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# Advisory Circular

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Airspace Operations

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**Change:**

This advisory circular (AC) contains both general information and detailed guidance for operators planning flights in oceanic and remote continental airspace. This includes Performance-based Navigation (PBN) and Special Areas of Operation (SAO). The Federal Aviation Administration (FAA) revised this AC to focus on the evolving operations in oceanic and remote continental airspace. This AC is laid out in a building block format, beginning with foundational information, followed by information on the training, authorizations, and equipment required to operate most efficiently in this airspace, and finishing with flight planning, flight execution, and contingency operations guidance. Our goal is to provide you with a template to guide you through planning and executing flight operations through oceanic and remote continental airspace. Information related to international operations in specific locales continues to be available in the [North Atlantic \(NAT\) Resource Guide for United States Operators](#); the [West Atlantic, Gulf of Mexico, and Caribbean Resource Guide for U.S. Operators](#); and the [Pacific Resource Guide for U.S. Operators](#). These online resource guides, along with Notices to Air Missions (NOTAM) and FAA International Notices, provide the most current information available to pilots, aircraft dispatchers, and other operational control personnel preparing for oceanic and international operations. We have also included hyperlinks to many documents, available free or for purchase. While we carefully checked at the time of publication that information included in this AC is current, oceanic and remote continental airspace operations are constantly evolving, and it is incumbent on you, the operators, to ensure you are flying with current information.

This AC neither is mandatory nor does it constitute a regulation. When this AC uses mandatory language (e.g., “must” or “may not”), it is quoting or paraphrasing a regulatory requirement or prohibition. When this AC uses permissive language (e.g., “should” or “may”), it describes an acceptable means, but not the only means, of conducting that aspect of operations in oceanic and remote continental airspace. However, if you use the means described in the AC, you must follow them in all important respects.

Wesley L. Mooty  
Acting Deputy Executive Director, Flight Standards Service

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## CHAPTER 1. GENERAL

- 1.1 Purpose of This Advisory Circular (AC).** The Federal Aviation Administration (FAA) (“we”) developed this AC to provide general information and guidance for certificated and General Aviation (GA) operators (“you”) planning flights in oceanic and remote continental airspace. This guidance includes the authorizations you may need for operations in such airspace. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide information to the public regarding existing requirements under the law or agency policies.
- 1.2 Audience.** We wrote this AC primarily for operators who do not have experience with flying in oceanic and remote continental airspace, to assist in developing their own procedures. We also wrote this AC for GA pilots who do not fly regularly in oceanic and remote continental airspace and need a refresher in planning and executing such a flight. Most certificated operators have company procedures for operations in oceanic and remote continental airspace. Those procedures have been accepted by FAA inspectors and conform to all relevant regulations and guidance. If you are working for one of these operators, this AC may serve to reinforce your company procedures.
- 1.3 Where You Can Find This AC.** You can find this AC on the FAA’s website at [https://www.faa.gov/regulations\\_policies/advisory\\_circulars](https://www.faa.gov/regulations_policies/advisory_circulars).
- 1.4 What This AC Cancels.** AC 91-70B CHG 1, Oceanic and Remote Continental Operations, dated February 1, 2019, is canceled.
- 1.5 Fundamental Changes From Previous Edition.** This revision of AC 91-70 contains numerous changes from the previous edition, many of which clarify or amplify information provided earlier. Operators should review this revised AC in its entirety. We have added information on the use of Satellite Voice (SATVOICE) communications, Controller-Pilot Data Link Communication (CPDLC), and space-based Automatic Dependent Surveillance-Broadcast (ADS-B), as well as updated information on common causes of pilot deviations and re-emphasized the importance of accurate flight plan equipment and capability codes. We updated the contingency procedures, in line with International Civil Aviation Organization (ICAO) changes, and explain the requirements for oceanic authorizations. Finally, we provide updated links to the most current sources of international material.
- 1.6 Related Title 14 of the Code of Federal Regulations (14 CFR) Parts.**
- Part 91, §§ 91.1 through 91.21, 91.101 through 91.143, 91.151 through 91.159, 91.167 through 91.193, 91.203, 91.205, 91.209 through 91.217, 91.221, 91.225, 91.227, 91.303 through 91.319, 91.323, 91.509, 91.511, 91.605, 91.609, 91.703 through 91.715, 91.903, 91.1039, and 91.1073; and Appendix G.
  - Part 119, §§ 119.5, 119.49, 119.59, and 119.63.

- Part [121](#), §§ [121.11](#), [121.101](#), [121.121](#), [121.163](#), [121.339](#), [121.351](#), [121.353](#), [121.355](#), [121.401](#), [121.415](#), [121.427](#), and [121.445](#); and Appendix [G](#).
- Part [125](#), §§ [125.23](#), [125.45](#), [125.51](#), [125.203](#), [125.209](#), [125.296](#), and [125.363](#).
- Part [135](#), §§ [135.3](#), [135.43](#), [135.145](#), [135.165](#), [135.167](#), [135.183](#), [135.213](#), [135.323](#), [135.329](#), [135.351](#), [135.364](#), and [135.381](#); and Appendix [G](#).

## **1.7 Related Reading Material (current editions).**

### **1.7.1 RTCA Documents.** Available for purchase on the RTCA website at <https://www.rtca.org/standards>.

1. RTCA/DO-258/ED-100, Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications.
2. RTCA/DO-260/ED-102, Minimum Operational Performance Standards (MOPS) for 1090 MHz Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B).
3. RTCA/DO-306/ED-122, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard).
4. RTCA/DO-350/ED-228, Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard).

### **1.7.2 FAA Technical Standard Orders (TSO).**

1. [TSO-C115](#), Flight Management System (FMS) Using Multi-Sensor Inputs.
2. [TSO-C145](#), Airborne Navigation Sensors Using The Global Positioning System Augmented by the Satellite Based Augmentation System (SBAS).
3. [TSO-C146](#), Stand-Alone Airborne Navigation Equipment Using The Global Positioning System Augmented by the Satellite Based Augmentation System (SBAS).
4. [TSO-C196](#), Airborne Supplemental Navigation Sensors for Global Positioning System Equipment Using Aircraft-Based Augmentation.

### **1.7.3 FAA ACs.**

1. AC [20-138](#), Airworthiness Approval of Positioning and Navigation Systems.
2. AC [20-140](#), Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS).
3. AC [20-150](#), Airworthiness Approval of Satellite Voice (SATVOICE) Equipment Supporting Air Traffic Service (ATS) Communication.
4. AC [90-80](#), Approval of Offshore Standard Approach Procedures, Airborne Radar Approaches, and Helicopter En Route Descent Areas.

5. AC [90-96](#), Approval of U.S. Operators and Aircraft to Operate Under Instrument Flight Rules (IFR) in European Airspace Designated for Basic Area Navigation (B-RNAV) and Precision Area Navigation (P-RNAV).
  6. AC [90-105](#), Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System and in Oceanic and Remote Continental Airspace.
  7. AC [90-114](#), Automatic Dependent Surveillance-Broadcast Operations.
  8. AC [90-117](#), Data Link Communications.
  9. AC [91-85](#), Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum (RVSM) Airspace.
  10. AC [91-92](#), Pilot's Guide to a Preflight Briefing.
  11. AC [120-42](#), Extended Operations (ETOPS and Polar Operations).
  12. AC [120-100](#), Basics of Aviation Fatigue.
  13. AC [120-103](#), Fatigue Risk Management Systems for Aviation Safety.
  14. AC [121-31](#), Flight Crew Sleeping Quarters and Rest Facilities.
  15. AC [135-42](#), Extended Operations (ETOPS) and Operations in the North Polar Area.
- 1.7.4** FAA IFR Enroute Aeronautical Planning Charts. These charts are available at [https://www.faa.gov/air\\_traffic/flight\\_info/aeronav/digital\\_products/ifr](https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/ifr).
1. North Atlantic Route Chart.
  2. North Pacific Route Chart.
  3. Western Atlantic Route System Chart.
- 1.8 AC Feedback Form.** For your convenience, the AC Feedback Form is the last page of this AC. Note any deficiencies found, clarifications needed, or suggested improvements regarding the contents of this AC on the AC Feedback Form.

## CHAPTER 2. BACKGROUND INFORMATION FOR OPERATIONS IN OCEANIC AND REMOTE CONTINENTAL AIRSPACE

**2.1 ICAO and Its Relationship to U.S. Aviation.** The United States is a Contracting State to the Convention on International Aviation (Chicago Convention) and an ICAO Member State and has fully supported the organization’s goals from its inception. ICAO works to achieve the highest level of standards and procedures for aircraft, personnel, airways, and aviation services throughout the world. ICAO oversees the international standards ascribed to by its more than 190 Member States for navigation facilities, airports, weather, and radio services. Through active support and participation in ICAO, the FAA strives to improve worldwide safety standards and procedures. ICAO’s strategic objectives are to continue to establish and maintain Standards and Recommended Practices (SARPs) for the safe and orderly development of international aviation. The 19 Annexes to the Chicago Convention (ICAO Annexes) contain more than 10,000 adopted SARPs.

**Note:** ICAO Member States are obligated to “collaborate in securing the highest practicable degree of uniformity in regulations” and generally achieve this by complying with the SARPs contained in the 19 Annexes and supporting ICAO documents such as ICAO Doc [4444](#), Procedures for Air Navigation Services—Air Traffic Management, and ICAO Doc [7030](#), Regional Supplementary Procedures. States notify ICAO of their “differences” with SARPs and publish them in their Aeronautical Information Publication (AIP).

- 2.2 ICAO Annexes.** Find all ICAO Annexes at the ICAO store at <https://store.icao.int>.
- 2.2.1 Annex 1, Personnel Licensing.** Provides information on licensing of flightcrews, air traffic controllers, and aircraft maintenance personnel, including medical standards for flightcrews and air traffic controllers.
- 2.2.2 Annex 2, Rules of the Air.** Contains visual flight rules (VFR) and instrument flight rules (IFR) for all operators.
- 2.2.3 Annex 3, Meteorological Service for International Air Navigation.** Provides for meteorological services for international air navigation and reporting of meteorological observations from aircraft.
- 2.2.4 Annex 4, Aeronautical Charts.** Contains specifications for aeronautical charts used in international aviation.
- 2.2.5 Annex 5, Units of Measurement to be Used in Air and Ground Operations.** Lists dimensional systems used in air and ground operations.
- 2.2.6 Annex 6, Operation of Aircraft (3 Parts).** Specifies minimum standards for below-listed operations throughout the world:



1. Part I, International Commercial Air Transport—Aeroplanes.
  2. Part II, International General Aviation—Aeroplanes.
  3. Part III, International Operations—Helicopters.
- 2.2.7** Annex 7, Aircraft Nationality and Registration Marks. Specifies requirements for registration and identification of aircraft.
- 2.2.8** Annex 8, Airworthiness of Aircraft. Specifies uniform procedures for certification and inspection of aircraft.
- 2.2.9** Annex 9, Facilitation. Provides for the standardization and simplification of border-crossing formalities.
- 2.2.10** Annex 10, Aeronautical Telecommunications:
1. Volume I, Radio Navigation Aids. Provides for standardizing communications equipment and systems.
  2. Volume II, Communication Procedures including those with PANS status. Standardizes communications procedures.
  3. Volume III, Communication Systems. Standardizes communications systems.
  4. Volume IV, Surveillance and Collision Avoidance Systems. Standardizes surveillance radar and collision avoidance.
  5. Volume V, Aeronautical Radio Frequency Spectrum Utilization. Standardizes aeronautical radio spectrum utilization.
- 2.2.11** Annex 11, Air Traffic Services. Includes information on establishing and operating air traffic control (ATC), flight information, and alerting services.
- 2.2.12** Annex 12, Search and Rescue. Provides information on organization and operation of facilities and services necessary for Search and Rescue (SAR).
- 2.2.13** Annex 13, Aircraft Accident and Incident Investigation. Provides for uniformity in notifying, investigating, and reporting on aircraft accidents.
- 2.2.14** Annex 14, Aerodromes:
1. Volume I, Aerodrome Design and Operations. Contains specifications for the design and equipment of aerodromes.
  2. Volume II, Heliports. Contains specifications for the design and equipment of heliports.
- 2.2.15** Annex 15, Aeronautical Information Services. Includes methods for collecting and disseminating aeronautical information required for flight operations.

**2.2.16** Annex 16, Environmental Protection:

1. Volume I, Aircraft Noise. Contains specifications for aircraft noise certification, noise monitoring, and noise exposure units for land-use planning.
2. Volume II, Aircraft Engine Emissions. Contains specifications for aircraft engine emissions.
3. Volume III, Aeroplane CO<sub>2</sub> Emissions.
4. Volume IV, Carbon Offsetting and Reduction Scheme for International Aviation (CORSA).

**2.2.17** Annex 17, Security. Specifies methods for safeguarding international civil aviation against unlawful acts of interference.

**2.2.18** Annex 18, The Safe Transport of Dangerous Goods by Air. Contains specifications for labeling, packing, and shipping dangerous cargo.

**2.2.19** Annex 19, Safety Management. Describes Safety Management System (SMS) development, regulatory framework, and supporting guidance.

**2.3 Applicability of U.S. and International Regulations.**

**2.3.1** FAA regulations relating to certification, airworthiness, licensing, and certain operational aspects (e.g., operational control, communication and navigation equipment, and Extended Operations (ETOPS)), are applicable to U.S. operators wherever they fly. Some of these regulations are fundamental to oceanic operations:

**2.3.1.1** Title 14 CFR part [91](#), § [91.511](#) (applicable to part 91 subpart [F](#)), deals with “overwater” operations which are more than 30 minutes or 100 nautical miles (NM) from the nearest shore.

**Note:** Section 91.511(b) notes that a unit is “independent if the function of any part of it does not depend on the functioning of any part of another receiver or electronic navigation unit.”

**2.3.1.1.1** For such operations, two independent long-range navigation systems (LRNS) are required, except in an area defined by coordinates in § 91.511(f), where only one LRNS is sufficient.

**2.3.1.1.2** Part 91 subpart F overwater operations outside very high frequency (VHF) voice communication coverage require two long-range communication systems (LRCS), except when an aircraft has two VHF radios, in which case only one high frequency (HF) radio is sufficient.

**2.3.1.2** Title 14 CFR part [121](#), § [121.351](#); part [125](#), § [125.203](#); and part [135](#), § [135.165](#) use a different term, “extended over-water” operations, defined in 14 CFR part [1](#), § [1.1](#) as more than 50 NM from the nearest shoreline.

- 2.3.1.2.1** Section 121.351 specifically requires two “independent long-range navigation systems” for extended over-water operations.
- 2.3.1.2.2** Sections 125.203 and 135.165 use different language, and only require “two approved independent navigation systems suitable for navigating the airplane along the route” within the “degree of accuracy required for ATC.” This allows extended over-water operations along ATS routes that have ground-based Navigational Aid (NAVAID) coverage, without any LRNS.
- 2.3.1.2.3** For parts 121, 125, and 135, extended over-water operations “in certain geographic areas” with only a single LRNS can be authorized via operations specification (OpSpec) B054, which defines an area by coordinates where only one LRNS is sufficient.
- 2.3.1.2.4** Extended overwater operations outside VHF voice communication coverage require two LRCSs, except for holders of OpSpec B045, which defines an area by coordinates where only one LRCS is sufficient.
- 2.3.2** FAA regulations governing “Flight Rules” (this is the title of part 91 subpart [B](#)), on the other hand, are applicable to all operators, in U.S. sovereign airspace only.<sup>1</sup> These so-called “flight and maneuver” regulations are generally harmonized with ICAO rules, in accordance with Article [12](#) to the Chicago Convention. Exceptions are listed as “Differences” in the relevant AIP. In the U.S. [AIP](#), these are found in Section GEN 1.7, Differences From ICAO Standards, Recommended Practices and Procedures.
- 2.3.3** U.S. operators flying outside U.S. sovereign airspace must abide by the “flight and maneuver” regulations in effect for that airspace. If the airspace is “high seas” (“high seas” airspace generally begins outside 12 NM from the nearest shore), the applicable rules are found in ICAO Annex 2 (titled “Rules of the Air”), and ICAO Doc 7030.<sup>2</sup> In other countries’ sovereign airspace, information on regulations is found in the relevant AIP, with Differences from ICAO SARPs also notified there.
- 2.3.3.1** Section [91.703](#) says that you must comply with ICAO Annex 2 if you operate your U.S.-registered aircraft “over the high seas.” Section 91.703 further requires that you, when within a foreign country, follow the rules “relating to the flight and maneuver of aircraft there in force.”
- 2.3.3.2** According to §§ [121.11](#), [125.23\(b\)](#), and [135.3\(a\)\(2\)](#), for operations under each respective part, when operating within a foreign country, you must comply with the air traffic rules of the country concerned and any local airport rules that may be in force. You must also follow all rules of that part that are more

<sup>1</sup> Exception: § 91.703 imposes the following subpart B flight rules for operations of civil aircraft of U.S. registry over the high seas: §§ [91.117\(c\)](#), [91.127](#), [91.129](#), and [91.131](#).

<sup>2</sup> In addition, 14 CFR contains three flight and maneuver regulations (listed in footnote 1) which apply to operations of civil aircraft of U.S. registry over the high seas.

restrictive than the rules of the foreign country in which you are operating, as long as you can do so without violating the rules of that country.

**Note:** In some countries, Annex 6 fuel requirements are in force, which may be more restrictive than applicable 14 CFR rules.

**2.3.4 Differing Airspace Requirements.** It is quite possible to transit regions with significantly different procedures in one long-range flight. Therefore, you should familiarize yourself with the equipment and procedural requirements to file and fly in each segment of foreign airspace in which you intend to operate by referencing, for example, the appropriate State's AIP.

