Conflicting aircraft identification information must not be transmitted to ATC through the ADS-B system and supporting components (e.g., transponders). Flight crews will remain aware that it may be required to enter the information below multiple times through the appropriate system interfaces.

1. Mode A Code
   - ATC automation relies on the Mode A code to identify aircraft under radar surveillance and to correlate the displayed target to a flight plan. The Mode A code is one element of the transmitted ADS-B message set. Because SSR and ADS-B surveillance will overlap in much of the NAS, correlation of the Mode A code between the transponder and the ADS-B message is necessary to ensure that a single target is resolved and correlated to a flight plan route.
   - It is imperative that the ATC-assigned transponder code is identical to the one in the ADS-B OUT message. If there is no single point of entry provided for the Mode A code into the

transponder, then the AFM or operating handbook must address the requirement to enter the Mode A code into both systems separately.

Note: Transmission of conflicting transponder and ADS-B Mode A codes will result in erroneous traffic conflict alerts within the ATC automation system.

2. Aircraft's Call Sign / Flight ID: The AFM provides specific instructions for entering the registration number or flight plan call sign. The term "aircraft call sign" means the radiotelephony call sign assigned to an aircraft for voice communications purposes. The aircraft call sign is normally the aircraft registration number (tail number) and should be preset. The flight ID entered into the Flight Management System (FMS) must exactly match the aircraft ID on the ATC flight plan.

H. Use of ITP:

- Prior to implementing ITP, the crew must use the onboard ADS-B avionics to confirm that ITP initiation criteria are satisfied and that ITP is available using no more than two reference aircraft. If conditions are appropriate, the crew may request an ITP clearance via free-text CPDLC using the phraseology below:

Begin with a REQUEST message:	
REQUEST CLIMB TO [altitude]	To initiate an ITP climb
REQUEST DESCENT TO [altitude]	To initiate an ITP descent
Then add the following verbiage based on the number and relative position of reference aircraft	
ITP Type	**Free Text Message Content**
1 reference aircraft (ahead)	"*ITP* [Distance] *BEHIND* [Aircraft FLT ID]"
1 reference aircraft (behind)	"*ITP* [Distance] *AHEAD OF* [Aircraft FLT ID]"
2 reference aircraft (both ahead)	"*ITP* [Distance] *BEHIND* [Aircraft FLT ID] *AND* [Distance] *BEHIND* [Aircraft FLT ID]"
2 reference aircraft (both behind)	"*ITP* [Distance] *AHEAD OF* [Aircraft FLT ID] *AND* [Distance] *AHEAD OF* [Aircraft FLT ID]"
2 reference aircraft (one ahead and one behind)	"*ITP* [Distance] *BEHIND* [Aircraft FLT ID] *AND* [Distance] *AHEAD OF* [Aircraft FLT ID]"
Example	
REQUEST CLIMB TO FL360 ITP 25 NM BEHIND SIA228 AND 21 NM AHEAD OF AFR008	

Note 1: Preformatted CPDLC messages for ITP have not yet been developed; however, the free text above should be considered standard phraseology.

Note 2: Currently, only CPDLC is being used in locations where ITP is approved. Voice (HF) requests are not yet permitted.

- Upon receipt of the ITP request, ATC will confirm that that the ITP aircraft and reference aircraft are of sufficient speed and separation to proceed. An ITP clearance will be issued via CPDLC free text message, taking the following form: "CLIMB TO AND MAINTAIN [altitude]" or "DESCEND TO AND MAINTAIN [altitude]" along with the text in the table above for reference aircraft.

  Note: ATC will not issue ITP clearances automatically; crews must initiate the request if they wish to receive any ITP benefit.

- The crew must then reassess their ADS-B data and confirm that all criteria for ITP are still satisfied. If there has been any change that would impact ITP (e.g., a loss of traffic information), the crew must immediately reject the ATC clearance and terminate the maneuver. In addition, if any information in the clearance does not match the initial request message – such as reference aircraft or the use of ITP versus a standard FL change – the crew must not perform the maneuver and should verify with ATC to confirm the clearance.
- If all criteria are still met to proceed, the crew will accept the clearance and begin ITP without delay. Crews are expected to maintain their flight planned route, assigned (or current) Mach, and minimum vertical speed of 300 FPM during the FL change. The maneuver is considered complete once the crew reports to ATC that they have reached the new FL.

  Note 1: Once ITP has been started, the crew should complete the FL change and must not return to their initial altitude, even if traffic data is lost or there is an ITP display failure. In such an event, crews should continue to the assigned altitude and notify ATC of the ITP failure and/or data loss upon completion.

  Note 2: If for any reason the crew initiates ITP, but determines they cannot complete it, they must follow the procedures described in the “Abnormal Procedures” section below, paragraph F.

I. Use of Interval Management:

- ATC will initiate an IM operation when it is operationally beneficial. The process begins when ATC identifies a potential IM pair and, through the software, an ASG, CP, and PCP are determined. ATC will also check for the feasibility of IM based on current spacing, traffic, and weather.
- If IM can proceed, ATC will issue an IM clearance as described earlier in this appendix. (Refer to “Interval Management,” Paragraphs C and D.) The crew will read back the IM clearance and enter any IM clearance information into the FIM avionics.
- The crew must then verify that they have selected the correct lead (reference) aircraft and that all IM clearance elements have been entered correctly.

  Note: Verifying the correct reference aircraft is an essential step. It can be complicated by two factors: the spoken call sign of the reference aircraft might not easily translate into the FLT ID displayed by the FIM avionics, and the reference aircraft (or nearby nonparticipating aircraft) might have erroneously programmed their FLT ID in their ADS-B Out system. Crews implementing IM should not accept the IM clearance if there is any doubt that they have correctly identified the reference aircraft as that given in the IM clearance.
- The FIM avionics will then perform an internal check to ensure all performance criteria are met. If the performance criteria are met, the FIM avionics will display the first IM speed. The crew must then evaluate the IM speed to determine whether it is acceptable given their current operational conditions and either accept or reject the clearance accordingly.
  - Rejected Clearance: If the crew determines that the IM speed is unacceptable, they will immediately notify ATC that they are unable to accept the IM clearance.
  - Accepted Clearance: If the crew determines that the IM speed is acceptable, they must begin complying with the IM speeds immediately. No further instruction will be given by ATC, nor is any further acknowledgement by the crew required.
- The crew must then comply with the IM speeds as cleared. The FIM avionics automatically calculate IM speeds to maintain or achieve the ASG, and it is crucial that crews do not try to “out-guess” the FIM by flying any other speeds.
  - Mandatory Published Speeds: IM speeds will supersede any published speeds (i.e., those on STAR procedure charts) when operating on an IM clearance. These published speeds are used by the FIM avionics in the calculation of the trajectory of the reference aircraft and are accounted for already. Crews using IM must continue to comply with the IM speed unless directed by ATC.

  - Compliance With Operational or Regulatory Speed Restrictions: IM speeds **do not** supersede regulatory speed restrictions, such as 250 KIAS below 10,000 feet MSL in the US. Although FIM avionics should limit IM speeds to remain within any aircraft performance restrictions and/or any regulatory speed limits, it is ultimately the crew's responsibility to ensure that each IM speed does not conflict with any such operational or regulatory speed restrictions.
- IM Cancellation: The crew must comply with IM speeds until the procedure is canceled (i.e., when the FIM avionics no longer provide IM speeds or alerts). Upon IM cancellation, the crew must comply with speeds as instructed by ATC, as published, or as the last IM speed displayed. The IM operation will be canceled in one of the following ways:
  1. Automatically by the FIM avionics upon reaching the PCP;
  2. Manually by the crew upon ATC instruction;
  3. Manually by the crew for other operational reasons; or
  4. Automatically due to certain off-nominal / abnormal situations.

     Note: If for any reason the crew initiates IM, but it cannot be completed as planned (i.e., for reasons 3 or 4 above), crews should follow the procedures described in the "Abnormal Procedures" section below, paragraph G.

Abnormal Procedures

A. The flight crew will immediately notify ATC if ADS-B equipment becomes inoperable.

B. Understanding Failure Indicators Within 1090ES ADS-B Systems

- In 1090ES configurations (i.e., an existing transponder is used to input Mode 3/A codes, emergency codes, and IDENT into the ADS-B system), the following two failure annunciations will be available:
  1. ADS-B Device Failure: The ADS-B equipment is unable to transmit ADS-B messages.
  2. ADS-B Function Failure: A position source or interface that provides data to populate the ADS-B messages / reports has failed and is preventing the system from providing pertinent information. In this case, the ADS-B system cannot function, but there is not a failure of the ADS-B equipment.
- Mode S transponders may indicate the failures described above (device failure and function failure) with the same indicator light. If the indicator light turns on, flight crews will refer to the AFM for information on the differences between device failures and function failures, and the implications and procedures associated with each failure type.
- In some cases, normal GNSS signal interference on the ground caused by nearby obstacles, such as a large hangar, may be incorrectly interpreted as a failure of the ADS-B system. Moving the aircraft clear of obstructions may be all that is needed to clear the indicated malfunction.

C. Disabling ADS-B Functionality: In 1090ES configurations, there may not be an independent Flight Deck Control selection between the ADS-B function (ADS-B on/off) and the ATC transponder function. In these configurations, the flight crew will not disable the ADS-B function unless procedures are specified in the AFM to retain transponder functionality.

D. Requests for ATC authorized deviations must be made to the ATC facility having jurisdiction over the concerned airspace within the time periods specified as follows:

  1. For operation of an aircraft with an inoperative ADS-B Out to the airport of ultimate destination, including any intermediate stops, or to proceed to a place where suitable repairs can be made or both, the request may be made at any time.
  2. For operation of an aircraft that is not equipped with ADS-B Out, the request must be made at least one (1) hour before the proposed operation.