**2.4 ICAO Guidance Documents and Reference Material.** Find the following ICAO documents at the ICAO store at <https://store.icao.int>.

**2.4.1 Guidance Documents.** We developed much of the material in this AC from these foundational documents: ICAO Annexes, other ICAO guidance documents, related sections of 14 CFR, and other FAA guidance material.

**2.4.2 Chicago Convention.** We single out the following articles of the Convention on International Civil Aviation (listed in ICAO Doc 7300) because of their importance in regulating international aviation. If you operate in oceanic and remote continental airspace, you should thoroughly understand them.

- Article 1, Sovereignty.
- Article 12, Rules of the Air.
- Article 29, Documents Carried in Aircraft.

**2.4.3 ICAO Publications.** The principal purpose of ICAO publications is the “systematic and prompt dissemination in concise form of the policies and activities of the Organization...” These publications consist of Annexes, documents with “Procedures for Air Navigation Services” and “Regional Supplementary Procedures” in the name, manuals, and other similar publications. The following is a brief description of each category of publications, beginning with the most authoritative, and moving down the hierarchy.

**2.4.3.1 Annexes.** There are 19 Annexes (named in paragraph [2.2](#) above) to the Convention on International Civil Aviation (listed in ICAO Doc 7300). They state the SARPs.

**2.4.3.2 Procedures for Air Navigation Services (PANS) and Regional Supplementary Procedures (SUPPS).** ICAO publications with “Procedures for Air Navigation Services” in the title have special status, as does the publication “Regional Supplementary Procedures.”

**2.4.3.2.1 ICAO Doc 4444, Procedures for Air Navigation Services—Air Traffic Management (PANS-ATM).** These procedures complement the SARPs

contained in ICAO Annex 2 and Annex 11, and specify, in greater detail than in the SARPs, the actual procedures Air Traffic Service (ATS) units apply when providing various services to air traffic.

**2.4.3.2.2** ICAO Doc 8168, Procedures for Air Navigation Services—Aircraft Operations (PANS-OPS). This document has three volumes:

1. Volume I, Flight Procedures, describes operational requirements for flying the procedures designed in accordance with the criteria provided in Volume II.
2. Volume II, Construction of Visual and Instrumental Flight Procedures, is intended for the guidance of procedures specialists and describes the essential areas and obstacle clearance requirements for the achievement of safe, regular instrument flight operations. It provides the basic guidelines to States, and those operators and organizations producing instrument flight charts, that will result in uniform practices at all aerodromes where instrument flight procedures are carried out.
3. Volume III, Aircraft Operating Procedures, describes operational procedures recommended for the guidance of flight operations personnel and flightcrew.

**2.4.3.2.3** ICAO Doc 7030, Regional Supplementary Procedures. For each ICAO region, ICAO Doc 7030 provides detailed procedures designed to meet those needs of specific areas that are not covered in the worldwide provisions contained in the Annexes and PANS documents. The SUPPS complement the statement of requirements for facilities and services contained in the Air Navigation Plan publications.

**Note:** To illustrate the hierarchy among ICAO publications, we can look at the topic of communication failure. ICAO Annex 2 details global procedures on communication failure. ICAO Doc 4444 elaborates on those procedures, which, “unless otherwise prescribed on the basis of regional air navigation agreement,” are in effect. ICAO Doc 7030 describes such regional agreements. FAA principal inspectors (PI) and specialists within the FAA’s Flight Technologies and Procedures Division, Flight Operations Group can help you understand the relationship between various ICAO publications.

**2.4.3.3** **Manuals.** Similar to our ACs, ICAO manuals provide guidance and information concerning selected aspects of aeronautical activity or facilitating the uniform application of ICAO SARPs. Therefore, you should familiarize yourself with the following documents (current editions) prior to undertaking operations in oceanic and remote continental airspace. The following are the more prominent ICAO manuals:

- 2.4.3.3.1** ICAO Doc 9574, Manual on a 300m (1,000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive. ICAO Doc 9574 provides States' regional planning groups with a basis for the revision of documents, procedures, and programs to enable the maintenance of a 300m (1,000 ft) vertical separation minimum between flight level (FL) 290 and FL 410 inclusive, in accordance with the criteria and requirements developed by ICAO. It provides guidance to State aviation authorities on those measures necessary to ensure that the criteria and requirements are met within their area of responsibility, as well as background information for operators to assist in the development of operating manuals and flightcrew procedures.
- 2.4.3.3.2** ICAO Doc 9613, Performance-based Navigation (PBN) Manual. This manual provides practical guidance on how to implement Area Navigation (RNAV) and Required Navigation Performance (RNP) applications, and how to ensure that the performance requirements are appropriate for the planned application.
- 2.4.3.3.3** ICAO Doc 9869, Performance-based Communication and Surveillance (PBCS) Manual. This guidance material explains the concepts of Required Communication Performance (RCP) and Required Surveillance Performance (RSP), identifies RCP and RSP requirements applicable to the provision and use of ATS, and provides a basis for the application of RCP and RSP in a specified airspace.
- 2.4.3.3.4** ICAO Doc 10037, Global Operational Data Link (GOLD) Manual. The GOLD Manual addresses data link service provision, operator readiness, controller and flightcrew procedures, performance-based specifications, and post-implementation monitoring and analysis. GOLD provides guidance and information concerning data link operations and is intended to facilitate the uniform application of ICAO SARPs contained in ICAO Annex 2, Annex 10, and Annex 11; the provisions in ICAO Doc 4444; and, when necessary, ICAO Doc 7030.
- 2.4.3.3.5** ICAO NAT Doc 007, North Atlantic Operations and Airspace Manual. This document provides information for aircraft operating agencies, pilots, and dispatchers planning and conducting operations in or above the North Atlantic High Level Airspace (NAT HLA). It also offers guidance to the State regulators responsible for the approval/certification/licensing of such aircraft operators, pilots, or dispatchers.

**Note:** Operators flying below NAT HLA should pay particular attention to ICAO NAT Doc 007, Chapter 17, Flight Operations Below the NAT HLA. Information in the North Atlantic International General Aviation Operations Manual (NAT IGA) was incorporated into ICAO NAT Doc 007 in 2013.

#### 2.4.4 Other References:

1. ICAO Satellite Voice Guidance Material (SVGGM), available at [https://www.icao.int/apac/documents/edocs/cns/satvoice\\_svgm\\_v1.pdf](https://www.icao.int/apac/documents/edocs/cns/satvoice_svgm_v1.pdf). This document is intended to maximize the operational benefits of SATVOICE implementations by promoting seamless and interoperable SATVOICE operations throughout the world. The document provides guidance and information concerning SATVOICE communications for aeronautical use and is intended to facilitate the uniform application of ICAO SARPs contained in ICAO Annex 2, the provisions in ICAO Doc 4444, and, when necessary, ICAO Doc 7030.
2. The FAA website at <https://www.faa.gov>.
3. Resource Guides for United States Operators:
  - a. North Atlantic (NAT) Resource Guide for U.S. Operators at <https://www.faa.gov/headquartersoffices/avs/nat-resource-guide>.
  - b. Pacific Resource Guide for U.S. Operators at <https://www.faa.gov/headquartersoffices/avs/pacific-resource-guide>.
  - c. West Atlantic, Gulf of Mexico, and Caribbean Resource Guide for U.S. Operators at <https://www.faa.gov/headquartersoffices/avs/wat-gomex-and-caribbean-resource-guide>.

**Note:** Contact information for specialists from the Flight Operations Group can be obtained from the responsible Flight Standards office, and is available in these resource guides.

4. Applicable FAA Domestic/International [Notices](#) and [Notices to Air Missions \(NOTAM\)](#).
5. U.S. [AIP](#) and applicable foreign AIPs. The AIP is the State's official publication that defines and describes the airspace, aeronautical facilities, services, and national rules and practices pertaining to air traffic, particularly if they differ from ICAO SARPs ("differences" are listed in AIPs). Eurocontrol maintains a global listing of links to AIPs here: <https://eurocontrol.int/articles/ais-online>. Refer to the current AIP for any States whose airspace you intend to operate in/through.
6. Regulations of the foreign countries over which you intend to fly.
7. The customs procedures, cultural considerations, entry and overflight procedures, and health and safety precautions for each country in which you intend to land.
8. The "Oceanic and Remote" section of the FAA's Flight Operations Group web page at [https://www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/afx/afs/afs400/afs410/oceanic\\_remote](https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/oceanic_remote). See in particular the "Oceanic and Remote Continental Application Guide" posted there.
9. The "Data Communications" section of the FAA's Flight Operations Group web page, at [https://www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/afx/afs/afs400/afs410/datacomm/](https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/datacomm/). See in particular the "Data Link Communication Application Guide" posted there.

10. NAT bulletins, found in the “EUR and NAT Documents” area of the ICAO website:  
<https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx>.

**2.5 Authorization to Operate in Oceanic/Remote Continental Airspace and Special Areas of Operation (SAO).** The FAA requires all certificated U.S. operators to obtain operational authorization to fly in oceanic and/or remote continental airspace.<sup>3</sup> The FAA requires all operators to obtain operational authorization to fly in some or all SAOs. SAOs are areas with unique characteristics that require special equipment, procedures, and/or techniques. The Administrator grants authorization in the form of an OpSpec, a management specification (MSpec), or a Letter of Authorization (LOA), depending on what part of 14 CFR governs your operations.

**2.5.1** Appendix [B](#), Special Areas of Operation and OpSpecs/MSpecs/LOAs, provides more information on SAOs, related authorizations, and other operational authorizations pertaining to oceanic, remote continental, and en route operations.

**2.5.1.1** Table [B-1](#), SAO-Related OpSpecs/MSpecs/LOAs, lists SAOs that require authorizations, broken down by part.

**2.5.1.2** Table [B-2](#), Oceanic and Remote/General En Route OpSpecs/MSpecs/LOAs, lists operations that require authorizations, broken down by part.

**2.5.2** Part 91 operators only require authorizations as indicated in the footnotes to Tables B-1 and B-2.

**2.6 Authorization Process.** The FAA uses a five-phase process to approve operator applications. The responsible Flight Standards office can provide you with the details pertinent to each phase and your specific requirements.

**2.6.1** Phase 1. You determine a need for authorization and contact the FAA.

**2.6.2** Phase 2. You formally submit a proposal for FAA evaluation.

**2.6.3** Phase 3. We evaluate the request and determine what level of demonstration is required. We may conduct the demonstration within the responsible Flight Standards office, at your site of operations, or at another suitable location.

**2.6.4** Phase 4. We observe and evaluate a demonstration of your ability to perform in accordance with your proposal. This is an operational evaluation. If the demonstration is unsuccessful, we will provide feedback on deficient areas and their resolution.

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<sup>3</sup> Certificated operators holding OpSpec B032/MSpec B031, En Route Limitations and Provisions, do not need OpSpec/MSpec B036, Oceanic and Remote Continental Navigation Using Multiple Long-Range Navigation Systems, provided they adhere to the OpSpec B032/MSpec B031 limitation of being able to obtain a “reliable fix” at least once each hour from a standard ICAO ground-based Navigational Aid (NAVAID).



**Note:** Flight or line observations are not required for GA LOA applications. For GA operators, we evaluate your application and if warranted, conduct a knowledge validation (tabletop exercise and/or static airplane demonstration).

**2.6.5** Phase 5. If your demonstration is successful, we issue the requested OpSpec/MSpec/LOA.

## **2.7 Web-Based Operations Safety System (WebOPSS).**

**2.7.1** WebOPSS Access. WebOPSS is the FAA's document management system for issuing OpSpecs, MSspecs, and LOAs to air operators as indicated in 14 CFR. Authorized aviation industry personnel can apply for access to WebOPSS through their PIs. WebOPSS access allows industry personnel to view and propose changes to their authorizations, which can expedite applications.

**2.7.2** WebOPSS Training. You will require training prior to receiving WebOPSS access. You can accomplish the training either through an FAA inspector or by taking the WebOPSS formal training course through the FAA's Mike Monroney Aeronautical Center (MMAC).

**Note:** The Operations Approval Portal System (OAPS) was introduced late 2018 to streamline processing of NextGen authorizations. OAPS allows bundling, and is integrated with WebOPSS. To register for an account, follow instructions on the web page: <https://oaps.faa.gov/>. For support and/or questions, email 9-AWA-AVS-AFS-OAPS@faa.gov.

## CHAPTER 3. PILOT QUALIFICATION AND TRAINING GUIDANCE FOR OCEANIC AND REMOTE CONTINENTAL AIRSPACE OPERATIONS

### 3.1 Training Requirements for Oceanic and Remote Continental Airspace Operations.

**3.1.1** Certificated Operator Training. Certificated operators are required to have training approved by the Administrator.<sup>4</sup> This normally takes place during the certification process and prior to issuance of OpSpecs or MSpecs.

**3.1.2** GA Training. If you are a GA pilot desiring to indicate RNP capability in oceanic and remote continental airspace, you need operational approval via an LOA (see Appendix B, paragraph B.1).<sup>5</sup> One or more of the following actions may satisfy training requirements:

1. Completing an operator's oceanic operations current training program.
2. Completing a commercial oceanic operations current training program.
3. Submitting military training records indicating prior oceanic operations experience.
4. Using other methods indicating that you can safely conduct oceanic operations. Examples could include written testing, oral testing, or evidence of prior recent experience.

**3.1.3** Relevant Subject Matter. The following items are examples of the subject matter with which you should be familiar in order to conduct operations in oceanic and remote continental airspace (as required based on the types of operations being conducted):

1. Title 14 CFR (applicable parts).
2. ICAO SARPs and measurement standards.
3. Operator's international operating procedures, to include the international operations manual,<sup>6</sup> its organization and structure, and access via Electronic Flight Bag (EFB), as applicable.
4. Use of oceanic flight planning charts.
5. Sources and content of international flight publications.
6. Itinerary planning and overflight clearances.
7. Meteorology, including Significant Weather (SIGWX) charts, prognostic weather charts, tropopause prognostic charts, and Terminal Aerodrome Forecasts (TAF), as well as contingency procedures for weather diversions.
8. Preparation of international flight plans, plotting charts, and operational flight plans (OFP)/flight logs, to include Equal Time Point (ETP) calculations. These include the

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<sup>4</sup> Regulatory references are §§ [91.1073](#), [121.401](#), [125.296](#), and [135.323](#).

<sup>5</sup> Regulatory reference is § [91.703](#), which incorporates ICAO Annex [2](#) by reference. Annex 2, in turn, refers to ICAO Doc [7030](#), which requires State of the Operator or State of Registry approval for oceanic RNP operations.

<sup>6</sup> See also Appendix [G](#), Suggested Subjects for Inclusion in Oceanic and International Procedures and/or an Operations Manual.

- communications, navigation, and surveillance capability codes appropriate to your aircraft and your operational authorization.
9. Specific airspace requirements, to include communications, navigation, and surveillance equipment requirements and specific approvals (OpSpecs/MSpecs/LOAs), as well as operational procedures related to Reduced Vertical Separation Minimum (RVSM) and RNP.
  10. Long-range, air-to-ground communication procedures, including all data link and satellite communications (SATCOM) voice operations, as applicable.
  11. En route and terminal procedures—differences from U.S. procedures.
  12. Use of oceanic checklists.
  13. Oceanic error risk mitigations.
  14. Understanding of Strategic Lateral Offset Procedures (SLOP).
  15. Air traffic clearances, to include proper terminology and phraseology.
  16. Emergency and contingency procedures (see Appendix F, Special Procedures for In-Flight Contingencies in Oceanic Airspace), including required emergency equipment, SAR techniques, navigation equipment failure techniques (to include dead reckoning (DR)), and communication equipment failure techniques.
  17. Specialized training, (e.g., if conducting operations in areas of magnetic unreliability (AMU), or for parts 121 and 135, ETOPS “preclude and protect” philosophy, as applicable).
  18. Use of polar/remote area checklists.
  19. Polar/remote continental terrain awareness, risk mitigations, and contingency options.

## CHAPTER 4. COMMUNICATIONS, NAVIGATION, AND SURVEILLANCE SYSTEMS GUIDANCE FOR OPERATIONS IN OCEANIC AND REMOTE CONTINENTAL AIRSPACE

### 4.1 Communications, Navigation, and Surveillance Improvements—Impact on ATS.

- 4.1.1 Technological Advances.** Technological advances in communications, navigation, and surveillance systems all contribute to an air traffic system that provides increased navigational accuracy and allows you and your aircraft to interact more quickly with controllers. These advances have also improved controller-pilot communications, navigation accuracy, and aircraft surveillance reporting. This enhanced communications, navigation, and surveillance capability greatly reduces the errors and retransmissions that hampered oceanic flights just a few years ago. These safety improvements have facilitated corresponding improvements in efficiency and capacity by reducing separation minima, allowing controllers to space aircraft closer together. Trials of new separation minima or implementations of new operating procedures are common in oceanic airspace. Operators should therefore make sure they have the most up-to-date information concerning the airspace in which they will be flying. U.S. and foreign State AIPs, NOTAMs, and related publications are normally the best sources of current information. International operations manuals that consolidate this information should be current.
- 4.1.2 ADS-B.** ADS-B supports these improvements by providing a higher update and enhanced accuracy of surveillance information over the current radar-based surveillance systems.
- 4.1.3 Space-Based ADS-B.** In 2019, a constellation of low-Earth orbit satellites with ADS-B receivers began supplying surveillance data to air traffic service providers (ATSP). Shortly thereafter, ICAO published a new separation standard for areas under ADS-B surveillance where VHF voice communications are not available. This new separation standard allows aircraft to be more closely spaced in oceanic areas, which in turn allows more efficient routing. While space-based ADS-B update rates are comparable to those of some domestic radar systems, communication systems traditionally used in oceanic and remote continental airspace do not perform as quickly as the VHF voice communications used in domestic environments. Consequently, aircraft cannot yet be spaced as closely as in domestic areas. As communication systems evolve, allowable separation between aircraft will likely be reduced further.