E. Emergency Status

- This ADS-B message element and transponder code alerts ATC that the aircraft is experiencing emergency conditions and indicates the type of emergency. The appropriate emergency code should be entered into the transponder (i.e., 7500, 7600, and 7700). The emergency codes defined in ICAO Annex 10, Volume IV for unlawful interference, no communications, and general emergency will be used.
- 1090ES ADS-B systems (i.e., integrated within a transponder) will automatically set the applicable emergency status when code 7500, 7600, or 7700 is entered into the transponder.
- UAT ADS-B systems (i.e., not integrated with the transponder) or systems with optional emergency codes require the appropriate emergency code to be entered through a separate pilot interface. Flight crews will ensure that both emergency codes (ADS-B and transponder) are identical.

F. ITP Contingency Procedures

- ITP has been extensively tested with consideration given to a variety of environmental and aircraft performance factors. A temporary breach of the 10 NM ITP distance does not constitute an unsafe procedure and should not be the sole factor when considering abandoning the procedure.
- No new contingency procedures are prescribed for ITP. If the crew believes the ITP maneuver cannot be successfully completed once the climb or descent has been initiated, they must:
  1. Contact ATC and request an alternative clearance as soon as practical;
  2. Inform ATC of any action the crew is taking or requesting;

     Note: This should be communicated using a free text CPDLC message.
  3. Comply with any regional contingency procedures appropriate to the circumstances, or as listed in ICAO Doc 4444 (i.e., Section 3.1.0).

G. IM Contingency Procedures

- In any situation where the crew must terminate IM prior to the intended or cleared cancellation by ATC (i.e., due to operational concerns or system failure), the crew must immediately report their termination of IM to ATC along with a description of the underlying factor(s).
- IM Suspend: ATC may have a need to interrupt (“suspend”) an active IM operation, such as to resolve a developing traffic conflict. Such an interruption is not strictly a clearance, but is instead functionality in the FIM avionics that will temporarily remove IM speeds, indications, and alerts while still retaining basic IM clearance information.

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Appendix O: RVSM Maintenance Policy

Introduction and Background

A. Prior to August 2016, there was a requirement for all operators of US-registered aircraft to have an RVSM maintenance program approved by the FAA prior to conducting any RVSM operations.

B. As of August 2016, the maintenance program is no longer a blanket requirement for all operators. However, the requirement to maintain aircraft in an RVSM-airworthy condition still exists for all aircraft to be flown in RVSM airspace.

C. Accordingly, this appendix is entered into the *Target Corporation International Operations Procedures Manual* to summarize general maintenance considerations to ensure continued RVSM airworthiness. These considerations apply to all aircraft capable of RVSM operations and should not be construed as a model-specific maintenance program.

Maintenance Considerations

A. Any servicing of RVSM systems or components must be performed by or under the direct supervision of an individual trained in RVSM maintenance.

B. Any time that an RVSM-certified aircraft becomes incapable of operating within RVSM airspace due to maintenance discrepancies, the Director of Maintenance will ensure that the aircraft is placarded “AIRCRAFT NOT RVSM QUALIFIED” until the discrepancy is corrected. The Director of Aviation will ensure that all crews are aware of the problem so that the aircraft is not flown into RVSM airspace.

C. All RVSM maintenance will be performed in accordance with the instructions described in the applicable aircraft maintenance guidance. This guidance may include any or all of the following documents, the latest revisions of which must be consulted by any individual performing RVSM maintenance:

- The applicable Aircraft Maintenance Manual;
- The applicable Service Bulletin, Service Letter, Aircraft Service Change, and/or Supplemental Type Certificate, if one was installed for initial RVSM compliance;
- The applicable Airplane Flight Manual Supplement for RVSM operations; and/or
- The Instructions for Initial and Continued Airworthiness for RVSM operations.

D. The Director of Maintenance will ensure that all recurring RVSM inspections required by the documentation listed above are tracked and complied with (e.g., via a computerized maintenance program). Such inspections may include, but are not limited to:

- Verification of RVSM avionics components, including part numbers;
- Air Data Systems ground checks;
- Pitot static probe/port inspections and/or calibration checks in accordance with 14 CFR Part 91.411;
- Altitude reporting equipment and ATC Transponder Modes C and S checks in accordance with 14 CFR Part 91.413; and/or
- SmartProbe inspections.

Operational Considerations

A. Operational policies and procedures for RVSM are summarized throughout the *Target Corporation International Operations Procedures Manual* and are not repeated here to avoid redundancy. However, the following are special emphasis items that should be reviewed as they can impact RVSM maintenance requirements:

- Crew training in RVSM, including special emphasis items (Section 1.3.0);
- Preflight altimeter inspections (Section 2.2.2.3);
- Use of TCAS, including error reporting procedures (Section 2.5.0);
- Altimetry error reporting procedures (Section 3.2.0) and form (Appendix K); and

- RVSM height monitoring practices and procedures (Appendix M).

B. If there is any doubt as to the current RVSM airworthiness status of the aircraft, it must not be flown into RVSM airspace until an RVSM trained and qualified individual has formally returned it to RVSM service.

FAA Notification of RVSM Deviations

A. Crews will notify the FAA of the following heightkeeping errors:

- An Assigned Altitude Deviation (AAD) error of 300 ft or more;
- A Total Vertical Error (TVE) of 300 ft or more;
- An Altimetry System Error (ASE) of 245 ft or more.

B. The flight crew will notify the Director of Aviation within 24 hours of any of the above deviations caused by equipment malfunction and / or operational error. The flight crew will utilize the Altitude Deviation Report Form (Appendix K). The Director of Aviation will then report the appropriate information to a cognizant operations, maintenance, or avionics safety inspector at the applicable FAA office within 72 hours following the event.

C. The report should include the date and time of the occurrence, an initial analysis of causal factors, and measures to prevent further events. Target Corporation must then keep the FAA informed as to cause of the deviation, if the aircraft has been removed from RVSM status, the corrective actions, and plans for return to RVSM compliance. This may include having to recertify the aircraft for RVSM.

Altimetry System Error Reports (ASE-R)

A. Regional monitoring agencies have been set up to monitor Altimetry System Errors (ASEs) and verify that the target level of safety for RVSM is continuously met by all RVSM-approved aircraft. In cases where an ASE is identified, an ASE Report (ASE-R) may be issued to operators for follow-up action.

B. If an ASE-R is issued, the flight department will review the accompanying resolution form and ensure that any required maintenance / corrective actions are made within the specified timeline(s). Aircraft performance may then be monitored by ADS-B, an AGHME overflight, or the use of a GNSS Monitoring Unit. When safe performance has been confirmed, a report confirming satisfactory resolution will be transmitted.

Appendix P: RNP Maintenance Policy

Introduction

A. The aircraft will be maintained and flown in accordance with the operating limitations contained in the Airplane Flight Manual.

B. The aircraft MELs contain provisions that satisfy the requirements of all applicable RNP operations.

C. The aircraft are certified capable of oceanic RNP operations to the level specified in the AFM in accordance with FAA Advisory Circular 90-105A, *Approval Guidance for RNP Operations and Barometric Vertical Navigation in the US National Airspace System and in Oceanic and Remote Continental Airspace*.

D. The aircraft are certified capable of RNAV-5 operations in accordance with JAA Temporary Guidance Leaflet No. 2 dated May 14, 1997: AMJ 20X2, *JAA Guidance Material on Airworthiness Approval and Operational Criteria for Use of Navigation Systems in European Airspace Designated for Basic RNAV Operations* and Advisory Circular 90-96A *Approval of U.S. Operators and Aircraft to Operate under IFR in European Airspace Designated for Basic Area Navigation (B-RNAV) and Precision Area Navigation (P-RNAV)*.

Periodic Inspections

The aircraft will be maintained in accordance with the provisions of the aircraft manufacturer's program requirements and limits as outlined in the Aircraft Maintenance Manual.

Maintenance and Inspection Procedures

A. Parts Control Program: Only approved parts as listed in the manufacturer's illustrated parts catalog will be used for replacement.

B. Outsourcing of Maintenance: Only approved service centers will be authorized to perform maintenance on RNP equipment.

C. Maintenance Practices for Maintaining all RNP Related Equipment: The Aircraft Maintenance Manual provides maintenance procedures for working on the navigation equipment required for RNP operations. Only maintenance technicians trained to provide corrective maintenance for navigation equipment necessary to operate in RNP airspace will operate on Long Range Navigation or Communication Systems.

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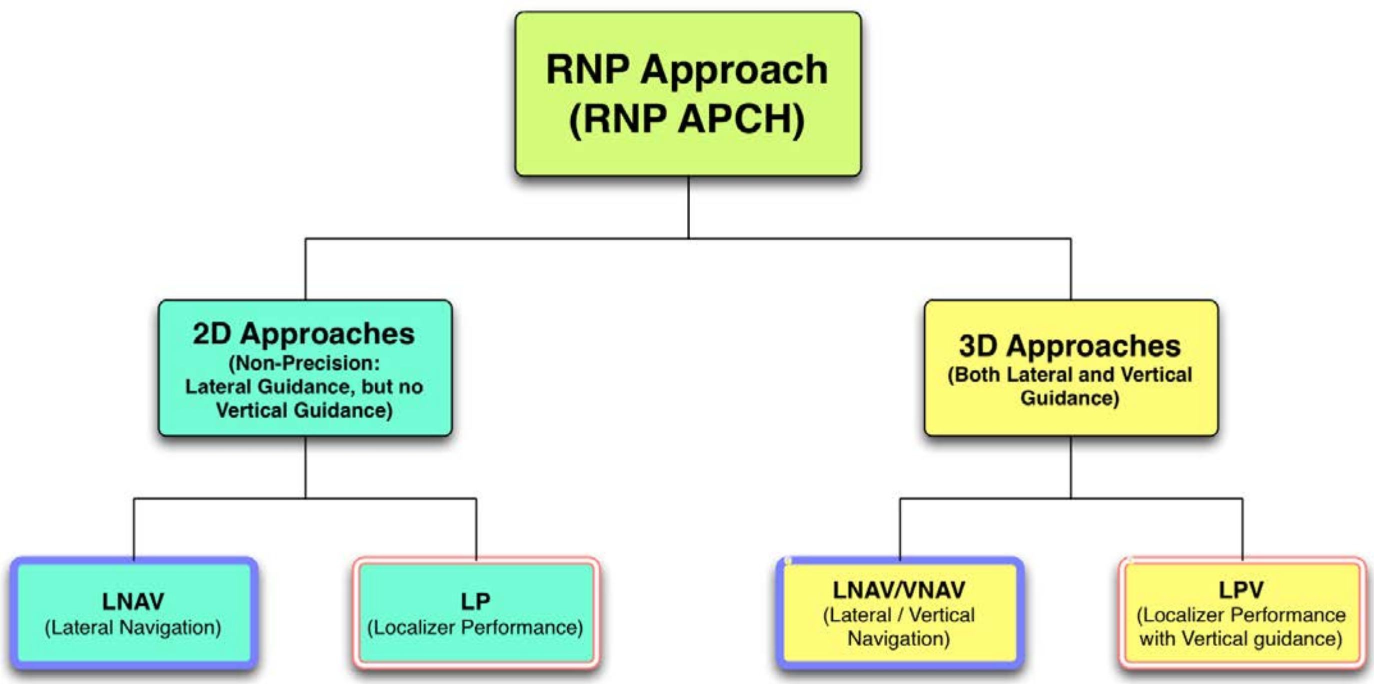
Appendix Q: RNP Approach Considerations