### 4.2 Performance-based Operations.

- 4.2.1 Measures of Performance.** Performance-based operations rely on RCP, RNP, and RSP. It uses these three primary measures of performance to determine required separation between flights, both in radar contact and in oceanic and remote continental airspace. ATS providers determine separation requirements based on a combination of these three performance indicators.
- 4.2.2 RCP.** RCP establishes aircraft/controller communications timeline, equipment, and flightcrew training standards. Generally, you can measure RCP in terms of the timeline required to complete the communication transaction and the continuity, availability, and

integrity of the transaction. In oceanic and remote continental airspace, RCP 240 and RCP 400 are the prevalent performance standards.

- 4.2.2.1** RCP 240 requires a 99.9 percent probability (continuity) the communications transaction will complete in less than 240 seconds (timeline). It also requires a 99.99 percent probability the communication can be initiated (availability) and no more than  $10^{-5}$  communications transaction malfunctions per flight-hour (integrity).
  - 4.2.2.2** RCP 400 requires a 99.9 percent probability (continuity) the communications transaction will complete in less than 400 seconds (timeline). It also requires a 99.9 percent probability the communication can be initiated (availability) and no more than  $10^{-5}$  communications transaction malfunctions per flight-hour (integrity).
  - 4.2.2.3** U.S. operators desiring Performance-based Communications and Surveillance (PBCS) approval for qualifying systems (e.g., with RCP 240 and RSP 180) can obtain OpSpec/MSpec/LOA A056, Data Link Communications. See paragraph [4.5](#) below.
  - 4.2.2.4** For additional details, please refer to AC [90-117](#), Data Link Communications; and the ICAO Doc 10037, Global Operational Data Link (GOLD) Manual, Appendix B, RCP Specifications, and ICAO Doc 9869, Performance-based Communication and Surveillance (PBCS) Manual, at <https://store.icao.int>.
- 4.2.3** RNP. RNP establishes aircraft navigation accuracy, equipment, and flightcrew training standards. ICAO Doc [9613](#), Performance-based Navigation (PBN) Manual, outlines these standards. Generally, we measure these standards in terms of accuracy, integrity, continuity, availability, and functionality. Oceanic and remote continental airspace ATS providers primarily provide RNP 10 (also known as RNAV 10) and RNP 4-based separation minima. RNP 2 applications have also become available for oceanic and remote continental airspace, to be used by individual States as necessary to meet their airspace requirements. In all cases, ATS providers will apply appropriate separation minima between adjacent aircraft based on the capabilities each aircraft operator files in the flight plan. You must only indicate the oceanic RNP capability authorized in your OpSpec/MSpec/LOA B036, Oceanic and Remote Continental Navigation using Multiple Long-Range Navigation Systems.<sup>7</sup>
1. RNP 10 requires accuracy to be within 10 NM 95 percent of the time.
  2. RNP 4 requires accuracy to be within 4 NM 95 percent of the time and within 8 NM 99.999 percent of the time.
  3. RNP 2 requires accuracy to be within 2 NM 95 percent of the time and within 4 NM 99.999 percent of the time.

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<sup>7</sup> Regulatory reference is § [91.169](#), which refers to § [91.153](#). This requires the flight plan to include “any other information the pilot in command (PIC) or ATC believes is necessary for ATC purposes.”

**Note:** Regardless of RNP value, pilots are expected to fly the centerline (or up to 2 NM right of course, where use of SLOP is authorized).

**4.2.4** RSP. RSP establishes aircraft/controller surveillance timeline and equipment standards. Generally, you can measure RSP in terms of the timeline required to complete the transaction and the continuity, availability, and integrity of the transaction. In oceanic and remote continental airspace, RSP 180 and RSP 400 are the prevalent performance standards.

**4.2.4.1** RSP 180 requires a 99 percent probability (continuity) the surveillance transaction will complete in less than 180 seconds (timeline). It also requires a 99.99 percent probability the communication can be initiated (availability) and no more than  $10^{-5}$  communications transaction malfunctions per flight-hour (integrity).

**4.2.4.2** RSP 400 requires a 99 percent probability (continuity) the surveillance transaction will complete in less than 400 seconds (timeline). It also requires a 99.9 percent probability the communication can be initiated (availability) and no more than  $10^{-5}$  communications transaction malfunctions per flight-hour (integrity).

**4.2.4.3** For additional details, please see ICAO Doc 10037, Appendix C, RSP Specifications.

**4.2.5** Access to Performance-based Separation. Communications, navigation, and surveillance capabilities of aircraft and crew determine eligibility for authorizations (i.e., via OpSpecs, MSpecs, and LOAs), which in turn allow operators to take advantage of performance-based separation in oceanic and remote continental airspace. The significant improvements in communications, navigation, and surveillance systems have allowed air traffic controllers to reduce separation between aircraft, expanding access to more favorable routing and/or altitudes that offer savings in time and fuel.

**Note:** For a list of pertinent OpSpecs/MSpecs/LOAs, please see Appendix B, Special Areas of Operation and OpSpecs/MSpecs/LOAs.

**4.3** **Voice Communications in Oceanic Airspace.** When operating over the high seas, ICAO Annex 2 requires you to maintain a continuous air-to-ground voice communication watch with the appropriate ATS authority on the appropriate communication channel.

**Note:** It is not acceptable to depend solely on other aircraft providing a radio relay to satisfy this requirement. The appropriate authority for the airspace where you conduct the flight may prescribe the aeronautical stations and frequencies used for two-way communications.

**4.3.1** HF Radio Communications. HF radios have been in use for almost a century over oceanic and remote continental areas. As technological advances lead to more sophisticated methods of communication, HF equipment has also improved. HF radios now offer digital tuning, compact size, selective calling systems (SELCAL) (see paragraph 4.3.2

below), and new antenna concepts. Consider the following when using HF communications:

- 4.3.1.1** HF radio calls are typically made to a radio operator, who in turn electronically relays the information, via keyboard and pre-formatted messages, to air traffic controllers in oceanic centers. There is some delay between your requests and ATC clearances, where the radio operator coordinates with the appropriate controller. Radio operators do not have the authority to issue ATC clearances on their own.
  - 4.3.1.2** Communications over HF radio rely heavily on proper radio terminology and scripted reports. Use the published guidance found in en route publications or the [Aeronautical Information Manual \(AIM\)](#) to make sure you deliver messages in the proper format. Speak at a moderate speed using the internationally accepted phraseology. You may find ICAO standard phraseology in ICAO Doc 9432, Manual of Radiotelephony. This document and other ICAO reference materials are available on ICAO's website at <https://store.icao.int>.
  - 4.3.1.3** If ATC uses the terms "expect" or "when can you accept," they have not granted you a clearance. Typically, oceanic radio operators will use the phraseology "ATC clears..." when relaying a clearance.
  - 4.3.1.4** ICAO Doc [4444](#), Procedures for Air Navigation Services—Air Traffic Management, requires the flightcrew to read back level instructions, heading and speed instructions, and ATC route clearances. Ensure that the radio operator acknowledges your exact read back to confirm that you correctly heard the instructions.
  - 4.3.1.5** In general, higher frequencies (above 10.0 megahertz (MHz)) work better during daylight and lower frequencies (below 10.0 MHz) at night. It is common to use several frequencies on one flight while communicating with the same ATS provider.
  - 4.3.1.6** HF communications are dependent on transmitted signals striking the ionosphere and reflecting back to antennae at ground stations. The ionosphere is susceptible to interference from space weather, resulting in periods where HF reception is marginal or unreadable. You may especially notice this phenomenon in polar regions above 60° N or below 60° S and during periods of significant solar activity.
- 4.3.2** SELCAL. SELCAL is a means to alert an individual aircraft that a ground station wishes to communicate with it. ATS providers can transmit SELCAL signals over VHF or HF. The signals produce an audio tone and possibly a cockpit indication that alerts you to initiate contact with the appropriate ATC unit.
- 4.3.2.1** The SELCAL codes are controlled by a commercial service and are assigned to a specific aircraft. Since the number of unique SELCAL codes is less than

the number of aircraft with SELCAL capability, multiple aircraft could be operating and logged in with the same SELCAL code assignment.

**4.3.2.2** When you apply for SELCAL codes for your aircraft, the issuing company will de-conflict duplicate codes by region as much as possible. However, aircraft flying in multiple regions may encounter another aircraft using the same code. Therefore, you should be certain that the ATS radio operator uses your exact call sign when responding to a SELCAL.

**4.3.2.3** New SELCAL systems use 32 tones, instead of only 16 tones currently used, and thereby increase the number of unique identifiers exponentially. The ICAO Communication Panel approved the global implementation of SELCAL 32 for revisions to take effect in November 2022. SELCAL 32 compliant equipment became available beginning in 2020. Operators with 16-tone HF SELCAL systems may continue to encounter a duplicate code situation.

**4.3.2.4** **Check HF SELCAL** even when your CPDLC is working properly. You should do a SELCAL check prior to oceanic entry and then again at each control area (CTA) boundary. See the sample transcript of an HF SELCAL check below.

<b>Sample Transcript of HF SELCAL Check</b>	
HF call from the air:	<i>“New York Radio, Airline 123, request SELCAL Check.”</i>
Answer from the ground:	<i>“Airline 123, New York Radio, roger.” [SELCAL tones transmitted]</i>
HF call from the air:	<i>[If successful] “SELCAL check good, thank you!”</i>

**4.3.3** SATVOICE. In keeping with ICAO’s recognition of SATVOICE as a valid LRCS, the FAA accommodates SATVOICE through arrangements with the recognized Aeronautical Mobile Satellite (Route) Service providers. The FAA currently restricts direct SATVOICE contact between the pilot and FAA ATC to “distress and urgency situations,” or other exceptional circumstances only. For oceanic communications with ATC via New York Radio and San Francisco Radio, relevant SATVOICE policy and short codes are published in the U.S. [AIP](#).

**4.3.3.1** The FAA requires SATVOICE equipment supporting ATS communications to be installed in accordance with AC [20-150B](#) (or subsequent edition), Airworthiness Approval of Satellite Voice (SATVOICE) Equipment Supporting Air Traffic Service (ATS) Communication.<sup>8</sup> Additional

<sup>8</sup> Regulatory references are § 91.703 and ICAO Annex 2, paragraph 3.6.5.1. The U.S. AIP, in describing the “appropriate communication channel,” invokes AC 20-150B.



requirements are listed in the U.S. AIP. Portable satellite phones are **not** approved for normal and routine ATC communications.

- 4.3.3.2** Additionally, the FAA requires a SATVOICE Callback Check when pilots use SATVOICE to communicate with ATC via New York Radio or San Francisco Radio. A sample transcript is here:

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

- 4.3.3.3** If SATVOICE is used (as authorized in the relevant AIP) as the sole voice LRCS, for purposes of maintaining a continuous air-to-ground voice communication watch with the relevant ATS authority on the appropriate communication channel, several important considerations apply:

1. Flightcrews should be thoroughly familiar with SATVOICE use, to include the aural and visual alerts for incoming calls, call answering, display and selection of call priority, use of press-to-talk switches, call setup with or without the avionics phone book, call preemption, and call termination.
2. Avionics (e.g., flight management computer (FMC)) phone books should be organized in a logical, easy-to-understand manner, and flightcrews should have the appropriate number preloaded to facilitate rapid call setup with the relevant ATS authority. Calls should be managed to ensure a line is always available for an incoming “Operational High” priority (Priority 2/Q12) call from the relevant ATS authority.
3. For purposes of compliance with 14 CFR requirements on numbers of LRCS, the FAA recognizes SATVOICE as an approved LRCS only in areas where the ground infrastructure supports SATVOICE as the “sole voice LRCS.” Such services are described in the relevant AIP. In areas

lacking this designation, at least one operable HF (voice) radio is required.<sup>9</sup>

4. As SATVOICE technology evolves, ensure that you comply with the latest guidance. In the United States, see entry in the U.S. AIP, with new changes published in the FAA's International Notices. For additional guidance, refer to the FAA's AIM, ICAO's [Satellite Voice Guidance Material \(SVGGM\)](#), and/or the relevant AIP.

**4.3.4 Changes to Communications Procedures.** Information needed on initial contact with an agency, radio frequencies, and other aspects of oceanic communications are changed frequently. Thus, it is important that you consult the appropriate AIP, international notices, current oceanic charts, and commercial en route publications for the most current information.

- ICAO NAT Doc [007](#), North Atlantic Operations and Airspace Manual, describes North Atlantic (NAT) operations, to include communication and navigation procedures in NAT airspace. The NAT section of ICAO Doc [7030](#), Regional Supplementary Procedures, currently requires HF SELCAL checks, meaning that an HF radio is required in NAT airspace.
- Commercially published navigation charts contain details of communication procedures on inserted panels. Exercise some caution in using this reference, as they may be on a different update cycle than the source documents and therefore could be not completely up to date.

**4.4 CPDLC and Automatic Dependent Surveillance-Contract (ADS-C).** Data link communications systems are widely used throughout the world and are normally used in concert with ADS-C systems that further improve ATS capability. CPDLC technology improves communications between aircraft and ATS providers. CPDLC replaces most of the often-challenging HF voice communications that were the only communication link with oceanic and remote continental airspace air traffic controllers for decades. With CPDLC, you and the controller transfer ATC clearance requests and instructions digitally, reducing the likelihood of miscommunication. CPDLC compliant with RCP 240 is required to fly the most efficient routes in the NAT.

**Note:** In ADS-C, C = "Contract." The controller sets up one or more electronic contracts with your aircraft to automatically provide time-triggered (periodic) and/or condition-triggered (e.g., deviation event) reports. In addition, a controller, at any time, can issue a "demand" contract for a single periodic ADS-C report.

**4.4.1 Title 14 CFR Requirements for LRCS.** For purposes of compliance with 14 CFR requirements on numbers of LRCS (cited in paragraph [2.3.1](#) above), the FAA recognizes CPDLC that is compliant with RCP 240 as an approved LRCS. Equipage with CPDLC does not eliminate the requirement for at least one operable voice LRCS. This means that

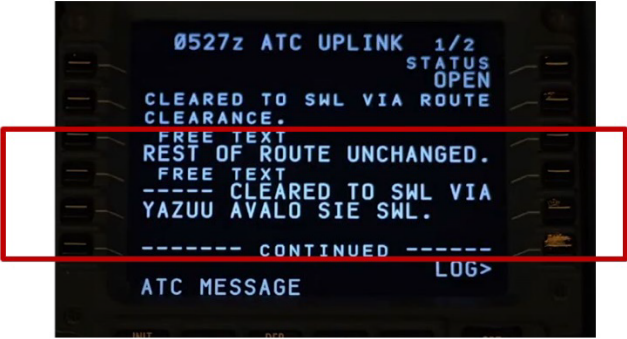
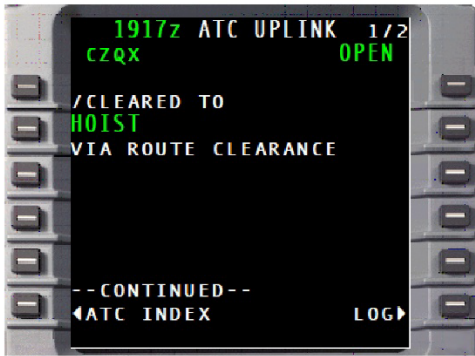

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<sup>9</sup> Regulatory references are § 91.703 and ICAO Annex 2, paragraph 3.6.5.1. The applicable AIP describes the "appropriate communication channel."

(as is mentioned in paragraph [4.3.3.3](#), item 3) unless the relevant AIP authorizes SATVOICE as a sole voice LRCS, at least one operable HF (voice) radio is required.

- 4.4.2** Access to Preferred Airspace. Since equipment like CPDLC and ADS-C improves the efficiency with which aircraft in oceanic and remote continental airspace can be controlled, such better-equipped aircraft are being better served through initiatives to reserve preferred blocks of oceanic airspace for those aircraft. Preferred altitudes and routes around the world are more readily issued to aircraft equipped with robust communications, navigation, and surveillance capabilities.
- 4.4.3** FAA Domestic CPDLC Use of Free Text in Route Uplinks. The FAA’s domestic flight data processing systems automatically add so-called “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. However, oceanic systems do not do this. The result is that pilots accustomed to the FAA domestic display of route clearances could be confused when seeing an oceanic route uplink. Figure [4-1](#), Sample CPDLC Route Uplinks, shows how a CPDLC route uplink might look if sent from a U.S. domestic system versus an oceanic system.

**Figure 4-1. Sample CPDLC Route Uplinks**

Sample Route Uplink <u>With</u> Free Text (Used by domestic FAA systems)	
 <p style="text-align: center;"><i>“Route clearance” is readily visible.</i></p>	
Sample Route Uplink <u>Without</u> Free Text (Used by oceanic systems)	
 <p><i>With this FMS, to view the “route clearance,” the pilot must advance to the next page, then select the “ATC CLNC” prompt.</i></p> <p><i>This is <u>not</u> a clearance to proceed direct to HOIST.</i></p>	 <p><i>With this FMS, to view the “route clearance,” the pilot must select the “LOAD” prompt.</i></p> <p><i>This is <u>not</u> a clearance to proceed direct to EVRIN.</i></p>

**4.5 Data Link Systems—Operational Authorization to Use.** We grant operational authorization for operators to use Future Air Navigation System (FANS) data link (used in oceanic areas and in the U.S.) by issuing OpSpec/MSpec/LOA A056, as appropriate.<sup>10</sup>

**Note:** OpSpec/MSpec/LOA A056 also applies to VHF datalink communications in overland areas, such as Aeronautical Telecommunications Network (ATN) Baseline 1 (B1) (formerly Link 2000+), used in European airspace.

<sup>10</sup> AC 90-117 provides information on OpSpec/MSpec/LOA A056.

**4.5.1 Oceanic Data Link Requires Authorization.** U.S. operators (including part 91) must have a data link authorization to file ATC flight plan capability codes J5 and/or J7 in oceanic airspace.<sup>11</sup> These codes denote Inmarsat and Iridium satellite communications capability, respectively. You can find our guidance on the process and procedures for operational authorization and aircraft data link system approval in the following documents:

- AC [20-140](#), Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS).
- AC 90-117.

**4.5.2 Data Link Requirements and Standards.** You can consult ICAO Doc 10037 for additional information on data link requirements and standards.

#### **4.6 ATC in Oceanic and Remote Continental Airspace.**

**4.6.1 Procedural Airspace.** In oceanic and remote continental airspace, ATC typically requires position reports via voice or ADS-C, and controllers apply “procedural separation,” spacing aircraft farther apart than in domestic “ATS surveillance airspace” (where radar or ADS-B surveillance is accompanied by VHF voice communication with ATC). Space-based ADS-B provides significant improvements in surveillance, but without ATC being able to issue a vector via VHF voice communications, required separation between aircraft is greater. In areas with space-based ADS-B surveillance that lack direct VHF voice communications with the controller, ATC still therefore provides at least some elements of procedural control.

**4.6.1.1** In procedural airspace, ATC issues clearances and instructions providing separation vertically and horizontally, based on the specific aircraft equipment authorizations you indicate on your flight plan.

**4.6.1.2** ATC monitors your compliance with the issued clearance. Your aircraft position reports are processed for conformance with the clearance. If your aircraft is equipped with ADS-C, it provides trigger alerting for lateral and vertical deviations.

**4.6.1.3** In order to make this procedural separation work the way it is designed, you must provide timely and accurate time estimates (estimated time of arrival (ETA)) and operate with strict discipline and adherence to ATC clearances and procedures, both normal and contingency.<sup>12</sup>

**4.6.1.4** Controllers manage longitudinal separation in procedural airspace by assigning speeds, either true Mach number or true airspeed. Proper separation

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<sup>11</sup> AC 90-117 cites the regulatory basis for this requirement, which is § [91.123](#).

<sup>12</sup> ICAO Annex 2, paragraph 3.6.2.2d), says: “if the time estimate ... changes in excess of 2 minutes from that previously notified to air traffic services, ... the flight crew shall notify the appropriate air traffic services unit as soon as possible.”

of aircraft is dependent upon pilots maintaining the speed assigned with the clearance (not to be confused with the speed filed on the flight plan).

- If traffic conditions permit, the controller may permit variations. However, if a controller assigns a speed, compliance with that speed is mandatory.
- Even when a controller permits variations, ICAO Annex 2 specifies that pilots must inform ATC of speed variations of Mach 0.02 or greater from the current flight plan (current clearance).

**4.6.2** ICAO Procedures for Specific Geographical Areas. You will find detailed procedures for the applicable ICAO Region in ICAO Doc 7030. When flying over the high seas (international airspace, generally greater than 12 NM from the nearest shore), part 91, § [91.703](#) requires compliance with Annex 2. Annex 2, in turn, refers to Doc 7030. You should consider ICAO Doc 7030 regulatory.

**4.6.3** U.S. ATS. Information on provision of ATS by the United States is available in FAA Order [JO 7400.11](#), Airspace Designations and Reporting Points. Also refer to 14 CFR part [71](#).

**4.6.3.1 Domestic Airspace.** (ICAO refers to this as “Continental” Airspace). Along the coast of the United States, domestic ATC procedures (with radar or ADS-B surveillance and VHF communications) are applied in U.S. Offshore Airspace, generally extending as far as the useful range of radar and VHF communications systems permits, approximately 150-200 NM from the coast.

**Note:** Domestic airspace generally includes sovereign airspace over terrain and territorial waters, as well as the “high seas” airspace beyond 12 NM from the coast with ATS surveillance and VHF communications. As discussed in paragraphs [2.3.2](#) and [2.3.3](#), part 91 subpart [B](#) applies in U.S. sovereign airspace, and ICAO Annex 2 applies in “high seas” airspace.

**4.6.3.2 Oceanic Airspace.** The United States provides ATS in oceanic airspace as follows:

- Atlantic Ocean: New York, Miami, and San Juan Flight Information Regions (FIR).
- Gulf of Mexico: Miami and Houston Oceanic CTAs/FIRs. Most of the Gulf of Mexico is under ADS-B surveillance, with VHF voice communications directly with the controller (above 18,000 ft mean sea level (MSL)).
- Pacific Ocean: Oakland and Anchorage CTA/FIR.
- Arctic Ocean: Anchorage Arctic CTA/FIR.

- 4.6.3.3 Remote Continental Airspace.** The United States provides ATS in remote continental airspace as follows: Alaska Remote Continental Airspace: Anchorage Air Route Traffic Control Center (ARTCC).
- 4.6.4 Advanced Technologies and Oceanic Procedures (ATOP).** U.S. controllers use the ATOP flight data processing system in the airspace of Oakland Oceanic, New York Oceanic, and Anchorage Oceanic and Arctic FIRs.
- 4.6.4.1** Within this airspace, ATOP allows for establishing the separation minima for all pairs of aircraft along a cleared profile, and provides aircraft profile conformance monitoring and protection.
- 4.6.4.2** ATOP deciphers ATC flight plan information to determine what separation standards may be applied to a particular aircraft based on filed aircraft equipage. Accordingly, you must notify ATC immediately if your communications, navigation, and surveillance equipment capability degrades below that which you listed in your flight plan.<sup>13</sup>
- 4.6.4.3** ATOP analyzes cleared routes of aircraft and alerts controllers of potential future conflicts (scalable to more than 2 hours ahead) with other aircraft. ATOP also considers different separation standards applied by adjacent ATC facilities and can warn the controller when a conflict will occur based on the adjacent ATC facility's requirements. This allows controllers to effectively plan for transitions to adjacent FIRs.
- 4.6.4.4** You can find specific information regarding ATC separation standards in FAA Order [JO 7110.65](#), Air Traffic Control. Additionally, trial periods where new separation standards are being applied will be announced on the FAA's International Notices [website](#).

#### **4.7 Special Use Airspace (SUA).**

- 4.7.1 Warning Area.** A warning area, as defined in 14 CFR part [1](#), § [1.1](#), is airspace of defined dimensions extending from 3 NM outward from the coast of the United States that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such a warning area is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.
- 4.7.2 Prohibited Areas.** ICAO Annex 2 specifies that these areas exist "above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited."

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<sup>13</sup> Regulatory reference is § 91.169, which refers to § 91.153. This requires the flight plan to include "any other information the pilot in command or ATC believes is necessary for ATC purposes." The U.S. AIP states that pilots must "advise ATC" if equipment failures render the filed capability indicators inaccurate.

- 4.7.3** Restricted Areas. ICAO Annex 2 specifies that these areas exist “above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.”

**Note:** Carefully review charts for these types of areas when you plan your flight, taking note of the area operating times and restrictions. You should also review applicable oceanic NOTAMs.

- 4.8** **Air Defense Identification Zones (ADIZ)**. Title 14 CFR Part [99](#), Security Control of Air Traffic, discusses defense areas and ADIZ. You can check part 99, the latest U.S. AIP, the latest AIM (chapter 5, section 6), and all FAA NOTAMs Domestic/International to ensure compliance with national security requirements in the ADIZ.

- 4.9** **World Geodetic System 1984 (WGS 84)**. ICAO and the United States endorse the WGS 84 or approved equivalent as the geodetic reference datum standard for air navigation latitude and longitude coordinates. WGS 84 provides for a common geodetic reference system and a means to standardize aeronautical surveys and related products. You should determine in advance whether any countries you intend to fly over or into are WGS 84-compliant. Information about WGS 84 compliance is often noted on charts used in terminal operations or on airfield diagrams. A State’s AIP generally notes compliance with WGS 84. Most areas of the world are listed as: 1) Unknown (U); 2) Partially Compliant (PC); 3) Compliant (C); or 4) Noncompliant (NC) with WGS 84.

**Note:** Commercial charting vendors also post information on their websites about specific countries and their compliance with WGS 84.

- 4.9.1** Operations in Areas That Are Not WGS 84-Compliant. Flight manuals may include a note for RNAV systems indicating that, for countries or terminal areas that are not WGS 84-compliant, the crew should deselect the use of Global Navigation Satellite Systems (GNSS), and use ground-based navigation aids for navigation. You should be familiar with your flight manual limitations as well as any country-specific procedures published in State AIPs when flying in countries or terminal areas that are not WGS 84-compliant.



## CHAPTER 5. FLIGHT PLANNING GUIDANCE FOR INTERNATIONAL AND OCEANIC AND REMOTE CONTINENTAL AIRSPACE OPERATIONS

### 5.1 Lead Time Requirements.

- 5.1.1** Preparation. Your preparation for a successful oceanic and remote continental and/or international flight, whether you fly large or small aircraft, starts with adequate training and planning. The lead time required for planning varies depending on such things as experience, training, and currency, as well as specific country requirements, and could exceed 30 days. Dispatch/flight locator departments of 14 CFR part [121](#) operators and large 14 CFR part [135](#) operators with good familiarity and experience with such flights can sometimes work with shorter lead times. Commercial flight planning companies used by 14 CFR part [91](#) and smaller part 135 operators can offer similar services.
- 5.1.2** Awareness. Ensure you are aware of current and special notices relating to entry and overflight requirements for the countries on your itinerary. In most cases outside North America and Europe, you obtain prior permission to land in or overfly a country directly from that country's Civil Aviation Authority (CAA). You can also find information on immunizations, ports of entry, and other important requirements in the country's AIP and in various commercial publications.
- 5.1.3** Verification. You should allow enough lead time to ensure your planning is thorough, complete, and correct. You should also cross-check and verify any flight planning products against the appropriate source documents. By doing so, you could uncover potential errors before they result in a pilot deviation.

### 5.2 Preparing an Itinerary.

- 5.2.1** Itinerary Factors. You should consider the following questions when developing your itinerary:
1. What airspace, routes, speeds, and altitudes, do I fly to get to my destination(s)?
  2. Are there any terrain clearance concerns along those routes at those altitudes?
  3. Is the flying time to suitable and available en route alternates from along those routes and altitudes appropriate for the aircraft and operating part? (Plotting ETPs will help answer this question.)
  4. Are there any pitfalls I should be aware of from each State's AIP?
  5. What communications, navigation, and surveillance equipment and authorizations must I have in order to fly my intended routes and altitudes?
  6. Will I be operating in an SAO? Do I have the necessary operational authorization(s) to do so? (See Appendix [B](#), Special Areas of Operation and OpSpecs/MSpecs/LOAs, Table [B-1](#), SAO-Related OpSpecs/MSpecs/LOAs.)
  7. With regard to my GNSS equipment, are there any WGS 84 compliance issues in countries I intend to transit? (Paragraph [4.9](#) provides information on WGS 84.)

8. What survival equipment must I have on board in order to fly my intended routes?
9. Are there suitable en route and destination alternates available in the event of an emergency diversion at other than my intended en route altitude? Are there terrain clearance or oxygen considerations at those divert altitudes?
10. Does my preferred destination have instrument approaches and arrival and departure procedures that are compatible with my aircraft equipment and authorizations?
11. What crew rest requirements will I have for each destination?

**Note:** See paragraph [5.3](#) below regarding fatigue management issues.

12. Should I use a flight planning or dispatch service for my trip?
13. Have I reviewed the following:
  - Oceanic error mitigation procedures?
  - Oceanic flight planning, plotting charts, navigation, and waypoint procedures?
  - My oceanic checklist?
  - SLOP?
  - En route procedures for all airspace I will pass through?
  - Oceanic contingency procedures?
14. Are there specific pilot certification, type rating, and/or medical certificate requirements for the countries I'll be visiting? Are single-pilot operations authorized?
15. Will my intended route take me through areas of volcanic activity?
16. If my route takes me through polar areas, have I researched the risks inherent to operations on polar routes? (Paragraph [5.10](#) provides information on polar operations.)
17. ETOPS consideration: Will I be operating more than 60 minutes (part 121) or more than 180 minutes (part 135) from an Adequate Airport?

**5.2.2** Administrative, Country-Specific Issues and Requirements. As part of your itinerary preparation, asking the following additional questions can help you determine the country-specific issues/airspace requirements that might affect your international flight:

1. Do I require overflight and landing permits for any of the airspace/airfields I will transit?
2. How much will overflight and landing fees cost, and how do I pay for each airspace and destination I intend to transit (e.g., credit card, cash, local currency, U.S. currency)?
3. How much advance notification do I need to provide prior to arrival?

**Note:** All countries require some form of advance notification of arrival. You should carry a copy of the advance notification, as well as confirmation that the

notification was sent. This is particularly important for countries that do not normally return approvals.

4. What are the availability, types, and duration of visas, tourist cards, and other required entry documents for all countries I intend to visit, as well as those with potential alternate airports (in the event I have to divert)?

**Note:** Some countries require that you have a visa for the next country of entry before departure, as well as proof of required immunizations for that country. You can obtain this information from the U.S. Department of State (DOS).

5. Are there prohibitions, restrictions, notices, and/or applicable travel advisories for countries I intend to visit?

**Note:** The FAA's website includes a special section on prohibitions, restrictions, notices, and DOS travel advisories applicable to foreign countries at [https://www.faa.gov/air\\_traffic/publications/us\\_restrictions/](https://www.faa.gov/air_traffic/publications/us_restrictions/). This is a particularly important aspect of your flight planning.

6. What is the normal work week for countries I intend to overfly/enter?

**Note:** Understanding this will help you coordinate for visas and overflight/landing permits. You can obtain this information from the DOS.

7. Are there any import regulations I need to consider, given the amount of time I intend to remain in the countries on my route?

**Note:** Aircraft that remain within the territorial limits of a country for an extended period may become subject to import regulations and impoundment.

8. What hours are customs, immigration, and other services operational?
9. Do I intend to conduct any operations that might be considered "cabotage?"

**5.2.3 Airport-Specific Issues.** Consider the following airport-specific issues when planning for your overseas trip:

1. What time considerations can affect your trip?
  - What is local time at each of my destination airports in terms of Coordinated Universal Time (UTC)?
  - What is local time at my original departure airport?
  - Are there restrictions on operating at night in the countries I intend to transit?
  - Do any of the airspaces/destinations I intend to transit require slot times?
2. Is a Prior Permission Only (PPO) number required for landing?
3. Do my preferred destination and alternate airfields have the appropriate grade of fuel and other types of aircraft handling services available?

4. Are maintenance services available at my destination airfields?
5. Should I bring spare parts for my aircraft?
6. Will I have lodging available at the destination?

### **5.3 Crew Fatigue.**

- 5.3.1 Fatigue Management.** International travel typically involves crossing time zones and interrupting normal sleep patterns (circadian rhythm). Ensure you have a plan for how you will manage fatigue for you and your crew.
- 5.3.2 Fatigue Management Strategies.** AC [120-100](#), Basics of Aviation Fatigue, discusses strategies to mitigate the effects of fatigue and is an excellent resource. AC [120-103](#), Fatigue Risk Management Systems for Aviation Safety, discusses the Fatigue Risk Management Systems (FRMS) prescribed in 14 CFR part [117](#). While part 117 does not apply to all operators, we recommend you review both ACs as the contents cover issues that are important to all aircrews. Although a Fatigue Risk Management Plan (FRMP) is only required for part 121 operators, the FAA recommends any operator who frequently conducts long-range flights to objectively assess the risks of flightcrew fatigue and implement some form of a plan to reduce those risks.
- 5.3.3 Self-Care and Time Zone Differences.** Having a high level of physical fitness, using caffeine strategically, and avoiding alcohol can help you adjust to time zone differences, allow your body to rest better, and help make you a more effective, safer operator.
- 5.3.4 Preparing to Mitigate Fatigue.** Inquire in advance about day sleeping or noise levels in the location where you intend to get your crew rest. This will help your crewmembers know what challenges to good rest might lie ahead. You should also consider adding pilots for long-duration flights or those outside of normal sleep times. This will help mitigate fatigue issues and promote safer flying.
- 5.3.5 Sleep Aids.** Make sure you understand the restrictions on using sleep aids and the importance of consulting an Aviation Medical Examiner (AME) prior to use. They will advise you on the possible side effects of sleep aids. We have built a list of approved prescription sedative-hypnotic-type drugs approved for use under certain conditions.
- Information regarding pharmaceutical sleep aids is available on the FAA’s [website](#).
  - This website includes names of many popular sleep aids. It also includes the required wait time after taking the last dose before you can fly (“pill to push” time).
- 5.4 Required Paperwork/Documentation.** Whenever you fly into, from, or over foreign territory, you must comply with that territory’s regulations. Ensure that you have all required entry documents available for presentation upon arrival; you may need to provide multiple copies of each.

**5.4.1 Documentation.** Local authorities may ask to see the below-listed types of paperwork. The [Articles of the Chicago Convention](#) specify those items marked with a double plus sign (\*\*).

**5.4.1.1 Aircraft/Aircrew Documentation.** It is important to note that you may be responsible for additional documentation requirements that this list does not include.