General

A. "RNAV (GPS) Approach" and "RNP Approach" are both used to refer to approach procedures that comply with the ICAO Performance Based Navigation Manual (Doc 9613) specifications for RNP APCH. The ICAO PBN Manual includes the following four types of RNP APCH:

1. **LNAV (Lateral Navigation)**: – A non-precision approach with lateral navigation guidance provided by GNSSU and an Aircraft Based Augmentation System (ABAS). Receiver Autonomous Integrity Monitoring (RAIM) is a form of ABAS.
2. **LP (Localizer Performance)**: A non-precision approach with lateral navigation guidance provided by GNSSU and a Satellite Based Augmentation System (SBAS).
3. **LNAV / VNAV (Lateral Navigation / Vertical Navigation)**: An Approach Procedure with Vertical guidance (APV). The lateral navigation guidance is provided by GNSSU and ABAS in the same way as for LNAV. The vertical guidance is provided by a Barometric Altimeter. This type of approach is commonly known as APV/Baro VNAV.
4. **LPV (Localizer Performance with Vertical guidance)**: An Approach Procedure with Vertical guidance (APV). Lateral and vertical guidance is provided by GNSSU and SBAS.



B. Prior to conducting any RNP APCH procedures, crews must complete training in the RNP APCH procedure to be performed, verify that the aircraft system is capable, and obtain any applicable authorization required either by the state of registry or operation.

Note 1: Some states may require an operational authorization before these approaches can be conducted. Crews must confirm whether or not authorization is required prior to conducting any international RNP APCH procedures.

Note 2: Certain "high-end" instrument approach procedures always require authorization, regardless of where the operations will be conducted. These procedures are designated as "RNP Authorization Required (AR) Approach" or "RNP AR APCH." A separate approval is required for each RNP AR approach.

C. The instrument approach procedures associated with RNP APCH are entitled RNAV (GNSS) to reflect that GNSS is the primary navigation system. The navigation specification qualifies as RNP, however these procedures pre-date PBN, so the chart name has remained as "RNAV."

Satellite Based Augmentation Systems

A. A Satellite-Based Augmentation System (SBAS) is a system of corrections and other augmentations established to improve the accuracy, integrity, availability, and continuity of GNSSs worldwide. Aircraft with equipment capable of taking advantage of SBAS augmentations are enabled to conduct more advanced approach procedures.

B. Current SBASs include:

- Wide Area Augmentation System (WAAS) in the USA;
- European Geostationary Navigation Overlay Service (EGNOS) in Europe; and
- MTSAT Satellite-based Augmentation System (MSAS) in Japan.

Wide Area Augmentation System (WAAS)

A. If there are no airworthiness limitations on other installed navigation equipment, WAAS avionics enable aircraft navigation during all phases of flight from takeoff through vertically guided approaches and guided missed approaches.

B. WAAS avionics with an appropriate airworthiness approval can enable aircraft to fly to the LPV, LP, LNAV/VNAV and LNAV lines of minima on RNAV (GPS) approaches. One of the major improvements WAAS provides is the ability to generate glidepath guidance independent of ground equipment. Temperature and pressure extremes do not affect WAAS vertical guidance unlike when baro-VNAV is used to fly to LNAV/VNAV line of minima.

C. Like most other navigation services, the WAAS network has service volume limits, and some airports on the fringe of WAAS coverage may experience reduced availability of WAAS vertical guidance. When a pilot selects an approach procedure, WAAS avionics display the best level of service supported by the combination of the WAAS signal-in-space, the aircraft avionics, and the selected RNAV (GPS) instrument approach.

D. The primary purpose of WAAS is to augment GPS data and support RNAV (GPS) approach operations to LPV and LP lines of minima. The design of the WAAS and associated avionics is interoperable with similar systems from other service providers. However, each State in conjunction with the service provider will determine the levels of service its SBAS implementation supports.

E. RNAV (GPS) approaches to LPV lines of minima take advantage of the improved accuracy of WAAS lateral and vertical guidance to provide an approach that is very similar to a Category I (CAT I) ILS. Just as with an ILS, LPV has vertical guidance and is flown to a DA. The design of the LPV approach incorporates angular guidance with increasing sensitivity as an aircraft gets closer to the runway. The sensitivities are nearly identical to those of the ILS at similar distances. This was done intentionally to allow the skills required to proficiently fly an ILS to readily transfer to flying RNAV (GPS) approaches to the LPV line of minima.

F. LP Lines of Minima

1. LP lines of minima take advantage of the improved accuracy of WAAS to provide approaches with lateral guidance. Lateral sensitivity increases as an aircraft gets closer to the runway, similar to localizer approaches. Unlike LPV, the LP line of minima is an MDA rather than a DA. Procedures with LP lines of minima will not be published with lines of minima that contain approved vertical guidance (LNAV/VNAV or LPV). Publishing an LP line of minima will only occur if terrain, obstructions, or some other reason prevent publishing a vertically guided procedure. It is possible to have LP and LNAV published on the same approach chart, but LP will only be published if it provides lower minima than the associated LNAV line of minima.
2. LP is not a fail-down mode for LPV. The avionics integration may include advisory vertical guidance during an LP approach to an LP line of minima. Barometric altimeter information remains the primary altitude reference for complying with any altitude restrictions.

G. IFR-approved WAAS receivers can support any approach procedure that has “GPS” in the title. The AFM, RFM or AFMS along with the manufacturer’s operating guide will specifically state any WAAS avionics limitations. Crews must be thoroughly familiar with the capabilities and limitations of their WAAS avionics.

H. An aircraft equipped with WAAS can operate within the coverage of the GPS constellation and WAAS service volume without the need for other radio navigation equipment. In the event of a WAAS failure, WAAS avionics revert to GNSSU-only operation, which is equivalent in function to un-augmented GNSS avionics and satisfies the requirements for IFR use of GNSSU.

I. Not all WAAS avionics are capable of supporting all lines of minima on an approach chart. For example:

1. Operational class 1 and 2 WAAS avionics do not support LPV or LP.
2. Equipment compliant with TSO-C145a/C146a operational class 3 and class 4 provides LPV capability, but is not required to provide LP capability. In some cases manufacturers may choose to modify their equipment to provide LP capability.
3. An FMS with WAAS integration might only provide position, velocity and time output to support RNAV or RNP operations without supporting LPV or LP.

Ground Based Augmentation Systems / Local Area Augmentation Systems

A. Like SBAS, a Ground-Based Augmentation System (GBAS) is a system of corrections and other augmentations established to improve the accuracy of GNSS information; however, whereas an SBAS (such as WAAS) is intended to provide augmentation to a large region or regions, a GBAS is an airport-specific augmentation based on local data.

Note: GBAS can also be referred to with the term “Local Area Augmentation System (LAAS)” to differentiate it from a larger-scale “Wide Area Augmentation System (WAAS).” However, the terminology of “LAAS” is mostly not used, with “GBAS” being more common.

B. Aircraft fitted with GBAS capable equipment may be eligible to utilize approaches labeled as “GBAS Landing System” or “GLS.” GLS approach charts will include a five-digit channel number along with approach verification methods.

Training Considerations

A. Flight crews must complete instrument approach procedures training prior to conducting any RNP APCH procedures.

B. As the systems used for RNP APCH are also used for other RNP operations (e.g., oceanic RNP-10/4), the Director of Aviation will ensure that crews are trained on the use of RNP systems for all phases of flight.

Preflight Considerations

A. Flight crews should verify the aircraft’s approval / capability for RNP APCH procedures by consulting the AFM. Crews should also confirm that they possess an operational authorization for the intended RNP APCH procedures, if required by the planned route.

B. Crews must ensure the navigation databases are current prior to takeoff. Any instrument approach procedure to be conducted must be retrievable from a current and approved database.

Note: In order to use an MDA as a DA/DH, crews must also ensure that the selected IAP, including the final approach FPA, is in compliance with Part 97 approach design requirements. It must have a VDA or GS in the profile view, and the VNAV path angle must be appropriate for the aircraft category. Refer to the later subheading, “Using an MDA as a DA/DH.”

C. The European Single Sky initiative has set the implementation of LNAV / VNAV and LPV as one of its objectives. On any flight to Europe, flight crews of aircraft capable of RNP APCH procedures should verify whether or not RNP APCH has been implemented at the destination airport.

Conducting RNAV (GPS) Approaches

A. RNP systems used must allow for a means to become established prior to the FAF on an ILS or GLS with minimal overshoot or undershoot. The appropriate navigation mode must be selected/armed and crews must ensure capture of the final approach segment. Pilots should exercise caution regarding early false lateral and vertical capture on ILS procedures.