1. Airworthiness certificate.\*\*
2. Aircraft registration\*\* (some States do not allow temporary certificates).
3. Radio station license.\*\*
  - ICAO Annex [6](#) Part I requires that one member of the flightcrew hold a valid radio telephone operator’s license “authorizing operation of the type of radio transmitting equipment to be used.”
  - The European Union Aviation Safety Agency (EASA) has published inspector guidance for its Ramp Inspections program that references the requirement in Article 30 of the Chicago Convention at <https://www.easa.europa.eu/sites/default/files/dfu/SAFA%20Ramp%20Inspections%20Guidance%20Material%20-%20Version%202.0.pdf>. Some operators have found it useful to create a ramp inspection binder for easy access to required documents.
  - For U.S. domestic flights operating only on VHF, the Federal Communications Commission (FCC) does not require the license.
4. Minimum equipment list (MEL) (or Master Minimum Equipment List (MMEL) if operator plans to operate under this option).
5. Airplane Flight Manual (AFM) with Weight and Balance (W&B) information and metric conversion tables, if applicable.
6. Copies of aircraft and engine logbooks.
7. Import papers for aircraft of foreign manufacture.
8. OpSpecs/MSpecs/LOAs.

**Note:** Some countries require an OpSpec/MSpec/LOA and/or an airworthiness statement for certain operations.

9. Ownership papers.
10. Certificates of insurance, if applicable.
11. Authorization letters from the operating company or the aircraft owner (original signature required), if applicable.

**Note:** For privately owned aircraft where the owner is not on board, many countries require a letter from the owner before they will allow operations within their country (you can find specific information on

this letter and other requirements in the AIP of the countries concerned).

12. Licenses.

13. Crewmember certificates.<sup>++</sup>

**Note:** Pay special attention to medical certificates, as expiration rules vary from country to country; consult the AIP for those countries where you intend to land.

**5.4.1.2 Trip-Specific Documentation.** The following information will change for each flight, but should be available for authorities:

1. Passenger manifest, containing complete names of passengers and places of embarkation and destinations of each.<sup>++</sup>
2. Cargo manifest and detailed declaration of the cargo, if carried.<sup>++</sup>
3. Copies of overflight and landing permissions.
4. General declarations.
5. Journey logbook, signed by the pilot in command (PIC).<sup>++</sup> ICAO Annex 6 identifies the components of the journey logbook as listed below. Consult the AIP for the country you are visiting for their particular requirement.
  - Airplane nationality and registration.
  - Date.
  - Names of crewmembers.
  - Duty assignments of crewmembers.
  - Place of departure.
  - Place of arrival.
  - Time of departure.
  - Time of arrival.
  - Hours of flight.
  - Nature of flight (private, aerial work, scheduled, or nonscheduled).
  - Incidents and observations, if any.
  - Signature of person in charge.

**5.4.1.3 Personal Documentation for Crew and Passengers.** When planning a trip to or from a foreign country, ensure that all travelers have proper personal documentation (passports and visas, as required). You may find the requirements for individual countries at <https://travel.state.gov/>.

## 5.5 Entry to Foreign Airspace—Flight Plan vs. Formal Advance Permission.

- 5.5.1** Permission for Airspace Entry. When the foreign ATS authority accepts your flight plan and issues you a flight clearance, you have not necessarily received official approval for entering that State’s airspace. The governing CAA may independently require permission for airspace entry, and your destination airfield may require permission as well.
- 5.5.2** Flight Plans. Your flight plan provides advance notice of foreign airspace penetration and facilitates effective ATC procedures. For some countries, your flight plan is the only advance notice required; other countries use your flight plan as a check against previously granted permission to enter national airspace.
- 5.5.3** State AIPs. During your pre-trip planning, as noted in paragraphs [5.1.2](#), [5.2.1](#), and [5.2.2](#) above, consult the AIP for the States you will transit to determine any overflight/landing permits and whether prior permission is required. Ensure you allow plenty of lead time to request and obtain all necessary permissions.

## 5.6 Managing Risk in Oceanic and Remote Continental Airspace Operations. Operators should have a risk management process before conducting oceanic operations (per ICAO Annex [19](#), originally issued in 2013). Many of the topics included in earlier portions of this chapter should be included as elements of your risk assessment. Operators are strongly encouraged to research the information available on the FAA website, both from the standpoint of oceanic operations planning, and risk management overall. Non-airline operators are also encouraged to review the material specifically earmarked for airline operators. You can get good ideas from that information.

**Note:** The Automated Mutual-assistance Vessel Rescue (AMVER) system, sponsored by the U.S. Coast Guard (USCG), is a computer-based voluntary global ship reporting system used worldwide by SAR authorities to arrange for assistance to persons in distress at sea. The web address is: <https://www.amver.com/>. Operators conducting oceanic operations are encouraged to be familiar with AMVER in case of a potential ditching. Once the operator notifies ATC of a possible ditching, all merchant vessels registered with AMVER and within 100 NM of the aircraft’s predicted ditching position will be notified.

## 5.7 Weather Forecasts and Other Meteorological Planning.

- 5.7.1** National Weather Service (NWS). The NWS provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters, and ocean areas. Parts 91 subpart [K](#) (part 91K), 121, and 135 operators must use an approved weather source (i.e., NWS or FAA-approved).<sup>14</sup>

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<sup>14</sup> Regulatory references are §§ [91.1039](#), [121.101](#), and [135.213](#).

**5.7.2 Weather Sources.** As representatives of the Administrator, Principal Operations Inspectors (POI) may approve, via OpSpec/MSpec A010, Aviation Weather Information (required for parts 91K, 121, and 135) the following weather sources:

- The NWS for the United States and its territories.
- U.S. and North Atlantic Treaty Organization (NATO) military observing sources.
- Meteorological offices or automated observations operated by ICAO Member States (as long as the States subscribe to ICAO meteorological standards and practices (i.e., list no differences to ICAO Annex 3)).
- Members of the World Meteorological Organization (WMO).

**5.7.3 Enhanced Weather Information Systems (EWINS).** Many certificated operators utilize an EWINS. EWINS are systems for gathering, evaluating, and disseminating aviation weather information, and for issuing weather reports and forecasts prepared by properly trained and qualified aviation meteorologists or aircraft dispatchers. Air carriers typically use a proprietary EWINS. Parts 91K, 121, and 135 operators require FAA approval via OpSpec/MSpec A010 to use EWINS.<sup>15</sup>

**5.7.3.1** Each carrier's EWINS must have sufficient procedures, personnel, and communications and data processing equipment to effectively obtain, analyze, and disseminate aeronautical weather data. An EWINS source may produce weather analyses and forecasts based on meteorological observations provided by the Federal government.

**5.7.3.2** For an explanation of EWINS, refer to FAA Order [8900.1](#), Volume 3, Chapter 26, Section 4, Enhanced Weather Information Systems. Approval to use EWINS weather products is issued on a case-by-case basis and is currently only applicable to part 91K program managers and part 121 or 135 certificate holders (CH), who may either act as their own EWINS or contract for services from an outside source. These approved operators may conduct flight operations using the weather analyses and forecasts produced by their approved EWINS.

**5.8 FAA International Notices Website.** International Notices include Flight Prohibitions Notices and International Oceanic Airspace Notices that could affect your decision to enter or use certain areas of foreign or international airspace. If you are seeking to enter areas of the world that require special considerations, these notices can be very important. To access FAA International Notices, refer to [https://www.faa.gov/air\\_traffic/publication/internationalnotices/](https://www.faa.gov/air_traffic/publication/internationalnotices/).

**5.9 ETOPS.** ETOPS (the ICAO term is "Extended Diversion Time Operations (EDTO)") requirements pertain to aircraft operated under parts 121 and 135. ETOPS is a system of maintenance, planning, alternate airport selection, dispatch, and flight operations standards that are designed to preclude a diversion and, if one were to occur, to protect

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<sup>15</sup> Regulatory references are §§ 91.1039, 121.101, and 135.213.



that diversion. Thus, ETOPS standards establish a higher level of performance requirements and equipment monitoring.

**Note:** Rules covering ETOPS do not address operations conducted under part 91. However, because risk increases with distance from an Adequate Airport (defined in § [121.7](#)), if you are a GA operator, we strongly recommend that your pilot training, maintenance practices, flight planning, and any applicable dispatch procedures follow the processes and procedures established in ETOPS regulations and guidance.

**5.9.1** **ETOPS Guidance.** Guidance pertaining to ETOPS is provided in AC [120-42](#), Extended Operations (ETOPS and Polar Operations), and AC [135-42](#), Extended Operations (ETOPS) and Operations in the North Polar Area. The regulatory basis for ETOPS requirements is provided by part 121 (§§ [121.161](#) and [121.374](#) and appendix [P](#)) and part 135 (§ [135.364](#) and appendix [G](#)).

**5.10** **Polar Operations.** ACs 120-42 and 135-42 cover polar operations by aircraft operated under parts 121 and 135 respectively. As noted in the ETOPS discussion above, we strongly recommend part 91 operators refer to these ACs if you fly a polar route. Other worthwhile sources of information include the Canada and Iceland AIPs and the Canadian Designated Airspace Handbook. The North Polar Area of Operations includes the area that lies north of latitude 78° N. The North Polar routes across Russia are shown in the Russian AIP or in commercial charts for Eastern Europe and Eurasia. The South Polar Area of Operations includes the area south of latitude 60° S. Operators should contact a specialist from the FAA’s Flight Technologies and Procedures Division, Flight Operations Group for advice on operational factors to consider when planning polar operations.

1. Relevant authorizations are:
  - a. OpSpec/MSpec B055, North Polar Operations.
  - b. OpSpec/MSpec B040, Operations in Areas of Magnetic Unreliability.
2. Operations in AMUs when using a Global Positioning System (GPS)-only navigation-sensor for the flight management system (FMS) require careful analysis to confirm that the FMS is receiving accurate and reliable heading information.

**5.11** **Areas With Limited or No ATS (Also Called “NO FIR” Areas).** Two examples of such areas are the boundary between Bodo Oceanic and Murmansk, and the area southeast of Mazatlan's Oceanic FIR off the west coast of Central America.

**5.11.1** **Part 91 Operators.** While part 91 GA operators are not bound by the requirements below, we recommend that they have a solid understanding of this information before attempting to operate in this type of airspace. If you intend to operate in advisory-only airspace, you are required, as you are for all flights, to become familiar with all available information

concerning that flight.<sup>16</sup> Good familiarity with applicable operating procedures allows for safe operations.

**5.11.2 Certificated Operators.** To operate in uncontrolled information regions, certificated operators must be issued OpSpec/MSpec A014, Special En Route IFR Operations in Class G Airspace, in accordance with § [91.1015](#); § [121.93](#); § [121.113](#); part 125, § [125.31](#); or § [135.215](#), as applicable. In uncontrolled airspace, you will not have access to ATC, air traffic advisory, flight information, and alerting services. In approving routes outside controlled airspace via OpSpec/MSpec A014, the Administrator makes a determination that traffic density is such that an adequate level of safety can be assured. FAA inspectors will also evaluate whether you have acceptable alternative means to ensure the following:

1. You can notify the appropriate organization in a timely manner should you require SAR assistance.
2. You have a method to access changes in SIGWX information in a timely manner.
3. Those navigation facilities necessary for you to safely conduct the operation are available and serviceable. You can receive updates regarding the serviceability of the required Navigational Aids (NAVAID).
4. You have reliable in-flight information concerning other IFR aircraft operating near your route of flight (e.g., Traffic Alert and Collision Avoidance System (TCAS) and/or ADS-B In). This could also include “broadcast in the blind” procedures and other “expected” practices (see Appendix [E](#), IATA In-Flight Broadcast Procedure, as well as ICAO Annex [11](#)’s description of traffic information broadcasts by aircraft (TIBA)).

## **5.12 Rotorcraft Operations.**

**5.12.1 FAA and ICAO Requirements.** The guidance on U.S. and International Regulations in Chapter [2](#), Background Information for Operations in Oceanic and Remote Continental Airspace, also applies to helicopter operations in oceanic and remote continental airspace.

**5.12.2 Offshore Helicopter Operations.** AC [90-80](#), Approval of Offshore Standard Approach Procedures, Airborne Radar Approaches, and Helicopter En Route Descent Areas, contains detailed information on offshore helicopter operations, both instrument and ATS surveillance (ADS-B or radar). It also provides instruction on how you can gain authorization to conduct such operations.

**5.12.3 Helicopter Offshore Instrument Operations.** OpSpec/MSpec/LOA H104, Helicopter Offshore Instrument Operations: Offshore Standard Approach Procedure (OSAP), Airborne Radar Approach (ARA), and Helicopter En Route Descent Area (HEDA) Operations, is available to authorize en route descent procedures under IFR.

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<sup>16</sup> Regulatory references are § [91.103](#), Preflight action, and ICAO Annex [2](#), Chapter 2, Applicability of the Rules of the Air, Paragraph 2.3.2, Pre-Flight Action.

**5.12.4** Helicopter Part 135 Proving and Validation Tests. Section [135.145](#) is relevant for rotorcraft operations in oceanic and remote continental airspace. You may develop proposed routes using NAVAIDs where you have adequate signal coverage available. In areas where signal coverage is not available, you must provide a suitable means of navigation. We may require a validation test in VFR conditions to ensure that you are able to demonstrate adequate navigational performance for the route(s) before granting approval for your use of the route(s).

## CHAPTER 6. FLIGHT EXECUTION GUIDANCE FOR OPERATIONS IN OCEANIC AND REMOTE CONTINENTAL AIRSPACE

**6.1 General Information.** The main focus of this guidance is operations in oceanic airspace. The guidance is also applicable to some operations in remote continental airspace, where LRCSs are used.

**6.1.1 Checklists.** In Appendix [D](#), Sample Oceanic Checklist, we have included a sample oceanic checklist tailored from the ICAO version, in both condensed and expanded forms. The checklist is designed to encourage an orderly task flow and reduce oceanic vertical, lateral, longitudinal, and timing navigation errors. Similar to the ICAO version, the checklist in this AC represents lessons learned from many years of flight in oceanic airspace, along with internationally accepted best practices for such operations.

**Note:** You may tailor the abbreviated and expanded checklists to your specific needs and operational circumstances. Until you are experienced and familiar with all items on your tailored checklist, we recommend you refer to your expanded checklist to ensure you follow the procedures in their entirety.

**6.1.2 Pilot Deviations—Common Causes.** Technological advances in communications, navigation, and surveillance equipment have enabled aircraft to operate with ever-improving precision and accuracy. However, despite these improvements in capability, pilots continue to deviate from their current route clearances.

**Note:** The NAT ICAO Region publishes the Oceanic Error Safety Bulletin (OESB), which is an excellent resource for understanding how to prevent common errors. The current OESB can be found in the “EUR and NAT Documents” area of the ICAO website, in the “NAT OPS Bulletins” folder: <https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx>.

**6.1.2.1 Large Height Deviation (LHD).** An LHD occurs when an aircraft is 300 feet or more off its assigned altitude. LHDs increase the risk of mid-air collision.

**6.1.2.1.1** The most common causes of LHDs are:

1. ATC loop errors:
  - Misunderstood or miscommunicated clearances.
  - Inadequate ATC coordination.
2. Pilot deviations from assigned altitude:
  - Following the flight plan rather than a clearance or revised clearance.
  - Erroneous altitude programming in the FMS, such as a mistake in the step-climb entry.
  - Misinterpretation/misapplication of conditional clearances.

- Improper execution of contingency procedures.
- Turbulence encounters.

**6.1.2.1.2** Data indicates that a majority of crew-related errors involve misinterpretation or misapplication of “conditional clearances.” Conditional clearances improve the efficient utilization of airspace, allowing ATC to assign altitudes that enable lower fuel burn. Event reports from ATC and flightcrews indicate that pilots misapply terms in the clearance such as “BY” or “AT”—terms, which have completely different meanings. See Table 6-1 below for examples of incorrectly applied conditional clearances.

**Table 6-1. Examples of Incorrectly Applied Conditional Clearances**

CLEARANCE	CREW ACTION	CORRECT ACTION
Via CPDLC at 1714, crew conditionally cleared, “maintain F340, at 1725 climb to and maintain F360, climb to reach F360 by 1735, report level, due to traffic.”	Crew initiated climb early, reported (ADS-C) passing F354 at 1721.	Crew should have delayed commencing climb until 1725, and planned to reach F360 by 1735.
Via CPDLC, crew at F380, cleared F390 to cross 66N040W level.	Crew commenced climb to F390 at 40W (Mode C).	Crew should have initiated climb prior to 40W in order to cross 40W at F390.
Via CPDLC at 1945, crew cleared maintain F330, at 1952 climb to and maintain F350, climb to reach F350 by 1957, report level F350.	Reported (ADS-C) level at F350 at 1948.	Crew should have delayed commencing climb until 1952, and planned to reach F350 by 1957.
Crew cleared 68/40 64/50 IRBIM F360 M083 via HF voice, crew recleared to descend after passing 65N to be level F340 before 64N.	Crew commenced descent at 6529N/4650W.	Crew should have initiated descent after passing 65N and levelled at F340 prior to 64N.
Crew cleared 66/30 65/40 63/50 IRBIM LOMTA F400 M081. Via CPDLC, crew cleared climb F410 to cross 65/40 level.	Crew failed to climb as cleared and crossed 65/40 at F400 (ADS-C).	Crew should have initiated climb prior to 65N in order to cross 65N at F410.

- 6.1.2.1.3** Your training program should provide your flightcrew with procedures that ensure all ATC clearances are complied with correctly, particularly clearances with en route restrictions such as changing FLs based on a coordinated time or a specific geographic position.

**Note:** Per ICAO NAT Doc [007](#), North Atlantic Operations and Airspace Manual, when flying in NAT HLA, if your aircraft is not using CPDLC/ADS-C, you must immediately report to ATC both when leaving and reaching a new FL. Doing so can enable the controller to identify and intervene when you have misunderstood or misapplied your conditional clearance.

- 6.1.2.2** **Gross Navigation Error (GNE).** The FAA defines GNEs as lateral deviations from course of 10 NM or greater. (Previously, the threshold was 25 NM).

- 6.1.2.2.1** The majority of today’s GNEs arise from pilots flying a very precise track to the wrong position because they failed to properly update their navigation system to reflect their *currently effective route clearance*. This can also result from a clearance or revised clearance that was incorrectly entered, misread, or misunderstood. Procedures to follow in the event of a revised clearance are included in paragraph [6.4.1.7](#). Examples of scenarios that have led to GNEs are:

1. Poor management of the Master Document, resulting in crews not knowing the *currently effective route clearance*.
2. Incorrect waypoint entry procedures, particularly if the waypoints are not named and flightcrews must enter the full latitude and longitude.

**Note 1:** We use the term “currently effective route clearance” to describe what ICAO Annex [2](#) refers to as the “current flight plan,” or the most recently issued ATC clearance.

**Note 2:** Waypoints entered via full latitude and longitude can produce misleading display names, with truncated or rounded minutes of latitude/longitude or longitude. For example, the following two points could have identical display names:

Waypoint Coordinates	Avionics Display ID
5530N020W (N55°30’/W020°)	N55W020
55N020W (N55° /W020°)	N55W020

**Note 3:** Pilots should therefore always confirm the expanded coordinates of undesignated significant points (i.e., unnamed waypoints defined by geographic coordinates).

- 6.1.2.2.2 GNEs also result when the aircraft navigation mode is actually different from that assumed by the crew. This scenario typically occurs when the crew fails to return the flight guidance system to an RNAV mode (e.g., “LNAV”) after using heading mode (e.g., “HDG”) to maneuver the aircraft.
- 6.1.2.2.3 Although there are a number of causes of GNEs, pilot inattention has been the root cause of many navigational errors. ICAO NAT Doc 007, Chapter 14, Guarding Against Common Errors, provides excellent lessons learned from evaluation of GNE incidents.
- 6.1.2.3 **Longitudinal Errors.** Longitudinal errors, in the form of failure to provide updated ETAs, are another common navigation error and one that is easily preventable.
  - 6.1.2.3.1 Deviations around weather can affect ETAs. ICAO Annex 2 requires you to provide ATC with an updated ETA when weather deviations cause the originally notified ETA to be inaccurate.
  - 6.1.2.3.2 Per ICAO Annex 2, you must adhere to any assigned Mach number or airspeed. If you use Long Range Cruise (LRC) or Economy (ECON) modes, you are operating in a constantly changing speed mode. Flying in these modes may not be compatible with maintaining a fixed ATC speed assignment.
  - 6.1.2.3.3 When position reports are made by voice, ICAO Annex 2 requires you to report to ATS any change to your ETA in excess of 2 minutes, both for your initial oceanic entry point as well as all required reporting points along your route of flight. (In the NAT region, the allowance for revised estimates is “3 minutes or more.”)
  - 6.1.2.3.4 Discrepant wind data can result in inaccurate ETA computations. This can be particularly problematic if you are not flying at the flight-planned altitude or have outdated winds loaded in your navigation system. You must diligently monitor your ETA and maintain your assigned Mach number in order to minimize these errors.
  - 6.1.2.3.5 Navigation system-computed ETAs, particularly for more distant waypoints, may be erroneous due to down track wind conditions, which the navigation system is not presently using to compute the ETA. You should compare navigation system estimates with the ETA calculated using the OFP prior to reporting the ETA to ATC.
  - 6.1.2.3.6 Automatic position reports delivered via ADS-C have greatly reduced the occurrence of longitudinal errors caused by inaccurate ETAs. ATC establishes an ADS-C periodic report interval appropriate for the longitudinal and lateral

separation criteria being used. More frequent reports compensate for wind discrepancies and provide ATC with accurate ETAs.

## 6.2 Flight Plan.

### 6.2.1 ATC Flight Plan.

**6.2.1.1** ICAO Annex 2 requires you to file a flight plan for any flight that crosses international borders. IFR operations in oceanic airspace generally start at 6,000 feet. VFR operations at or below 5,500 feet must comply with all applicable regulations and foreign airspace requirements.

**6.2.1.1.1** Even though you may legally conduct flights in oceanic and remote continental airspace under VFR, you will likely encounter instrument meteorological conditions (IMC) at some point in your flight.

**6.2.1.1.2** We therefore recommend that you file and fly under IFR on all oceanic flights.

**6.2.1.2** Proper completion of an ATC flight plan relies on detailed knowledge of the airspace you intend to transit, the airspace equipment requirements, and the required FAA authorizations (OpSpecs/MSpecs/LOAs). You also need to be thoroughly familiar with the equipment your aircraft has on board as listed in your filed flight plan. When you file, your flight plan is transmitted to ATS facilities along the route of flight. If you do not file correctly, you could possibly experience delays before takeoff for an issue with an ATS authority along your route of flight.

**6.2.1.2.1** The AIM has a step-by-step description detailing how to complete FAA Form [7233-4](#), Pre-Flight Pilot Checklist and International Flight Plan.

**6.2.1.3** As Performance-based Navigation (PBN) and PBCS become more prevalent worldwide, ATS authorities will increasingly set aside certain airspace for compliant aircraft. You list your aircraft and crew capabilities using descriptors in items 10A, 10B, and 18 of the flight plan.

**Note:** Without the proper codes or remarks identifying the operational approvals of your crew and aircraft, controllers may deny you en route climbs to your most fuel-efficient FLs or access to the optimum routings or, in some cases, reject your flight plan entirely.

**6.2.1.4** Title 14 CFR part [121](#) dispatch services have staff knowledgeable in all filing requirements for both domestic and international operations. These services can support flight plan reroutes that may arise due to weather or congestion along the route of flight. Regardless of whether you are operating with a dispatch service, you must comply with 14 CFR part [91](#), § [91.103](#), which requires pilots to “become familiar with all available information” concerning a flight. Pilots should have the knowledge and necessary tools available to



react to unplanned reroutes, equipment failures, or emergencies that may affect a flight while en route. Operators using commercial vendor flight planning services remain responsible for all aspects of the flight.

## 6.2.2 Equipment Capability Codes—Flight Plan.

**6.2.2.1** PBN and PBCS are changing the way ATS providers apply separation criteria between aircraft. Without notifying the crew of either aircraft involved, ATS providers in “mixed mandate” airspace can reduce separation between aircraft based on your stated capability. In order to take advantage of opportunities for more efficient routings, your flight plan should reflect the lowest (i.e., the best) RNP, RCP, and RSP values for which you are capable and authorized. You must only use codes for equipment that is installed and operable. Similarly, you must only use capability codes that reflect your actual authorizations, when authorization is required. You must have a specific approval (OpSpec/MSpec/LOA) to indicate RNP 2, 4, or 10 capability on your flight plan.<sup>17</sup> Conversely, you do not require an LOA for RNAV 1 or 2.

**6.2.2.2** The absence of equipment or capability codes in your flight plan (e.g. for RNP, RSP, RCP, ADS-C, ADS-B, CPDLC, RVSM, etc.) informs ATC that your aircraft is either not equipped with or authorized to use such capabilities. The presence or absence of equipment and capability codes affects route and altitude assignments, as well as separation differences with other aircraft. You should ensure your flight plan reflects all the codes, as per flight plan guidance in the AIM, applicable to your aircraft equipment and authorizations.

**6.2.2.3** The RNAV/RNP, RCP, or RSP capability indicated on your flight plan must not be better than that for which you have been approved via an OpSpec, MSpec, or LOA, as applicable. For example, if you have only been approved RNAV/RNP 10 (code A1), you must not indicate RNP 4 capability (code L1).

## 6.3 **Aircraft Preflight Guidance.**

**6.3.1** Preflight—Necessary Documents. Effective oceanic and remote continental airspace flight planning and execution requires a number of important pieces of information. You should ensure you have easy access to the following documents/information in the cockpit, as well as others that may be pertinent to your flight:

**6.3.1.1** Master flight plan (“Master Document”).

**Note:** Use strict procedures to manage the Master Document. Maintain only one OFP labeled “master” in the cockpit.

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<sup>17</sup> Regulatory reference is § [91.169](#), which refers to § [91.153](#). This requires the flight plan to include “any other information the pilot in command or ATC believes is necessary for ATC purposes.” The U.S. AIP states that pilots must “advise ATC” if equipment failures render the filed capability indicators inaccurate.

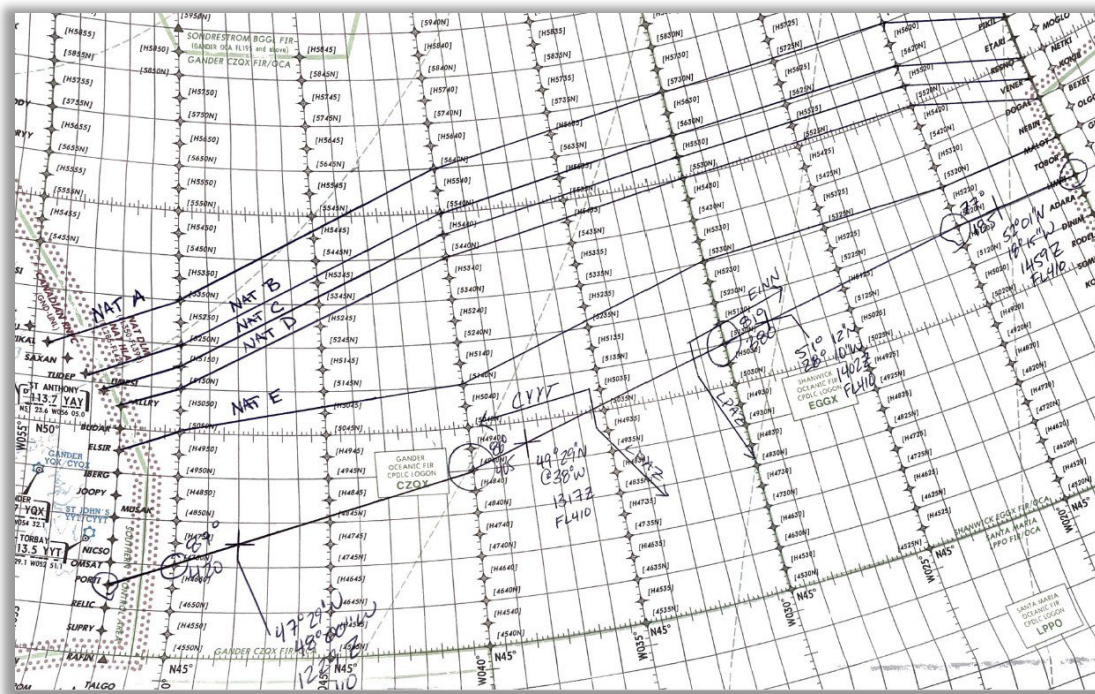
- 6.3.1.2** [NOTAMs](#) for departure, destination, alternate(s), ETOPS alternates (as applicable), and applicable FIRs.
- 6.3.1.3** [GPS NOTAMs](#) (as applicable).
- 6.3.1.4** Weather for departure, destination, alternate airports along the route of flight, and ETOPS alternates (as applicable).
- 6.3.1.5** SIGWX chart.
- 6.3.1.6** Wind charts for planned altitudes and altitudes after driftdown/emergency descent.
- Note:** Compute ETPs for contingencies, such as medical divert, engine loss, rapid decompression (RD), and a simultaneous RD and engine loss. Note the location of the ETPs on your plotting/orientation chart.
- 6.3.1.7** Space weather: solar flare information (see the National Oceanic and Atmospheric Administration's (NOAA) website at <https://www.swpc.noaa.gov/forecasts>).
- 6.3.1.8** Volcanic ash information (as applicable).
- 6.3.1.9** Pilot Weather Reports (PIREP).
- 6.3.1.10** Receiver autonomous integrity monitoring (RAIM) and fault detection and exclusion (FDE) prediction tools (for GNSS and RNP operations), available at <https://sapt.faa.gov/default.php>.
- 6.3.1.11** Current track message (for any operations in airspace with a flexible organized track system (OTS)).
- Note:** If you have a track message or other separate route document associated with the flight, verify that the effective time of the message corresponds to your flight and that the designated route agrees with both your filed routing and the waypoint routing on your Master Document.
- 6.3.1.12** Plotting/orientation chart.
- 6.3.1.12.1** You should use an oceanic plotting/orientation chart, of appropriate scale, and with latitude and longitude depicted, to provide a visual presentation of your intended route, regardless of your type(s) of LRNS and method of cross-checking aircraft position. Plotting your route on a chart helps with situational awareness, and (together with the OFP) also helps with navigation contingencies such as DR, in the event of navigation system degradation/failure.

**6.3.1.12.2** Your chart should include, at a minimum:

1. The route of your filed flight plan. If your cleared route differs from what you filed, your *currently effective route clearance*.
2. Clearly depicted waypoints using standardized symbology.
3. All ETPs, plotted on the chart (with relation to the route).
4. Alternate airports.
5. Proximity of other adjacent tracks.

**6.3.1.12.3** Figure 6-1 shows a sample plotting chart for an eastbound flight on a random route in the North Atlantic at FL 410. Note that the westbound tracks are plotted north of the route of flight, for situational awareness.

**Figure 6-1. Sample Plotting Chart**



**Note:** For certificated operators, if you hold OpSpec/MSpec A061, Electronic Flight Bag (EFB) Program, authorizing use of an EFB, the principal inspector (PI) can authorize “interactive plotting for oceanic and remote continental navigation,” ensuring the EFB application fulfils plotting/orientation chart requirements listed in paragraph 6.3.1.12. With this authorization, you can use your EFB application in place of a paper plotting/orientation chart. AC [120-76](#), Authorization for Use of Electronic Flight Bags, provides guidance for operators to develop associated EFB procedures. Title 14 part 91

operators may use an EFB, provided they observe the criteria and considerations of AC [91-78](#), Use of Class 1 or Class 2 Electronic Flight Bag (EFB).

### 6.3.2 Cockpit Preparations.

**Note:** These procedures assume at least two pilots are on duty. Some aircraft are certified for single-pilot operations. If your intended flight in oceanic or remote airspace can safely accommodate single pilot operations, you should develop some methodology to check your clearance, waypoint entries, equipment setup, etc. It may be possible to involve non-flying crew in some checks, either prior to flight, or in-flight, via appropriate voice and/or data communications. Where such support is not available, single pilot procedures should be carefully designed to detect and fix errors promptly, thereby minimizing or altogether preventing deviations.

**6.3.2.1** Check your maintenance log to ensure all your required communications, navigation, and surveillance and altimetry equipment is operational.

1. Consult your MEL to be fully familiar with operational procedures associated with any inoperative equipment, before you depart.
2. Inoperative equipment could affect the capabilities filed in the ATC flight plan. It is important to update the codes, as needed, to ensure ATC routes you in accordance with your capabilities.
3. A departure delay to accommodate repairs may be warranted. Alternatively, a reroute to avoid oceanic airspace may be necessary.

**6.3.2.2** Identify a single master clock in the cockpit.

1. Verify that your onboard primary time source, or master clock, is set to UTC. In most cases, this time source is the FMS.
2. Use master clock times for all ETAs and actual times of arrival (ATA).

**6.3.2.3** Align your inertial navigation system (INS)/inertial reference system (IRS).

1. Proper INS/IRS loading and operating procedures are another important aspect to help you avoid navigation errors. Ensure you select navigation (NAV) mode at the appropriate time and properly manage your navigation computer during intermediate stops.
2. Carefully follow your inertial system flight manual procedures to ensure proper navigation reliability.

**6.3.2.4** Have a second pilot independently verify the aircraft present position coordinates you have loaded in your navigation system.

1. Both pilots should verify the present position in the LRNS. Aircraft maintenance or towing can cause the present position suggested on initialization to be incorrect.
  2. If you conduct another present position check on taxi out and it shows a gross difference from your gate coordinates, it could indicate a problem with the LRNS.
- 6.3.2.5** Two pilots should independently coordinate the loading and verification of all flight plan entries. One pilot should load the entire route into the LRNS, to include all waypoints, using the Master Document as source. He or she should then verify the routing has been loaded correctly. Below are recommended steps for performing this loading and verification. The second pilot's subsequent confirmation procedures are explained beginning in paragraph 6.3.2.6.
- 6.3.2.5.1** Prior to loading the flight plan, carefully cross-check the waypoint routing on your Master Document against your filed flight plan to verify both documents show the same routing.
- 6.3.2.5.2** Ensure your navigation database and FMS software version are current and correct.
- 6.3.2.5.3** For systems with pilot-defined waypoint designators or numbers, we recommend you use a consistent procedure. Enter this designator on the Master Document and use it to store waypoints in the navigation computer.
- 6.3.2.5.4** Verify all navigational information contained in the Master Document against the navigation data information in the navigation system.
- 6.3.2.5.5** Your procedures should provide for a means of verification of the data you loaded. You should check the expanded coordinates and course/distance between waypoints against the same information on your Master Document. You may also check the route presentation on your navigation display. Most long-range aircraft have a navigation system that is capable of automatically uplinking flight plans sent from ATC or from a dispatch service. These "push to load" flight plan uplinks are very reliable, but there are occasional glitches that can lead to loading partial routes, requiring you to make changes to complete the route load. Regardless of how you load your flight plan into your navigation system, you should have procedures to verify your flight plan route against your navigation system entries.
- 6.3.2.6** After the first pilot has loaded and verified the navigation system entries against the flight plan, a second pilot should recall and confirm the waypoint data against source information.
- 6.3.2.6.1** It is not sufficient for one crewmember simply to observe another crewmember entering the data. You should use an independent cross-check

method between pilots so no navigation system entry goes unverified. An attitude of “healthy suspicion” can facilitate good cross-checks.