Note 1: Charts for ILS and GLS procedures with RNP transitions will contain notes specifying the requirement for suitable RNP capability. These RNP transitions are also identified by the use of waypoint symbols on the procedure.

Note 2: Pay close attention to the navigation source of both lateral and vertical axis. When transitioning from an RNP segment to a precision approach segment, it is possible for the lateral precision navigation source to acquire while the vertical RNP source remains primary.

B. Advisory Vertical Guidance: An RNAV (GPS) instrument approach may contain both the LNAV and the LP lines of minima, and a pilot may use advisory vertical guidance when flying to either the LNAV or LP lines of minima. The vertical guidance is advisory only and pilots must use the barometric altimeter as the primary altitude reference to ensure compliance with any and all altitude restrictions during instrument approach operations. Refer to the table below.

Line of Minima	Approved Guidance	Advisory Guidance
LPV	X	
LP		X
LNAV/VNAV	X	
LNAV		X*

*LPV capable equipment requires special considerations when using advisory vertical guidance. Refer to the AFM.

Note: Some aircraft integrations may use GNSSU to provide lateral path deviation indications and baro-VNAV to provide vertical path deviation indications for charted LNAV/VNAV lines of minima. This integration constitutes approved vertical guidance for charted LNAV/VNAV lines of minima. Do not confuse this integration with advisory vertical guidance.

C. Pilots of aircraft with a recognized RNP airworthiness capability must not fly to LPV/LP lines of minima based solely upon their RNP capability. Only aircraft with an airworthiness approval for WAAS LPV/LP capability may fly RNAV (GPS) procedures using the LPV/LP line of minima. The aircraft must use WAAS to fly to the LPV/LP line of minima on an RNAV (GPS) approach.

Initial Approach

A. Crews must comply with any instructions or procedures identified in the AFM.

B. Crews must confirm the system has initiated transition from terminal mode to approach mode by 2 NM prior to the FAF.

C. The appropriate displays must be selected so that the following information can be monitored:

1. The RNP APCH computed desired track (DTK); and
2. Aircraft position relative to the path cross-track deviation (XTK) for FTE monitoring.

D. All pilots are expected to maintain procedure centerlines, as depicted by onboard lateral deviation indicators and/or flight guidance during the approach procedure unless authorized to deviate by ATC or under emergency conditions.

E. While operating on RNP APCH segments, pilots are encouraged to use flight director and/or autopilot in lateral navigation mode and vertical navigation mode, if available.

Intermediate Approach

A. For aircraft requiring two pilots, crews must verify that each pilot's altimeter has the current setting before beginning the final approach of an RNP APCH approach procedure. The crew must also observe any operational limitations associated with the source(s) for the altimeter setting and the latency of checking and setting the altimeters approaching the FAF.

B. Although scaling should change automatically, pilots of aircraft with a lateral deviation indicator (e.g., CDI) must ensure that lateral deviation indicator scaling (full scale deflection) is suitable for the various segments of the procedure (i.e., ±1.0 NM for the Initial and intermediate segments, ±0.3 NM for the final approach segment, and ±1.0 NM for the missed approach segment).

C. RNP APCH approach procedures require flight crew monitoring of lateral and, if installed, vertical track deviations on the pilot's primary flight displays (PFD) to ensure the aircraft remains within the bounds defined by the procedure.

D. Altimeter Crosscheck

- Where two pilots are required, the flight crew must complete an altimetry crosscheck ensuring both pilots' altimeters agree within ±100 feet prior to the FAF. If the altimetry crosscheck fails then the procedure should not be conducted or, if in progress, it must not be continued.
- This operational crosscheck is not necessary if the aircraft automatically compares the altitudes to within 100 feet.

Final Approach

A. The flight crew must initiate a go-around if either a lateral or vertical deviation is too large unless the visual conditions required to continue the approach exist between the aircraft and the runway of intended landing.

B. For normal operations, cross track error/deviation (the difference between the displayed computed path and the displayed aircraft position relative to the path) should be limited to the values specified for the segment of the procedure (i.e., 0.5 NM for the initial and intermediate segments, 0.25 NM for the final approach segment, and 0.5 NM for the missed approach segment). Brief deviations from this standard (e.g., overshoots or undershoots) during and immediately after turns, up to a maximum of one times the navigation accuracy (i.e., 1.0 NM for the initial and intermediate segments) are allowable.

C. Aircraft accomplishing RNP APCH approaches are required to monitor lateral and, if approved for operational credit, vertical guidance deviations. For baro-VNAV approach operations on an RNP APCH approach using the LNAV/VNAV minimums, the legacy vertical deviation limits are +100/-50 feet.

   Note: Aircraft qualified using AC 20-138 deviation display requirements for navigation may use a vertical deviation limit of ±75 feet (or a smaller value). This information must be published in the AFM or a Supplemental Type Certificate.

Go-Around or Missed Approach

A. The missed approach segment may be based upon the conventional NAVAID (e.g., VOR, DME, and NDB), but DME/DME-based systems are not acceptable for RNP APCH.

B. Unless the pilot has in sight the visual references required to continue the approach, the procedure must be discontinued if any of the following conditions occur:

   1. The navigation display is flagged invalid;
   2. There is a loss of the integrity alerting function;
   3. The integrity alerting function is activated before passing the FAF; or
   4. Lateral or vertical deviation exceeds the limits described in Section 3.2.3.3 (Final Approach).

      Note: Discontinuing the procedure may not be necessary for a multisensor RNP system that includes demonstrated RNP capability without GNSSU or incorporates integrity checking as part of a TSE alert. The AFM should be reviewed to determine the extent to which the system may be used in such a configuration.

Barometric VNAV

A. The crew is expected to fly the aircraft along the published vertical path and execute a missed approach procedure upon reaching DA, unless the visual references required for continuing the approach are present.

B. Temperature Limitation: Because of the pronounced effect of nonstandard temperature on baro-VNAV operations, VNAV approaches will contain a temperature limitation below which use of the VNAV DA, based on baro-VNAV, is not authorized. The temperature limitation will be shown as a note on the procedure. If the airborne system contains a temperature compensation capability, the AFM should be followed for use of the baro-VNAV function.

C. VNAV Path Mode Selection: Crews should be knowledgeable on selection of the appropriate vertical mode(s) that command vertical navigation via the published vertical path. Other vertical modes such as vertical speed are not applicable to baro-VNAV approach operations.

D. Remote Altimeter Setting Restriction: Use of baro-VNAV to a DA is not authorized with a remote altimeter setting. A current altimeter setting for the landing airport is required. Where remote altimeter minima are shown, the VNAV function may be used but only to the published LNAV MDA.

RF Considerations

A. Radius to Fix (RF): An RF leg is a constant radius circular path around a defined turn center that starts and terminates at a fix. An RF leg may be published as part of a procedure.

B. Since not all aircraft have the capability to fly these leg types, pilots are responsible for knowing if they can conduct an RNAV approach with an RF leg. Requirements for RF legs will be indicated on the approach chart in the notes section or at the applicable initial approach fix.

C. Controllers will clear RNAV-equipped aircraft for instrument approach procedures containing RF legs:

1. Via published transitions; or
2. Direct to the IAF / IF at intercept angles not greater than 90 degrees for both conventional and RNAV instrument approaches.
    - Controllers may issue a heading or a course direct to a fix between the IF and FAF at intercept angles not greater than 30 degrees for both conventional and RNAV instrument approaches.
    - In all cases, controllers will assign altitudes that ensure obstacle clearance and will permit a normal descent to the FAF. When clearing aircraft direct to the IF, ATC will radar monitor the aircraft until the IF and will advise the pilot to expect clearance direct to the IF at least 5 miles from the fix.
    - ATC must issue a straight-in approach clearance when clearing an aircraft direct to an IAF / IF with a procedure turn or hold-in-lieu of a procedure turn, and ATC does not want the aircraft to execute the course reversal.

    Note: ATC will not clear aircraft direct to any waypoint beginning or within an RF leg, and will not assign fix / waypoint crossing speeds in excess of charted speed restrictions.

D. Operating Procedures:

- The pilot must use either a flight director or autopilot when flying an RF leg. The pilot should comply with any instructions or procedures identified by the manufacturer as necessary to comply with the performance requirements in this attachment.
- When the dispatch of a flight is predicated on flying an RNP procedure with an RF leg, the pilot must determine that the installed autopilot/flight director is operational (i.e., the Autopilot / Flight Director and any related components are not considered inoperative per the MEL).
- The pilot is not authorized to fly a published RNP procedure unless it is retrievable by the procedure name from the aircraft navigation database and conforms to the charted procedure. The lateral path must not be modified, with the exception of complying with ATC clearances/instructions.
- The aircraft must be established on the procedure prior to beginning the RF leg.
- The pilot is expected to maintain the centerline of the desired path on RF legs. For normal operations, cross-track error/deviation (the difference between the displayed path and the displayed aircraft position relative to the displayed path, (i.e., FTE) should be limited to half the navigation accuracy associated with the procedure (e.g., 0.5 NM for RNP 1).
- Where published, the pilot must not exceed maximum airspeeds associated with the flyability (design) of the RF leg.

- If an aircraft system failure results in the loss of capability to follow an RF turn the pilot should maintain the current bank and roll out on the charted RF exit course. The pilot should advise Air Traffic Control as soon as possible of the system failure.

E. Prior to flying an RF leg, flight crewmembers must be thoroughly familiar with the principles and practice of RF turns, limiting airspeeds, bank angle/aircraft configuration, the effect of high winds, and contingency procedures for manual intervention which, although rare, may be required.

Parallel Offset Considerations

A. The system should be capable of flying tracks offset by up to 20 NM from the parent track. The presence of an offset should be continuously indicated. Tracks offset from the parent track must be continued for all ATS route segments and turns until either removed by the crew or automatically cancelled following:

1. Amendment of the active flight plan by executing a “Direct-To”;
2. Commencement of an approach procedure;
3. Where a course change exceeds 90 degrees; and

   Note: The navigation system can be expected to terminate the offset no later than the fix where the course change occurs.