- 6.3.2.6.2** Cross-checks should include comparing the expanded coordinates of the waypoints loaded in the navigation system to the filed flight plan, track message (if applicable), and the Master Document.
- 6.3.2.6.3** Verify the total route distance in your navigation system against your Master Document to help find embedded mistakes. Also cross-check course/headings and distances between each waypoint to ensure the navigation system routing matches your Master Document. Referencing your plotting or orientation chart here can also be beneficial.
- 6.3.2.6.4** A 1° course deviation causes the aircraft to be off planned routing by approximately 1 mile every 60 miles of travel. A course deviation on an oceanic crossing closer to the equator, where leg lengths are typically longer, can result in cumulatively larger displacements from course. However, although leg lengths are typically shorter at higher latitudes, and similar deviations result in cumulatively smaller displacements from course, the density of traffic and closer spacing of parallel tracks at high northern latitudes actually constitute an environment less tolerant of course deviations.
- 6.3.2.6.5** The second pilot should work from the navigation system back to the Master Document (i.e., by reading what is in the navigation system, and comparing that with what is in the Master Document). Reading from the Master Document to the navigation system can result in “seeing what we expect to see” (expectation bias). A simple way to consider this is that the first pilot works from “paper to glass” while the second pilot works from “glass to paper.”
- 6.3.2.7** Adopt appropriate annotations to indicate the status of each waypoint listed on the Master Document. For example:
1. The first pilot could put a circle next to the waypoint, waypoint number, or symbol on the Master Document to signify that they have independently cross-checked the entry of the coordinates in the navigation computer.
  2. The second pilot could then tick or diagonally slash the circle next to the waypoint, waypoint number, or symbol to signify having performed the cross-check described above, to include confirming the course and distance information within a specified tolerance (e.g., plus or minus 2° and 2 NM).
- 6.3.2.7.1** We discuss additional Master Document symbology in the en route section, in paragraph [6.4](#).

- 6.3.2.8** Set the appropriate mode select secondary radar with data link (Mode S) flight identification (FLT ID), which should correspond verbatim to the Aircraft Identification (ACID) (call sign) entered in Block 7 of the ATC flight plan.
- 6.3.2.8.1** ATC systems worldwide are becoming more reliant upon information transmitted by Mode S transponders to manage air traffic. ATC systems use transmitted FLT IDs to uniquely identify each aircraft within a given airspace and correlate them to a filed flight plan for the provision of surveillance and separation services.
- 6.3.2.8.2** A FLT ID is comprised of a maximum of seven alphanumeric characters (e.g., N235RA, AAL3342, BONGO33) and must agree, verbatim, with the ACID entered in block 7 of the ATC flight plan.
- 6.3.2.8.3** You typically enter your FLT ID through either an FMS interface or your transponder control panel. For ATC systems to function correctly, you must ensure the FLT ID you enter in the FMS exactly matches the ACID in block 7 of the ATC flight plan.
- 6.3.2.9** Check your ground speed in the blocks and on taxi out.
1. If you are still in the blocks and your ground speed reads other than zero, you may have a developing error in your LRNS.
  2. Similarly, if your groundspeed on taxi out appears unreasonable, this may also indicate a problem with your LRNS.
- 6.3.2.10** Accomplish required RVSM altimetry ground checks.
- 6.3.2.10.1** Before taxi, set your altimeters to the airport local altimeter setting. Both primary altimeters should read within  $\pm 75$  feet of a known elevation (e.g., field elevation).
- 6.3.2.10.2** The two primary altimeters must also agree with each other within the limits noted in the aircraft operating manual.

## **6.4 En Route Guidance.**

### **6.4.1 Oceanic Clearance: How to Request, Receive, and Process.**

- 6.4.1.1** Oceanic clearances are unique clearances that frequently require coordination between two or more air traffic agencies. The clearance you receive from an ATC facility on the ground before departure may not constitute a clearance into or through your filed oceanic and remote continental airspace. Depending on the first oceanic FIR you enter, you may need to obtain this clearance separately and specifically as you approach that airspace. Check the AIP (or other relevant source document) to determine if such separate oceanic clearance is required.

**6.4.1.2** In situations where a separate oceanic clearance is required, and your departure airport is relatively close to the oceanic airspace boundary, you may, and at some airports must, obtain your oceanic clearance prior to departure. Check the AIP or other relevant source documents to determine clearance requirements unique to your departure airport.

**Note:** In some airspace, ATC issues the route portion of the oceanic clearance before the aircraft departs, even when the departure airport is not close to the oceanic boundary. In this case, ATC assigns the altitude and airspeed (as required) for oceanic crossing prior to entering oceanic airspace. New York oceanic control area (OCA) and Oakland OCA both operate in this manner.

**6.4.1.3** In most cases, obtain your oceanic clearance via voice at least 40 minutes prior to entry, or 20 to 90 minutes prior if using the Aircraft Communications Addressing and Reporting System (ACARS) data link Oceanic Clearance Delivery (OCD).

**6.4.1.4** CPDLC Departure Clearances provided at large U.S. airports may include an oceanic clearance. Oceanic clearances could also be issued via CPDLC from en route controllers.

**6.4.1.5** When receiving a clearance via voice, at least two pilots should be involved, one actively obtaining the clearance and the other monitoring. We recommend both pilots be on a headset during this process.

**6.4.1.6** Both pilots should independently copy the clearance. Each pilot cross-checks and verifies the routing, altitudes, and Mach number/airspeed assigned (if applicable).

1. Read all waypoint coordinates back to the ATS provider in detail. Sometimes, approved local procedures make full read back optional. Always cross-check each detail of the clearance with your Master Document.
2. Ensure the ATS provider acknowledges your correct read back.
3. The terms “expect” or “when can you accept” are not used by ATC when issuing a clearance. Typical ATC clearance phraseology is “ATC clears....”
4. After each pilot conducts an independent review and verification of the clearance, the crew should discuss the clearance to verify a common understanding and make any plans resulting from the clearance.

**6.4.1.7** Ensure the following upon receipt of a revised clearance:

**Note:** A revised clearance (that is, a clearance that differs from either the oceanic route requested via the flight plan, or from a previously



issued oceanic clearance) is the number one scenario leading to pilot deviation from the assigned routing. You should be particularly cautious when receiving a revised clearance.

1. At least two pilots should separately copy the clearance from the ATS provider. Each pilot should be on a headset.
2. You read it back correctly and receive an acknowledgement of your read back from the ATS provider.
3. All pilots compare and analyze the clearance they just copied; contact the ATS provider for clarification of any inconsistencies.
4. One pilot reprograms the navigation system, updates the Master Document, and updates the plotting/orientation chart.
5. A second pilot cross-checks the revised clearance with the reprogrammed route loaded into the navigation system, the updated Master Document, and the updated plotting/orientation chart.
  - a. The cross-check of the navigation system coordinates includes comparing the expanded coordinates (i.e., degrees *and* minutes).
  - b. Course and distance connecting the new waypoints should also be checked. Course and distance tables are available commercially for every 10° of longitude, or dispatch may be able to send a new OFP/Master Document with the updated track and distances. Preferably, an onboard flight planning application in an EFB is used to independently calculate course and distance, and check that against the navigation system. Legacy methods, using plotter (protractor) and pencil on a plotting chart, are also possible; pilots, however, need focused training to be proficient with these methods.
6. If the clearance is received via CPDLC, each pilot should read it silently to develop an independent understanding of the new clearance, making sure the full content of the uplink has been viewed (all pages, as well as routes to be loaded). They should then discuss the clearance and ask the controller for clarification if they have any doubts as to what the clearance means.

**Note 1:** If you receive a loadable clearance via CPDLC, the FAA recommends you automatically load that clearance in your navigation system. Some crews have accepted, but not automatically loaded, a CPDLC clearance to avoid losing wind data or to preserve meaningful waypoint labels. Failure to properly load the clearance in the navigation system will result in a deviation.

**Note 2:** Revised clearances sent via CPDLC have also been associated with navigation errors. Operators should be cognizant of this when designing operating procedures for the use of CPDLC.

7. Thoroughly brief all relief pilots on the revised clearance prior to them assuming cockpit duties.

**Note:** We highly recommend that the relief pilot(s) also cross-check the navigation system against the Master Document to ensure complete understanding of the new clearance.

- 6.4.1.8** Ensure you have given an accurate ETA to ATC for your oceanic entry point. If you previously provided a time estimate, and it subsequently changes in excess of 2 minutes (in the NAT, “3 minutes or greater”), you must revise your estimate with ATC.

**Note:** Pilots do not need to provide a revised estimate when under ATS surveillance (refer to ICAO Doc [4444](#), Procedures for Air Navigation Services—Air Traffic Management, paragraph 8.6.4.4). Also, for aircraft providing automatic position reports via ADS-C, position reports can be omitted “in airspace where ADS-C services are provided” (refer to ICAO Annex 2, paragraph 3.6.2.2). Nonetheless, domestic controllers often relay the pilot-provided estimate to oceanic controllers, and separation can be predicated on that time estimate.

- 6.4.1.9** You must also ensure you enter oceanic airspace at your cleared/assigned FL for the crossing. The domestic ATC sector does not always automatically clear you to the oceanic clearance altitude; if this appears to be happening, query ATC.

## **6.4.2** Communications/Navigation/Surveillance System Checks.

- 6.4.2.1** You should have checked your HF radios prior to departure. If you were unable to get a good check on the ground, check them prior to entering oceanic and remote continental airspace.
- 6.4.2.2** Accomplish a SELCAL check prior to oceanic and remote continental airspace entry and then again at each CTA boundary. Check your SELCAL even when your CPDLC is working properly.
- 6.4.2.3** If you are using SATVOICE to communicate with ATC via New York or San Francisco Radio, the FAA requires a SATVOICE Callback Check, with a sample transcript provided in paragraph [4.3.3.2](#). You can find operational policy regarding the use of SATVOICE in the U.S. [AIP](#), section ENR 7. You may find changes to SATVOICE policy, between AIP publication cycles, posted on the FAA’s International Notices [website](#).
- 6.4.2.4** For certificated operators, your OpSpecs or MSpecs will prescribe the requirements for confirming your navigation accuracy, and assessing the performance of your LRNS, prior to entering oceanic airspace. We recommend GA operators perform similar navigation accuracy checks, as

further described in paragraph [D.2.5.1](#) of the sample oceanic checklist provided in Appendix [D](#).

- 6.4.2.5** Upon entering oceanic and remote continental airspace, verify that the RNP alerting by your FMC is consistent with the RNP capability indicated on your flight plan. If you indicate RNP 4 capability on the flight plan, for example, FMC alerting must be no higher than 4.0.
- 6.4.2.6** If you are no longer able to meet your RNP navigation specification (NavSpec) while en route (i.e., your Actual Navigation Performance (ANP) exceeds your RNP or required equipment has failed, or you receive an “UNABLE RNP” alert), you are required to immediately notify your ATS provider so they can adjust separation standards between you and other nearby aircraft as required.
- 6.4.2.7** If you plan to use SATCOM data link systems, check them prior to oceanic airspace entry. AC [90-117](#), Data Link Communications, recommends you initiate logon/notification for CPDLC and/or ADS-C services 10 to 25 minutes prior to the oceanic/FIR boundary, unless otherwise specified in the relevant AIP.
- 6.4.2.8** Conduct altimetry checks prior to entering oceanic airspace and every hour thereafter, or as specified in the aircraft flight manual. Your two primary altimeters should read within 200 feet of each other.

**Note:** We recommend you record these readings, along with their times, on your Master Document. This will aid you in determining the most accurate altimeter in the event of a subsequent altimetry problem.

### **6.4.3** Entering Oceanic and Remote Continental Airspace—First Steps.

- 6.4.3.1** Set your transponder in accordance with regional requirements (generally to code 2000). This requirement varies with the oceanic airspace. You should confirm these procedures, through applicable AIP or other regional documents during flight planning. In the NAT, for example, pilots should change the transponder code 30 minutes after entering oceanic airspace. In the Pacific, Oakland advises that pilots should change the transponder code “upon entering” the OCA, after radar (/surveillance) services are terminated.
- 6.4.3.2** Adjust your airspeed to maintain your assigned Mach number, as applicable.
- 6.4.3.3** Once you have departed VHF radio range, set your radios to air-to-air (generally 123.45) and guard (121.5) frequencies.
  - 6.4.3.3.1** ATC and air defense authorities will generally attempt contact with aircraft on guard (121.5 or 243.0 MHz) before ordering an intercept. For this reason, all aircraft are highly encouraged to maintain a listening watch on guard.

- 6.4.3.3.2 The AIM, chapter 5, section 6, addresses interception procedures and provides the intercepting signals table published in ICAO Annex 2.
- 6.4.3.3.3 The International Air Transport Association (IATA) has developed widely adopted procedures for use in FIRs where poor communications and/or reduced quality of ATS may pose a flight hazard. See Appendix E, IATA In-Flight Broadcast Procedure, for IATA procedures for transponder use and radio broadcast in affected areas. The procedures involve maintaining a listening watch and broadcasting aircraft position “in the blind.”
- 6.4.3.4 Institute an appropriate offset, based on the SLOP, unless not authorized. Use of SLOP helps mitigate the heightened risk of collision due to highly accurate navigation systems, and it helps avoid wake turbulence.
  - 6.4.3.4.1 SLOP guidance is published in the U.S. AIP, Part 2, En Route (ENR), and ICAO Doc 4444, section 16.5. As a reminder, SLOP offsets are only right of course.
  - 6.4.3.4.2 We recommend SLOP be part of your oceanic training program and standard procedures for oceanic flying. You should check applicable State AIPs to determine where use of SLOP is authorized.
  - 6.4.3.5 Specify which FMS pages, or other displays of navigation information, that individual flightcrew members are charged with monitoring during the oceanic portion of the flight (e.g., cross-track error or time/distance).
- 6.4.4 The Master Document: A Suggested Method for Managing It.
  - 6.4.4.1 A Master Document is a copy of the OFP (also referred to as navigation log, or computer flight plan (CFP)) with “MASTER” written on it. It does not “belong” to the pilot or the copilot, but rather is the flightcrew’s central reference document to record clearances, frequencies, ETAs notified to ATC, fuel status, and other operational information. The Master Document is also used to record verification of waypoint information, and should be kept current and organized so pilots can easily understand the progress of the flight, to include the *currently effective route clearance*. ICAO NAT Doc 007 provides further details on recommended use of a Master Document, and notes that it should list sequentially the waypoints defining the route, the course and distance between each waypoint, and other information relevant to navigation along the cleared route.
  - 6.4.4.2 Suggested Master Document annotations are provided here to help operators standardize procedures. Other annotations, for example, squares, rectangles, or hash marks, could be used as well, as long as they are part of a clearly defined and standardized process of managing the Master Document.

**6.4.4.2.1** A circle next to the waypoint identifier denotes both pilots verified the coordinates, courses, and distances. This would normally be done during initial navigation system loading.

ARWY	POSITION	MC	DIST	EST	TIME	MOR	FL	MACH	GS/TAS	ZBO
COORDINATES		MH			ET	ATA	TROP	SAT	WIND	FUEL
NAME		TC/TH								
<b>○</b> DCT	40N60	079	448		47	011	F370	M827	574/471	11515
N4000.0 W16000.0		074	1804		4:37		F374	M60	290/109	72069
N40 00 W160 00		087/082								
CP-3 PAKN-1148/KPDX-1261 5:26 N4000.7 W15016.7 60241/58242										

**6.4.4.2.2** A diagonal backslash (\) over the circle denotes confirming a subsequent waypoint’s coordinates and the track and distance to it. An ETA for that waypoint is also recorded. This would normally be done after rollout on the new course, and/or approaching the active waypoint.

ARWY	POSITION	MC	DIST	EST	TIME	MOR	FL	MACH	GS/TAS	ZBO
COORDINATES		MH			ET	ATA	TROP	SAT	WIND	FUEL
NAME		TC/TH								
<b>○\</b> DCT	40N60	079	448		47	011	F370	M827	574/471	11515
N4000.0 W16000.0		074	1804		4:37		F374	M60	290/109	72069
N40 00 W160 00		087/082			12:54					
CP-3 PAKN-1148/KPDX-1261 5:26 N4000.7 W15016.7 60241/58242										

**6.4.4.2.3** As you make your position report over the waypoint, note your fuel remaining on the Master Document next to that waypoint. This is especially important if the cleared route and FL differ from your flight plan.

Approaching each oceanic waypoint, verify the next and subsequent (“next + 1”) waypoints. Using your *currently effective route clearance*:

1. Check the expanded FMC coordinates for the next and subsequent waypoints, and
2. Check that the expected outbound magnetic course and distance to the next waypoint presented in the FMC agree with that clearance.

**6.4.4.2.4** A diagonal forward slash (/) turns the previously annotated back-slash into an “X.” This denotes waypoint passage. Overhead time is confirmed with a “check” (or updated time, as applicable) and fuel remaining is annotated.

ARWY	POSITION	MC	DIST	EST	TIME	MOR	FL	MACH	GS/TAS	ZBO
COORDINATES		MH			ET	ATA	TROP	SAT	WIND	FUEL
NAME		TC/TH								
<b>○\</b> DCT	40N60	079	448		47	011	F370	M827	574/471	11515
N4000.0 W16000.0		074	1804		4:37		F374	M60	290/109	72069
N40 00 W160 00		087/082			12:54 ✓					73,100
CP-3 PAKN-1148/KPDX-1261 5:26 N4000.7 W15016.7 60241/58242										

As you pass each waypoint, verify the aircraft is progressing on the correct route by cross-checking the leg distance and magnetic course on the Master Document against the distance and magnetic course to the next point as displayed on the avionics.