4. Route segment ends at a hold fix.

B. The cross track offset distance should be manually entered into the RNP system to a resolution of 1 NM or better.

C. The lateral track-keeping requirement of RNP must be maintained in reference to the offset track where parallel offsets are applied.

D. Where Fixed Radius Transitions are applied, the offset track must be flown with the same turn radius as the parent track.

E. When a lateral offset is activated in the RNAV or RNP system, the aircraft will leave the defined route and typically intercept the offset at an angle of 45 degrees or less. When the offset is cancelled, the aircraft returns to the defined route in a similar manner. The navigation system must have a “Direct-To” function the flight crew can activate at any time. This function must be available to any fix.

F. The navigation system must also be capable of generating a geodesic path to the designated “To” fix, without “S-turning” and without undue delay.

Contingency Procedures

A. If there is any loss of GNSSU and/or WAAS capability, the crew will notify ATC of the loss along with a proposed course of action.

B. If LPV or LP lines of minima approach are not available due to *reduced* WAAS service:

1. Prior to the FAF:
   - The LNAV or LNAV/VNAV line of minima may still be available depending on the nature of the reduced service.
   - The crew may elect to continue the approach to the LNAV or LNAV/VNAV line of minima.
   - Alternatively, the crew may select a different approach using a ground-based NAVAID or fly to an alternate airport.
2. After the aircraft passes the FAF, an alert may result in a fail-down to LNAV-only operations.
   - The crew can continue to the LNAV minimums if the aircraft is above the MDA or the next step-down fix altitude for the LNAV approach.
   - The crew must initiate a missed approach if below a required altitude on the approach and cannot transition visually to land.

     Note: If the aircraft equipment does not include LNAV fail-down capability, the crew must perform a missed approach when the vertical guidance is flagged or another integrity alert is indicated. The crew must perform a missed approach for any TSO-C146 equipment if both lateral and vertical guidance is flagged or another integrity alert is indicated.

C. If there is *no* WAAS service:

Note: This situation is comparable to un-augmented GNSS equipment (e.g., TSO-C196).

1. Prior to the aircraft passing the FAF:
   - The avionics will provide integrity using FDE.
   - If there is no lateral flag or other integrity alert, the crew may complete the RNAV (GPS) approach using the LNAV line of minima.
   - If the crew sees a lateral flag or integrity alert, the crew should do one of the following:
     a. Request clearance from ATC to enter and remain in a holding pattern (fuel permitting) until the lateral flag or integrity alert disappears;
     b. Request a clearance from ATC for a different approach using ground-based navigation aids (if available); or
     c. Request a clearance from ATC to fly to an alternate airport.
2. After the aircraft passes the FAF, if the avionics provide a lateral flag or integrity alert, the crew must perform a missed approach if unable to continue visually.

D. If there is a complete GPS service outage or avionics malfunction: All RNAV (GPS) approaches will be out of service. The crew must choose an instrument approach based on ground-based NAVAIDs such as VOR, NDB or ILS.

Using an MDA as a DA/DH

A. The use of MDA as a DA/DH does not ensure obstacle clearance from the MDA to the landing runway. Crews must see and avoid obstacles between the MDA and the runway when regulatory requirements (e.g., 14 CFR Part 91.175) are met and the approach is continued below the MDA for landing.

B. When operationally authorized, crews may fly non-precision straight-in IAPs that Target Corporation is approved for using an MDA as a DA/DH, as long as the approach being flown meets one of the following requirements:

1. The approach serves a runway that has a published RNAV IAP (“RNAV (GPS),” “RNAV (RNP),” or “GPS” in the title) with a published LNAV/VNAV or RNP DA, and:
   a. Has the exact published final approach course as the RNAV IAP.
   b. Has a published vertical descent angle (VDA) coincident with or higher than the barometric vertical guidance (glideslope (GS)) on the published RNAV IAP.

      Note: A published VDA is not required when using the LNAV minima line on an RNAV approach that has a published LPV and/or LNAV/VNAV DA. Use the published GS. The VNAV path must be at or above all step-down fixes.
   c. Is selected from an approved and current database and the FMS displays a final approach Flight Path Angle (FPA) in tenths or hundredths. The displayed FPA may have a maximum difference of minus .04 from the IAP VDA or GS. The displayed FPA may always be rounded up to the next tenth. The range for a given FPA will be 2.9 to 3.0, 3.1 to 3.2, 3.2 to 3.3, 4.0 to 4.1, etc. This applies to systems that display the FPA in tenths or hundredths.
2. The approach serves a runway that has a published ILS, GLS, or RNAV IAP with LPV minima, and:
   a. Has the exact published final approach course as the ILS, GLS, or RNAV IAP.
   b. Has a published VDA coincident with or higher than the electronic GS on the published ILS, GLS, or RNAV IAP.
      - A published VDA is not required on an LOC-only approach when the ILS GS is out of service. Use the published GS. The VNAV path must be at or above all stepdown fixes.

- A published VDA is not required when using LNAV minima on an RNAV approach that has a published LPV or LNAV/VNAV DA. Use the published GS. The VNAV path must be at or above all stepdown fixes.

c. Is selected from an approved and current database and the FMS displays a final approach FPA in tenths or hundredths. The displayed FPA may have a maximum difference of minus .04 from the IAP VDA or GS. The displayed FPA may always be rounded up to the next tenth. The range for a given FPA will be 2.9 to 3.0, 3.1 to 3.2, 3.2 to 3.3, 4.0 to 4.1, etc. This applies to systems that display the FPA in tenths or hundredths.

3. The approach serves a runway to an airport operating under 14 CFR Part 139 with a Visual Glide Slope Indicator (VGSI).

a. The VDA or GS on the published final approach course must be coincident with or higher than the published VGSI descent angle.

b. The published final approach course is within plus or minus 4 degrees of the runway centerline (RCL) course.

C. VNAV Path Angle: The VNAV path angle must be greater than 2.75 and less than 3.77 degrees for Category A, B, and C aircraft, and greater than 2.75 and less than 3.50 degrees for Category D/E aircraft.

D. If an operational authorization has not been approved, then crews will not use an MDA as a DA/DH. Crews may use a Continuous Descent Final Approach (CDFA), but will begin the missed approach at an altitude above the MDA that will not allow the aircraft to descend below the MDA.

Maintenance Considerations

A. Only approved parts as listed in the manufacturer’s illustrated parts catalog will be used for replacement.

B. Only approved service centers will be authorized to perform maintenance on equipment used for instrument approach procedures (e.g., FMSs, GNSS equipment, RNP navigation components, etc.).

C. The Aircraft Maintenance Manual provides maintenance procedures for working on the equipment required for instrument approach procedures. Only maintenance technicians trained to provide corrective maintenance for this equipment will operate on systems required for instrument approach procedures.

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Appendix R: Abbreviations and Acronyms

A-RNP	Advanced Required Navigation Performance
AACS	Automatic Altitude Control System
AAD	Assigned Altitude Deviation
ACARS	Aircraft Communications, Addressing and Reporting System
ACC	Area Control Center
ADC	Air Data Computer
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
AFI	Africa
AFIS	Aerodrome Flight Information Service
AGCS	Air Ground Communication System
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIREP	Air Report
AMU	Area of Magnetic Unreliability
ANSP	Air Navigation Service Provider
AORRA	Atlantic Ocean Random Routing RNAV Area
APARMO	Asia-Pacific Approvals Registry and Monitoring Organization
APV	Approach Procedure with Vertical guidance
ARINC	Aeronautical Radio, Inc.
ARMA	Africa (AFI) Regional Monitoring Agency
ARP	Airport Reference Point
ARTCC	Air Route Traffic Control Center
ASDA	Accelerate Stop Distance Available
ASE	Altimetry System Error
ASG	Assigned Spacing Goal (See also: ADS-B In, IM)
ATC	Air Traffic Control
ATCC	Air Traffic Control Center
ATS	Air Traffic Service
ATSP	Air Traffic Service Providers
B-RNAV	Basic RNAV
BOTA	Brest Oceanic Transition Area
CARSAMMA	Caribbean / South American Monitoring Agency
CAVS	CDTI-Assisted Visual Separation
CBP	Customs Border Patrol
CDA	Canadian Domestic Airspace

CDTI	Cockpit Display of Traffic Information (See also: ADS-B In)
CDU	Control Display Unit
CENPAC	Central Pacific
CEP	Central East Pacific
CERAP	Center Radar Approach Control
CERT	Carbon Estimation and Reporting Tool
CFL	Cleared Flight Level
CFR	Code of Federal Regulations
CHIRP	Confidential Human Factors Incident Reporting Program (UK)
CLA	Clearance Acknowledgement Downlink Message
CLX	Oceanic Clearance Uplink Message
CMA	Central Monitoring Agency
CMV	Converted Meteorological Visibility
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CPDLC	Controller Pilot Data Link Communications
CPDLC-DCL	Controller Pilot Data Link Communications Departure Clearance
CVSM	Conventional Vertical Separation Minimum (2,000’)
DA (H)	Decision Altitude (Height)
DADC	Digital Air Data Computer
DHS	Department of Homeland Security
DLC	Data Link Communications
DME	Distance Measuring Equipment
DR	Dead Reckoning
eAPIS	Electronic Advance Passenger Information System
EASA	European Union Aviation Safety Agency
EET	Estimated Elapsed Time
EOBT	Estimated Off-Blocks Time
ETA	Estimated Time of Arrival
ETP	Equal Time Point
FAA	Federal Aviation Administration
FC	Friction Coefficient
FDE	Fault Detection and Exclusion
FDPS	Flight Data Processing System
FIM	Flight deck Interval Management (See also: ADS-B In, IM)
FIR	Flight Information Region
FIS	Flight Information Service
FL	Flight Level

FLAS	Flight Level Allocation Scheme
FMS	Flight Management System
FPL	Flight Plan
FPRD	Flight Plan Route to Destination
FTL	Flight Time Limitations
GBAS	Ground-Based Augmentation System
GLS	GBAS Landing System
GNE	Gross Navigational Error
GNSS	Global Navigation Satellite System
GNSSU	Global Navigation System Sensor Unit
GPS	(The) Global Positioning System
HF	High Frequency
HFDL	High Frequency Datalink
hPa	Hectopascals (one hPa = one millibar)
Hz	Hertz
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFBP	IATA Inflight Broadcast Procedures
IFPS	Integrated Initial Flight Plan Processing System
IFPZ	Integrated Initial Flight Plan Processing Zone
IFR	Instrument Flight Rules
IM	Interval Management (See also: ADS-B In)
INS	Inertial Navigation System
IORRA	Indian Ocean Random Routing RNAV Area
IRS	Inertial Reference System
ITP	In-Trail Procedure
KIAS	Knots Indicated AirSpeed
Kts	Knots
LAAS	Local Area Augmentation System
LAT	Latitude
LNAV	Lateral Navigation
LONG	Longitude
LP	Localizer Performance
LPV	Localizer Performance with Vertical guidance
LRCS	Long Range Communication System
LRNS	Long Range Navigation System
M	Meters

MDA (H)	Minimum Descent Altitude (Height)
MEL	Minimum Equipment List
MET	Meteorological
MHz	Megahertz
MIDRMA	Middle East Regional Monitoring Agency
MNT	Mach Number Technique
MPS	Meters Per Second
MSL	Mean Sea Level
NAARMO	North American Approvals and Registry Monitoring Organization
NAT	North Atlantic (Traffic)
NAT CMA	North Atlantic Central Monitoring Agency
NAT HLA	North Atlantic High Level Airspace
NDA (Canada)	Canadian Northern Domestic Airspace
NDB	Navigation Database
NM	Nautical Miles
NOPAC	North Pacific
NOTA	Northern Oceanic Transition Area
NOTAMs	Notices to Air Missions
OAC	Oceanic Area Control
OACC	Oceanic Area Control Center
OCA	Oceanic Control Area
OCD	Oceanic Clearance Delivery
OEP	Oceanic Entry Point
ORCA	Oceanic Route Clearance Authorization Service
OTR	Oceanic Transition Route
OTS	Out of Service
OWAFS	Operations Without an Assigned Fixed Speed
P-RNAV	Precision Area Navigation
PACOTS	Pacific Organized Track System
PANS-ATM	Procedures for Air Navigation Services - Air Traffic Management
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations
PBCS	Performance Based Communication and Surveillance
PBN	Performance Based Navigation
PDC	Pre-Departure Clearance
PIC	Pilot-in-Command
PNR	Point of No Return
PSR	Point of Safe Return

QFE	Height Above Airport Elevation (or Runway Threshold)
QNE	Altimeter Setting 29.92” Hg. or 1013.2 mb (Standard Pressure Setting)
QNH	Height (Altitude) Above Sea Level
QRH	Quick Reference Handbook
RA	Resolution Advisory
RAD	Route Availability Document
RAIM	Receiver-Autonomous Integrity Monitoring
RCL	Request for Clearance
RCP	Required Communications Performance
RF	Radius to Fix
RFL	Requested Flight Level
RLongSM	Reduced Longitudinal Separation Minimum
RMV	Reported Meteorological Visibility
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP APCH	RNP Approach
RNP AR	RNP Authorization Required Approach
RSP	Required Surveillance Performance
RTF	Radio Frequency Transmission
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minimum (1,000’)
SAFA	Safety Assessment of Foreign Aircraft
SAM	South America
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SAT/AFIS	Satellite Communications Airborne Flight Information System
SATCOM	Satellite Communications
SATMA	South Atlantic Monitoring Agency
SBAS	Satellite-Based Augmentation System
SDA (Canada)	Canadian Southern Domestic Airspace
SELCAL	Selective Calling
SIC	Second-in-Command
SLOP	Strategic Lateral Offset Procedure
SOTA	Shannon Oceanic Transition Area
SRD	Standard Route Document
SSB	Single Sideband
SSR	Secondary Surveillance Radar

TA	Traffic Alert
TCAS	Traffic Alert and Collision Avoidance System
TDLS	Tower Data Link Services
TDM	Track Definition Message
TMA	Terminal Control Area
TMI	Track Message Identification
TMU	Traffic Management Unit
TOAC	Time of Arrival Control
TODA	Take Off Distance Available
TORA	Take Off Run Available
TVE	Total Vertical Error
US	United States
UTC	Universal Coordinated Time
VAR	Volcanic Ash Report Form
VNAV	Vertical Navigation
VOR	VHF Omnidirectional Range
WAAS	Wide Area Augmentation System
WAT	West Atlantic (Formerly “WATRS / West Atlantic Route System”)

Appendix S: Contact Information Directory

ARINC SATCOM Voice Backup Services

ARINC has been authorized to use SATCOM Voice in oceanic areas in the event HF communications fail or are otherwise unavailable. HF remains the primary communication means for all air-ground-air communications between ARINC Communications Centers and en route oceanic aircraft. Aircraft desiring to contact ARINC, utilizing SATCOM Voice, should dial the following ICAO Short Codes (used with INMARSAT compatible systems only) or direct dial phone numbers:

Center	Oceanic Area	ICAO Short Code	Direct Dial
NYC	Atlantic, Caribbean, Central, & South America	436623	+1 (631) 244-2492
SFO	Pacific and Arctic Areas	436625	+1 (925) 371-3920

Aeradio Station Contact Information

Note: SATCOM Voice communications should be made to aeronautical radio stations rather than ATS units unless the urgency of the communication dictates otherwise. HF propagation difficulties does not constitute urgency.

Radio Station	SATCOM Short Code (INMARSAT)	Phone Number
Accra	Accra 462701 Cotonou 460106 Lome 460108	+225 21 27 64 39
Anchorage	436602	+1 (907) 269-1103
Atlantico	471001	+55 (81) 2129-8330
BODO	425702	+47 75-52-12-83
Canarias	424201	+34 928-577-071
Dakar	466301	+87 076 304-1733
Fukuoka		+81-92-607-9988
Gander	431613 431603 (Emergency Only) 431602 (Domestic)	+1 (709) 651-5207
Iceland	425105 425101 or 425103 (Emergency Only)	+354 568-4600
Johannesburg	460104	+27 (11) 928-6456 +27 (11) 928-6452 +27 (11) 928-6453
New York	ARINC: 436623 New York East (NAT HLA): 436695 New York West (WAT): 436696	+1 (631) 468-1413

Radio Station	SATCOM Short Code (INMARSAT)	Phone Number
Oakland	436697	+1 (510) 745-3415 or 3416
San Francisco	436625	+1 (925) 371-3920
Santa Maria	426302 or 426305	+351 296-820-438
Shanwick	425002	+353 61-368241

North Atlantic Communications NAT HF Frequency Families

NAT A	NAT B	NAT C	NAT D	NAT E	NAT F**
3016	2899	2872	2971	2962	3476
5598	5616	5649	4675	6628	6622
8906	8864	8879	8891	8825	8831
13306	13291	11336	11279	11309	13291
17946*	17946*	13306	13291	13354	17946*
		17946*	17946*	17946*	

*New York, Santa Maria, and Shanwick use frequency 17946

**NAT Family F is part-time operation only with times coinciding with the NAT track valid times.

1. Reykjavik monitors families B, C, and D.
2. Gander monitors families A, B, C, and F.
3. Shanwick monitors families A, B, C, D and F.
4. New York Monitors families A and E.
5. Santa Maria monitors families A and E.
6. Aircraft registered west of 30° W use NAT family B while operating in Reykjavik, Shanwick, and Gander.
7. Aircraft registered east of 30° W should use NAT family C.
8. All aircraft operating in the NAT are required to monitor 121.5.
9. The worldwide inter-pilot air-to-air frequency is 123.45.

Oceanic HF Frequency Assignments

For daily assigned HF frequencies, consult the Arinc website at one of the URLs listed below:

Region	Website	ARINC Phone Number
Atlantic (Including Gulf of Mexico)	https://radio.arinc.net/atlantic/	+1-631-589-7272
Pacific	https://radio.arinc.net/pacific/	+1-925-294-8297

Appendix T: Quick Reference Conversion Tables

Meters Per Second / Knots

Some countries, such as Russia and China, report wind speed in meters per second. The conversion chart below may be referenced, or you can use the following formula: **Knots X 0.514444 = Meters / Second**.

Knots	M / S	Knots	M / S	Knots	M / S	Knots	M / S	Knots	M / S
1	0.5	21	10.8	41	21.1	61	31.4	81	41.7
2	1.0	22	11.3	42	21.6	62	34.9	82	42.2
3	1.5	23	11.8	43	22.1	63	32.4	83	42.7
4	2.1	24	12.3	44	22.6	64	32.9	84	43.2
5	2.6	25	12.9	45	23.1	65	33.4	85	43.7
6	3.1	26	13.4	46	23.7	66	34.0	86	44.2
7	3.6	27	13.9	47	24.2	67	34.5	87	44.8
8	4.1	28	14.4	48	24.7	68	35.0	88	45.3
9	4.6	29	14.9	49	25.2	69	35.5	89	45.8
10	5.1	30	15.4	50	25.7	70	36.0	90	46.3
11	5.7	31	15.9	51	26.2	71	36.5	91	46.8
12	6.2	32	16.5	52	26.8	72	37.0	92	47.3
13	6.7	33	17.0	53	27.3	73	37.6	93	47.8
14	7.2	34	17.5	54	27.8	74	38.1	94	48.4
15	7.7	35	18.0	55	28.3	75	38.6	95	48.9
16	8.2	36	18.5	56	28.8	76	39.1	96	49.4
17	8.7	37	19.0	57	29.3	77	39.6	97	49.9
18	9.3	38	19.5	58	29.8	78	40.1	98	50.4
19	9.8	39	20.1	59	30.4	79	40.6	99	50.9
20	10.3	40	20.6	60	30.9	80	41.2	100	51.4

Millibars / Hectopascals to Inches in Mercury (InHg)

mb	0	1	2	3	4	5	6	7	8	9
	Inches									
940	27.76	27.79	27.82	27.82	27.88	27.91	27.94	27.96	27.99	28.02
950	28.05	28.08	28.11	28.14	28.17	28.20	28.23	28.26	28.29	28.32
960	28.35	28.38	28.41	28.44	28.47	28.50	28.53	28.56	28.59	28.61
970	28.64	28.67	28.70	28.73	28.76	28.76	28.82	28.85	28.88	28.91
980	28.94	28.97	29.00	29.03	29.06	29.09	29.12	29.15	29.18	29.21
990	29.23	29.26	29.29	29.32	29.35	29.38	29.41	29.44	29.47	29.50
1000	29.53	29.56	29.59	29.62	29.65	29.68	29.71	29.74	29.77	29.80
1010	29.83	29.85	29.88	29.91	29.94	29.97	30.00	30.03	30.06	30.09
1020	30.12	30.15	30.18	30.21	30.24	30.27	30.30	30.33	30.36	30.39
1030	30.42	30.45	30.47	30.50	30.53	30.56	30.59	30.62	30.65	30.68
1040	30.71	30.74	30.77	30.80	30.83	30.86	30.89	30.92	30.95	30.98
1050	31.01	31.04	31.07	31.10	31.12	31.15	31.18	31.21	31.24	31.27

Inches in Mercury (InHg) to Millibars / Hectopascals

InHg	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
	Millibars / Hectopascals									
27.0	914.3	914.7	915.0	915.3	915.7	916.0	916.4	916.7	917.0	917.4
27.1	917.7	918.1	918.4	918.7	919.1	919.4	919.7	920.1	920.4	920.8
27.2	921.1	921.4	921.8	922.1	922.5	922.8	923.1	923.5	923.8	924.1
27.3	924.5	924.8	925.2	925.5	925.8	926.2	926.5	926.9	927.2	927.5
27.4	927.9	928.2	928.5	928.9	929.2	929.6	929.9	930.2	930.6	930.9
27.5	931.3	931.6	931.9	932.3	932.6	933.0	933.3	933.6	934.0	934.3
27.6	934.6	935.0	935.3	935.7	936.0	936.3	936.7	937.0	937.4	937.7
27.7	938.0	938.4	938.7	939.0	939.4	939.7	940.1	940.4	940.7	941.1
27.8	941.4	941.8	942.1	942.4	942.8	943.1	943.4	943.8	944.1	944.5
27.9	944.8	945.1	945.5	945.8	946.2	946.5	946.8	947.2	947.5	947.9
28.0	948.2	948.5	948.9	949.2	949.5	949.9	950.2	950.6	950.9	951.2
28.1	951.6	951.9	952.3	952.6	952.9	953.3	953.6	953.9	954.3	954.6
28.2	955.0	955.3	955.6	956.0	956.3	956.7	957.0	957.3	957.7	958.0
28.3	958.3	958.7	959.0	959.4	959.7	960.0	960.4	960.7	961.1	961.4
28.4	961.7	962.1	962.4	962.8	963.1	963.4	963.8	964.1	964.4	964.8
28.5	965.1	965.5	965.8	966.1	966.5	966.8	967.2	967.5	967.8	968.2
28.6	968.5	968.8	969.2	969.5	969.9	970.2	970.5	970.9	971.2	971.6
28.7	971.9	972.2	972.6	972.9	973.2	973.6	973.9	974.3	974.6	974.9
28.8	975.3	975.6	976.0	976.3	976.6	977.0	977.3	977.7	978.0	978.3
28.9	978.7	979.0	979.3	979.7	980.0	980.4	980.7	981.0	981.4	981.7
29.0	982.1	982.4	982.7	983.1	983.4	983.7	984.1	984.4	984.8	985.1
29.1	985.4	985.8	986.1	986.5	986.8	987.1	987.5	987.8	988.2	988.5
29.2	988.8	989.2	989.5	989.8	990.2	990.5	990.9	991.2	991.5	991.9
29.3	992.2	992.6	992.6	993.2	993.6	993.9	994.2	994.6	994.9	995.3
29.4	995.6	995.9	996.3	996.6	997.0	997.3	997.6	998.0	998.3	998.6
29.5	999.0	999.3	999.7	1000.0	1000.4	1000.7	1001.0	1001.4	1001.7	1002.0
29.6	1002.4	1002.7	1003.1	1003.4	1003.7	1004.1	1004.4	1004.7	1005.1	1005.4
29.7	1005.8	1006.1	1006.4	1006.8	1007.1	1007.5	1007.8	1008.1	1008.5	1008.8
29.8	1009.1	1009.5	1009.8	1010.2	1010.5	1010.8	1011.2	1011.5	1011.9	1012.2
29.9	1012.5	1012.9	1013.2	1013.5	1013.9	1014.2	1014.6	1014.9	1015.2	1015.6
30.0	1015.9	1016.3	1016.6	1016.9	1017.3	1017.6	1018.0	1018.3	1018.6	1019.0
30.1	1019.3	1019.6	1020.0	1020.3	1020.7	1021.0	1021.3	1021.7	1022.0	1022.4
30.2	1022.7	1023.0	1023.4	1023.7	1024.0	1024.4	1024.7	1025.1	1025.4	1025.7
30.3	1026.1	1026.4	1026.8	1027.1	1027.4	1027.8	1028.1	1028.4	1028.8	1029.1
30.4	1029.5	1029.8	1030.1	1030.5	1030.8	1031.2	1031.5	1031.8	1032.2	1032.5
30.5	1032.9	1033.2	1033.5	1033.9	1034.2	1034.5	1034.9	1035.2	1035.6	1035.9
30.6	1036.2	1036.6	1036.9	1037.3	1037.6	1037.9	1038.3	1038.6	1038.9	1039.3
30.7	1039.6	1040.0	1040.3	1040.6	1041.0	1041.3	1041.7	1042.0	1042.3	1042.7
30.8	1043.0	1043.3	1043.7	1044.0	1044.4	1044.7	1045.0	1045.4	1045.7	1043.1
30.9	1046.4	1046.7	1047.1	1047.4	1047.8	1048.1	1048.4	1048.8	1049.1	1049.4

Flight Levels / Feet / Meters

Track 000° - 179°		
Flight Level	**Feet**	**Meters**
30	3,000	900
49	4,900	1,500
69	6,900	2,100
89	8,900	2,700
108	10,800	3,300
128	12,800	3,900
148	14,800	4,500
167	16,700	5,100
187	18,700	5,700
207	20,700	6,300
226	22,600	6,900
246	24,600	7,500
266	26,600	8,100
290	29,000	8,850
295	29,500	9,000
299	29,900	9,100
310	31,000	9,450
330	33,000	10,050
331	33,100	10,100
335	33,500	10,200
350	35,000	10,650
364	36,400	11,100
370	37,000	11,300
374	37,400	11,400
390	39,000	11,900
397	39,700	12,100
410	41,000	12,500

Track 180° - 359°		
Flight Level	**Feet**	**Meters**
39	3,900	1,200
59	5,900	1,800
79	7,900	2,400
98	9,800	3,000
118	11,800	3,600
138	13,800	4,200
157	15,700	4,800
177	17,700	5,400
197	19,700	6,000
217	21,700	6,600
236	23,600	7,200
256	25,600	7,800
276	27,600	8,400
282	28,200	8,600
300	30,000	9,150
315	31,500	9,600
320	32,000	9,750
340	34,000	10,350
348	34,800	10,600
354	35,400	10,800
360	36,000	10,950
380	38,000	11,600
381	38,100	11,600
394	39,400	12,000
400	40,000	12,200
430	43,000	13,100

Note: The figures under “Feet” are rounded to the nearest hundred and are shown for reference only.

Metric / Standard Conversion for Takeoff and Landing

These tables convert existing operational approvals. Values not shown may be interpolated.

RVR Conversion	
Feet	**Meters**
300 ft	75 m
400 ft	125 m
500 ft	150 m
600 ft	175 m
700 ft	200 m
1,000 ft	300 m
1,200 ft	350 m
1,600 ft	500 m
1,800 ft	550 m
2,000 ft	600 m
2,100 ft	650 m
2,400 ft	750 m
3,000 ft	1,000 m
4,000 ft	1,200 m
4,500 ft	1,400 m
5,000 ft	1,500 m
6,000 ft	1,800 m

Meteorological Visibility Conversion		
Statute Miles	**Meters**	**Nautical Miles**
1/4 sm	400 m	1/4 nm
3/8 sm	600 m	3/8 nm
1/2 sm	800 m	1/2 nm
5/8 sm	1,000 m	5/8 nm
3/4 sm	1,200 m	7/10 nm
7/8 sm	1,400 m	7/8 nm
1 sm	1,600 m	9/10 nm
1 1/8 sm	1,800 m	1 1/8 nm
1 1/4 sm	2,000 m	1 1/10 nm
1 1/2 sm	2,400 m	1 3/10 nm
1 3/4 sm	2,800 m	1 1/2 nm
2 sm	3,200 m	1 3/4 nm
2 1/4 sm	3,600 m	2 nm
2 1/2 sm	4,000 m	2 2/10 nm
2 3/4 sm	4,400 m	2 4/10 nm
3 sm	4,800 m	2 6/10 nm

Conversion of Reported VIS to RVR / CMV

When an RVR value exceeds 2,000 m, it is reported as a VISIBILITY (VIS). To convert the VIS value to an RVR / CMV value, multiply it by the value given in the table below.

Lighting Elements in Operation	RVR / CMV = Reported VIS x ____	
	Day	**Night**
HIALS and HIRL (Approach and Runway Lights)	1.5	2.0
Any type of lighting installation other than above	1.0	1.5
No lighting	1.0	Not Applicable

<u>Example</u>: At night when approach and runway lights are in operation, the reported VIS is 1,200 m and the required minimum for the approach is a CMV of 1,800 m. The VIS of 1,200 m is therefore multiplied by 2, giving a CMV of 2,400 m, which is above the required 1,800 m.

Temperature (C to F)

C°	F°	C°	F°	C°	F°	C°	F°	C°	F°
-49	-56.2	-29	-20.2	-9	15.8	11	51.8	31	87.8
-48	-54.4	-28	-18.4	-8	17.6	12	53.6	32	89.6
-47	-52.6	-27	-16.6	-7	19.4	13	55.4	33	91.4
-46	-50.8	-26	-14.8	-6	21.2	14	57.2	34	93.2
-45	-49.0	-25	-13.0	-5	23.0	15	59.0	35	95.0
-44	-47.2	-24	-11.2	-4	24.8	16	60.8	36	96.8
-43	-45.4	-23	-9.4	-3	26.6	17	62.6	37	98.6
-42	-43.6	-22	-7.6	-2	28.4	18	64.4	38	100.4
-41	-41.8	-21	-5.8	-1	30.2	19	66.2	39	102.2
-40	-40.0	-20	-4.0	0	32.0	20	68.0	40	104.0
-39	-38.2	-19	-2.2	1	33.8	21	69.8	41	105.8
-38	-36.4	-18	-0.4	2	35.6	22	71.6	42	107.6
-37	-34.6	-17	1.4	3	37.4	23	73.4	43	109.4
-36	-32.8	-16	3.2	4	39.2	24	75.2	44	111.2
-35	-31.0	-15	5.0	5	41.0	25	77.0	45	113.0
-34	-29.2	-14	6.8	6	42.8	26	78.8	46	114.8
-33	-27.4	-13	8.6	7	44.6	27	80.6	47	116.6
-32	-25.6	-12	10.4	8	46.4	28	82.4	48	118.4
-31	-23.8	-11	12.2	9	48.2	29	84.2	49	120.2
-30	-22.0	-10	14.0	10	50.0	30	86.0	50	122.0

Fuel to Weight Conversions

	1 US Gallon Equals:	1 Imperial Gallon Equals:
Aviation Fuel	6.0 lbs	7.21 lbs
Jet Fuel	6.7 lbs	8.05 lbs
Oil	7.5 lbs	9.01 lbs

Other Conversion Formulas

Volume	Gallons to Liters	Gallons x 3.7854 = Liters
Volume	Liters to Gallons	Liters / 3.7854 = Gallons
Volume to Weight	Gallons to Pounds (JP-4)	Gallons x 6.55 = Pounds
Volume to Weight	Gallons to Pounds (JP-5)	Gallons x 6.82 = Pounds
Volume to Weight	Gallons to Pounds (Kerosene)	Gallons x 6.7 = Pounds
Volume to Weight	Gallons to Pounds (Jet A)	Gallons x 6.74 = Pounds
Volume to Weight	Gallons to Pounds (Gasoline)	Gallons x 5.87 = Pounds
Weight	Pounds to Kilograms	Pounds / 2.2046 = Kilograms
Weight	Kilograms to Pounds	Kilograms x 2.2046 = Pounds

Appendix U: AIP References

An Aeronautical Information Publication (AIP) is a publication issued by or with the authority of a state and containing aeronautical information essential to air navigation (ICAO Annex 15 - Aeronautical Information Services). AIPs contain details of regulations, procedures and other information pertinent to the operation of aircraft in the country to which it relates. It is issued by or on behalf of the respective civil aviation administration and constitutes the basic information source for permanent information and long duration temporary changes.

Prior to flight, crew members are advised to review the AIPs for any countries in which they plan to operate to ensure full compliance with local regulatory requirements. What follows is a list of countries known to have an AIP at the time of this manual's publication, as well as hyperlinks to the applicable websites where those AIPs can be found (if available).

In some cases, the AIP is not directly accessible and must be bought or can only be accessed after creating a username and password. In those cases, the hyperlink directs to the overall website where those steps can be initiated.

In addition, crews can find online directories of AIP resources through the following URLs:

https://www.eurocontrol.int/articles/ais-online
https://erau.libguides.com/uas/electronic-aips-country

Europe

Albania (LA)	Kyrgyzstan (UC)
Armenia (UD)	Latvia (EV)
Austria (LO)	Lithuania (EY)
Azerbaijan (UB)	Luxembourg (EL)
Belarus (UM)	Malta (LM)
Belgium (EB)	Moldova (LU)
Bosnia and Herzegovina (LQ)	Montenegro (LY)
Bulgaria (LB)	Netherlands (EH)
Croatia (LD)	Norway (EN)
Cyprus (LC)	Poland (EP)
Czech Republic LK)	Portugal (Azores-Madeira) (LP)
Denmark (Faroe Islands / Greenland) (EK/BG)	Romania (LR)
Estonia (EE)	Russian Federation (UU)
Finland (EF)	Serbia (LY)
North Macedonia (LW)	Slovakia (LZ)
France (LF)	Slovenia (LJ)

Georgia (UG)	Spain (Balearic Is. - Canary Is.) (LE)
Germany (ED)	Sweden (ES)
Greece (LG)	Switzerland (LS)
Hungary (LH)	Tajikistan (UT)
Iceland (BI)	Türkiye (LT)
Ireland (EI)	Turkmenistan (UT)
Italy (LI)	Ukraine (UK)
Kazakhstan (UA)	United Kingdom (Eurocontrol) (EG); NAT UK
Kosovo (BK)	Uzbekistan (UT)

Note: AIPs of ECAC member states are accessible through the European AIS Database public user website – EAD Basic, with registration required.

Africa

Algeria (DA)	Madagascar (FM)
Angola (FN)	Malawi (FW)
Benin (DN)	Mali (GA)
Botswana	Mauritania (GQ)
Burkina Faso (DF)	Mauritius (FI)
Burundi	Morocco (GM)
Cameroon (FK)	Mozambique (FQ)
Cape Verde	Namibia (FY)
Central African Republic (FE)	Niger
Chad (FT)	Nigeria (DN)
Comoros (FM)	Reunion (France) (FM)
Congo, Republic (FC)	Rwanda (HR)
Ivory Coast (DI)	Sao Tomé and Principe (FP)
D.R. of Congo (FZ)	Senegal (GO)
Djibouti (HD)	Seychelles (FS)
Egypt (HE)	Sierra Leone (GF)
Equatorial Guinea (FG)	Somalia (HC)
Ethiopia (HA)	South Africa (FA)
Gabon (FO)	St Helena (United Kingdom) (FH)
Gambia (GB)	Sudan (HS)
Ghana (DG)	Tanzania (HT)
Guinea (GU)	Togo (DX)

Guinea-Bissau (GG)	Tunisia (DT)
Kenya (HK)	Uganda (HU)
Lesotho (FX)	Zambia (FL)
Liberia (GL)	Zimbabwe (FV)
Libya (HL)	

Asia & Pacific

Australia (Y)	Mongolia (ZM)
American Samoa (NS)	Myanmar (VY)
Bangladesh (VG)	Nauru (AN)
Bhutan (VQ)	Nepal (VN)
Brunei Darussalam (WB)	New Caledonia (France) (NW)
Cambodia (VD)	New Zealand (NZ)
China (Z – except ZK and ZM)	North Mariana Islands (FAA)
Cook Islands (NC)	Niue (NI)
DPR of Korea (ZK)	Papua New Guinea (AY)
Fiji (NF)	Philippines (RP)
French Polynesia (France) (NT)	Republic of Korea (RK)
Guam (FAA)	Samoa (NS)
Hong Kong (HK)	Singapore (WS)
India (VA, VE , VI, VO)	Solomon Island (AG)
Indonesia (WA, WI, WQ, WR)	Sri Lanka (VC)
Japan (RO, RJ)	Taiwan (RC)
Kiribati (NG)	Thailand (VT)
Laos (VL)	Timor Leste (WP)
Macao (VM)	Tonga (NF)
Malaysia (WB, WM)	Tuvalu (NG)
Maldives (VR)	Vanuatu (NV)
Marshall Islands	Vietnam (VV)
Micronesia, Federated States of (PT)	Wallis and Futuna Islands (NL)

Middle East

Afghanistan (OA)	Oman (OO)
Bahrain (OB)	Pakistan (OP)
Iran (OI)	Qatar (OT)
Iraq (OR)	Saudi Arabia (OE)
Israel (LL)	Syria (OS)
Jordan (OJ)	United Arab Emirates (OM)
Kuwait (OK)	Yemen (OY)
Lebanon (OL)	

North & Central America

Anguilla (TQ)	Guatemala (MG)
Antigua and Barbuda (TA)	Haiti (MT)
Aruba (TN)	Honduras (MH)
Bahamas (MY)	Jamaica (MK)
Barbados (TB)	Mexico (MM)
Belize (MZ)	Montserrat (United Kingdom)
Bermuda (TX)	Nicaragua (MN)
Bonaire (Netherlands)	Saba (Netherlands)
Canada (C)	Saint Eustatius (Netherlands)
Cayman Islands (MW)	Saint Kitts and Nevis (TK)
Costa Rica (MR)	Saint Lucia (TL)
Cuba (MU)	Sint Maarten (Netherlands) (TN)
Curaçao (TN)	Saint Vincent and Grenadines (TV)
Dominica (TD)	Trinidad and Tobago (TT)
Dominican Republic (MD)	Turks and Caicos Islands (MB)
EL Salvador (MS)	United States (K, P)
French Antilles	Virgin Islands (United Kingdom) (TU)
Grenada (TG)	

South America

Argentina (SA)	Guyana (SY)
Bolivia (SL)	Panama (MP)
Brazil	Paraguay (SG)
Chile (CH, SH)	Peru (SP)
Colombia (SK)	Suriname (SM)
Ecuador (SE)	Uruguay (SU)
Falkland Islands (Malvinas) (SF)	Venezuela (SV)
French Guiana (France) (SO)	

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