#### **6.4.5** Position Reporting—General Requirements.

- 6.4.5.1** Communications over HF radio rely heavily on proper radio terminology and scripted reports. Use the published guidance found in en route publications or the AIM to make sure you deliver messages in the proper format.
1. You are expected to speak at a moderate speed using internationally accepted phraseology.
  2. Be certain you are communicating with the facility appropriate to the oceanic and remote continental airspace in which you are operating or about to enter. More than one station may be using the same HF frequency at the same time. Only accept clearances from the ATS provider for the oceanic and remote continental airspace in which you are operating.
- 6.4.5.1.1** Radio call signs of ground stations. Position reports are generally provided to aeronautical radio stations, which relay this information to ATC. If the ATS provider you are talking to is identified as a “Center,” (e.g., “Gander Center”) or a “Control” (e.g., “Tokyo Control”), you are talking directly to an air traffic controller. If the provider you are talking to is identified as a “Radio” (e.g., “New York Radio”), you are talking to an aeronautical radio station, which is a relay facility that communicates between the ATC controlling facility and aircraft. An aeronautical radio station does not control air traffic—it relays the instructions of the ATC facility.
- 6.4.5.1.2** You must report departing your current FL. In certain regions, the NAT for example, you are also required to report reaching your assigned altitude. You should consult the appropriate regional or State documents (e.g., ICAO NAT Doc 007, AIP, Chart Supplement, etc.) to confirm reporting requirements.
- 6.4.5.1.3** In addition to reporting your position to your current ATS provider, in the case of boundary points, often you must repeat your last position report to the FIR or CTA you are entering. Do so when so prescribed in the appropriate section of ICAO Doc [7030](#), Regional Supplementary Procedures, in the applicable AIP, or when requested by ATC.
- 6.4.5.1.4** If another aircraft relays your report, use the appropriate air-to-air frequency and not the emergency (guard) frequency.
- 6.4.5.1.5** If you operate in airspace approved for the use of data link, you may provide automatic position reporting via ADS-C. In this case, you should discontinue voice position reports.

- 6.4.5.2** When following a designated oceanic route, you must make position reports when passing each designated compulsory reporting point.

**Note:** The appropriate ATS authority may request reports over non-compulsory reporting points as well. In oceanic airspace where the FAA is the ATS provider, position reports are required over all points used in the flight plan to define the route of flight, even if they are non-compulsory.

- 6.4.5.3** If you are not on a designated oceanic route, provide position reports at all points listed in Item 15 (route of flight) of the flight plan. ATC expects reports as soon as possible after the first half hour of flight in oceanic and remote continental airspace and at hourly intervals thereafter. The appropriate ATS provider, however, may request additional reports at shorter intervals of time.

1. If your flight tracks predominantly east and west, ATS providers will generally request reports every 5° or 10° of longitude.
2. If your flight tracks predominantly north and south, ATS providers will generally request reports every 5° or 10° of latitude.

#### **6.4.6** Position Reporting—Format.

- 6.4.6.1** See the AIM, chapter 5, for general guidance on position report format. You must provide information regarding your current fix and the next two fixes on your route of flight, in the following order:

1. Your complete aircraft call sign.
2. Your position and crossing time, reported in 4 digits UTC.

**Note:** In reporting coordinates and times, say each number individually (e.g., 1032 is “one zero three two,” not “ten thirty-two”). You do not have to say “UTC” or “Zulu” when you report the time.

3. Your FL.
4. Your next fix and estimate over that fix in 4 digits UTC.

**Note:** If any reported ETA changes in excess of 2 minutes (3 minutes or more in the NAT), you must provide an updated estimate to the ATS provider.

5. Name of your subsequent fix.

- 6.4.6.2** An example position report is:  
“N1234 over CEBEN at 1422, FL350, estimating CIVIT 1503, CORTT next.”

- 6.4.6.3** When position is expressed in coordinates, the following pertains:

1. If your flight tracks predominantly east and west, ATS providers will generally expect latitude to be expressed in degrees and minutes, and longitude in whole degrees only.
2. If your flight tracks predominantly north and south, ATS providers will generally expect latitude to be expressed in whole degrees only, and longitude in degrees and minutes.

**6.4.6.4** A 2010 change to ICAO Annex [3](#) cancelled the requirement to report wind and temperature data via voice. You should continue to report any turbulence or other significant meteorological conditions you encounter to ATC.

**Note 1:** Ensure the reporting of such meteorological observations references your geographical coordinates at the time of occurrence.

**Note 2:** ICAO NAT Doc 007 has a form for reporting significant wake turbulence encounters. We encourage you to submit this form whenever you encounter significant wake turbulence while operating in NAT airspace, in order to support the monitoring efforts of the NAT airspace authorities.

#### **6.4.7** Navigation Cross-Checking Procedures: Why They Are Important.

**6.4.7.1** ICAO Doc 7030 includes language requiring the State of Registry or the State of the Operator to approve operator programs established to mitigate the occurrence of navigational errors due to equipment malfunction or operational error. These operator programs must include in-flight operating drills, consisting of mandatory navigation cross-checking procedures, to identify navigation errors in sufficient time to prevent aircraft from inadvertent deviation from an ATC-cleared route.

**6.4.7.2** Navigation cross-check procedures mitigate risk and promote situational awareness—an essential requirement for crews operating highly automated airplanes in increasingly crowded airspace. Such procedures help ensure aircraft operating under procedural ATC control are in fact maintaining the separation from other aircraft that ATC has planned and is expecting. Cross-check procedures enable pilots to be certain they are where they think they are; this awareness becomes particularly critical during emergency situations.

**6.4.7.3** While advances in navigation accuracy and communications capability generally enhance safety and reduce flightcrew and controller workloads, these advancements have not eliminated human errors. Pilot deviations continue to occur and can be attributed to complacency, poor operational procedures, poor understanding of systems and processes, or simply human frailties such as cognitive or auditory failures.



**Note:** Numerous deviations in oceanic airspace are the result of flightcrews failing to follow revised clearances. Transposed numbers, misunderstood clearances, or route amendments not properly verified or not passed on to relief crewmembers also contribute to navigation errors. In addition, paragraph [4.4.3](#) describes issues with displays of CPDLC messages; Figure [4-1](#) shows sample FMS pages flightcrews would interact with to load an uplinked, revised route.

#### **6.4.8** Navigation Cross-Checking—Acceptable Procedures.

- 6.4.8.1** In line with the rationale and requirements for navigation cross-checking procedures described in paragraph [6.4.7](#), the FAA believes cross-checking is synonymous with “making sure.” We consider the “sample oceanic checklists,” provided in Appendix [D](#), to provide operators with not only a “to-do” list but also a means to make sure certain items, known to result in navigation errors if overlooked or done incorrectly, are performed in an organized, systematic manner.
- 6.4.8.2** The sample checklists (simple and expanded versions) provided in Appendix D are derived from ICAO NAT OPS Bulletin 2017-005, Sample Oceanic Checklists. In these checklists, we have provided two acceptable methods for cross-checking aircraft position at a point approximately 10 minutes after oceanic waypoint passage. Previously, the only recommended method of cross-checking aircraft position in the oceanic airspace environment was manual plotting on a chart. However, a panel of aviation industry and FAA personnel completed an Operational Safety Assessment (OSA) of methods for cross-checking oceanic flight navigation. The panel determined that an alternative to manual plotting, by which aircraft position could be checked through use of aircraft FMS-driven navigation displays and indications, would provide for an equivalent level of safety. See Appendix D, paragraph [D.2.9.2](#).
- 6.4.8.3** The check of aircraft position at a point approximately 10 minutes following waypoint passage is designed to enable you to observe and correct a navigation error before safety of flight is jeopardized. If you made a subtle mistake either while en route to or crossing a waypoint, 10 minutes of travel should allow you to observe that mistake before significant problems result. These cross-checks are a backup to an otherwise well-planned flight that is being executed through systematic and disciplined attention to effective procedures, such as those provided in this chapter and Appendix D. The cross-checks are not designed to overcome poor planning, sloppy procedures or inadequate attention to detail. To reiterate: in-flight operating drills, to include cross-checking of navigation during oceanic and remote continental airspace operations, are mandatory under ICAO standards.

**Note 1:** Some operators use 2 degrees of travel instead of 10 minutes. This would generally also be approximately 10 minutes, depending on a number of factors.

**Note 2:** If your method and technique of position cross-checking allow observation of an error earlier, it is acceptable to do the check at approximately 5 minutes after waypoint passage, or 1 degree of travel.

**6.4.8.4** The FAA recognizes that, for any number of reasons, operators may require or choose to use navigation cross-checking procedures different from those in the oceanic checklist provided in Appendix D. For those operators who require operational approval, whether to operate in oceanic and remote continental airspace in general, to operate in airspace where RNP is prescribed, or to operate within oceanic and remote SAOs, such as NAT HLA, their choice of procedures will help establish the basis of that approval. Operational approval will be predicated upon use of either the cross-checking procedures described in the sample oceanic checklist (Appendix [D](#)) or via an alternative method that will achieve an equivalent level of safety. In order to determine equivalent levels of flight safety, an operator's proposed alternative cross-checking procedures will be assessed, by the PI and a specialist from the FAA's Flight Technologies and Procedures Division, Flight Operations Group, against the following criteria:

1. Are they written, standardized, and required for use by the operator's flightcrews?
2. Do they require use of a plotting or orientation chart, of adequate scale, for reference/situational awareness purposes?
3. Do they address all the major functions/action points (e.g., independent route verification; at waypoint passage; after waypoint passage) outlined in the sample oceanic checklist?
4. Do they provide for confirming that the aircraft is flying toward, via the expected course/track line, the intended/expected waypoint contained in the flight's *currently effective route clearance*?
5. Do they prescribe periodic cross-checking, for reasonableness, of the position data reported by all onboard navigation systems?
6. Do they require checking of aircraft position approximately 10 minutes after each oceanic waypoint prescribed in the *currently effective route clearance*?
7. Do they direct prompt and proper correction for any detected deviations from the *currently effective route clearance*?
8. Do they establish acceptable tolerances for track deviation, as well as course/heading/distance between waypoints, when compared between the flight plan and the navigation system?

9. Do they include ready reference to, and direct compliance with, accepted in-flight contingency procedures (refer to ICAO Doc 4444)?

**Note:** Alternative methods proposed by certificated operators will also require review/approval by the Flight Standards Service (FS).

- 6.4.8.5** If an operator adopts new oceanic procedures, it is crucial this be done as part of a carefully orchestrated effort in close coordination with both your PI and a specialist from the Flight Operations Group. Checklists need to be tailored to reflect operator-unique aspects, manuals need to be updated, and crews need to be trained. Failure to properly implement the change can lead to confusion, misunderstandings, and errors.
- 6.4.8.6** Diligent cross-checking of the navigation system and Master Document against the *currently effective route clearance* remains the key to preventing inadvertent deviations from the cleared route.
1. The *active leg* is the most immediate indication of adherence to the *currently effective route clearance*. The active leg is formed by a “FROM” position and a “TO” waypoint, and features an associated course to fly between the points; this information should be cross-checked against the OFP.
  2. In addition to verifying the “TO” waypoint, the FAA also recommends the flightcrew verify autopilot steering mode (e.g., lateral navigation (LNAV)/NAV, not Heading (HDG)).
  3. When checking waypoints, ensure you look at the “expanded” (i.e., degrees and minutes) coordinates. Some waypoint labels can be misleading.
- 6.4.8.7** While the procedures discussed above, and the items provided in the oceanic checklists in Appendix [D](#), emphasize prevention of lateral errors, we want to emphasize that altitude deviations and longitudinal errors are no less significant. Steps to avoid those two types of errors in oceanic operations are discussed further in paragraph [6.1.2](#).
- 6.4.9** Relief Pilots—Preparing to Assume Duties. Increasingly, with long-range operations, relief pilots are part of the crew. In such cases, it is vital to brief the relief pilot on all current operational issues affecting the flight.
1. Many navigation errors have been traced back to inadequate handoff between pilots who first loaded the route into the navigation system and relief pilots who took over hours into the flight. It is therefore vital that you fully brief the relief pilot on your *currently effective route clearance*.
  2. We recommend the relief pilot verify the current cleared route prior to occupying the seat, if practical. Work from the navigation system to the Master Document to lessen

the risk of expectation bias (seeing what is expected) and maintain an attitude of “healthy suspicion.”

- 6.4.10** Exiting Oceanic and Remote Continental Airspace. Refer to the Coast-In step in the Sample Oceanic Checklist (Appendix [D](#)).

## CHAPTER 7. IN-FLIGHT CONTINGENCY GUIDANCE FOR OPERATIONS IN OCEANIC AIRSPACE

**7.1 Contingency Procedures: When They May Be Needed.** ICAO Doc [4444](#) includes contingency procedures to allow you to safely deviate from your assigned clearance, in the event a revised clearance cannot first be obtained. The procedures are designed to rapidly separate you from the regular flow of traffic while you address an emergency. Although we can't cover all possible emergencies you may face, the more common cases that might drive you to fly oceanic contingency procedures include:

1. Unexpected meteorological conditions, e.g., severe weather and/or turbulence.
2. Degradations in aircraft performance.
  - Aircraft engine or pressurization failure.
  - Inability to maintain cleared FL (e.g., due to unexpected temperatures).
  - Loss of, or significant reduction in, navigation capability.
3. Loss of communications capability. This can have many causes:
  - Degradation or failure of aircraft communication equipment.
  - Degradation or failure of ground communication equipment.
  - Unexpected closure of an oceanic ATC facility.
4. Medical situations.

**7.1.1 Adhering to Contingency Procedures.** Keep in mind that you must follow these contingency procedures precisely as written. If you fail to do so, you incur additional risk by invalidating procedures designed to prevent collisions. To be clear, for operations in airspace where direct controller-pilot VHF voice communications are not available, the only assurances of safe separation come when all aircraft are flying the exact track and altitude assigned by ATC. ATC can no longer assure safe separation when an aircraft deviates from the assigned track or altitude, without prior clearance. The contingency procedures, if followed exactly, minimize the risk inherent in these deviations.

### **7.2 Choosing the Correct Contingency Procedure.**

**7.2.1 Primary Guidance.** ICAO Doc 4444, section 15.2, contains primary guidance for oceanic contingency procedures. ICAO Doc [7030](#) includes additional, region-specific guidance, generally in chapter 9 of each regional section. The procedures are also described in the En Route (ENR) 7.3 section of the U.S. [AIP](#). Refer also to the FAA's International Notices [website](#), which will include any changes or regional applications to contingency procedures.

**Note 1:** On November 5, 2020, ICAO changed oceanic contingency procedures globally, to use 5 NM offsets for the general procedures, and an altitude deviation beginning at 5 NM for the weather contingency procedures.

**Note 2:** Whenever possible, obtain a revised clearance instead of flying a contingency procedure. If the nature of the emergency precludes this, consider querying ATC about safest routes, even if ATC is unable to clear you that way.

**7.2.2** General and Weather Deviation Contingency Procedures. A “General” contingency procedure is available, as is a weather deviation procedure. Flightcrews should be thoroughly familiar with these procedures and ensure ready access to them on the flight deck so they may be performed precisely and without undue delay.

**7.2.2.1** The general procedure results in a 5 NM lateral offset, at an altitude of 500 or 1,000 feet “different from those normally used.” It is reprinted in Appendix [F](#), Special Procedures for In-Flight Contingencies in Oceanic Airspace.

**7.2.2.2** The weather deviation procedure results in an altitude change of 300 feet, when the lateral deviation reaches 5 NM from centerline. It is also reprinted in Appendix F.

**7.3** **Altimetry and/or Navigation Degradation.** You must notify the ATS provider as soon as possible if your altimetry and/or navigation systems have degraded below that required to operate in RVSM, RNP, or RNAV airspace. In general, that notification, either via voice or CPDLC, will include the phrase “UNABLE RNP (OR RNAV OR RVSM) DUE EQUIPMENT.”

**7.3.1** Whenever possible, you should request a revised clearance that accounts for the degradation you have experienced. Upon receipt of your message, ATS providers will assess the traffic situation and either allow you to remain as filed or issue a reroute, depending on your current (and projected future) separation from other traffic.

**7.3.2** For navigation degradation scenarios, dead reckoning procedures may be required. Flightcrews should be familiar with determining heading and leg time required, through the use of the Master Document, the chart, and/or EFB applications.

**Note:** ICAO NAT Doc [007](#) provides specific procedures to be used in the NAT in the event of navigation system degradation or failure.

**7.4** **Lost Communications Procedures.** The general rules for lost communications are captured in ICAO Annex [2](#), chapter 3, and are included in their entirety in ICAO Doc 4444, section 15.3.

**7.4.1** Region-Specific Rules. In some regions, ATS authorities have amended the rules to meet their specific air traffic management (ATM) requirements. These amended rules are included in ICAO Doc 7030, generally in chapter 9 of the applicable region’s section. ICAO NAT Doc 007 also provides a detailed discussion of lost communications procedures specific to NAT airspace. Refer also to the FAA’s International Notices [website](#), which will include any changes or regional applications to lost communications procedures.

- 7.4.2 Preflight Preparation.** Prior to departure, ensure you are familiar with the lost communications rules for the regions you are transiting. The guidance in the following paragraphs is not all-inclusive and should not be the sole basis for your understanding of the lost communications rules that impact your trip.
- 7.4.2.1**     ATS authorities expect you to maintain your last assigned speed and altitude for some period (usually 20 minutes or 60 minutes, depending on the region), then adjust your speed and altitude to conform to your flight plan.
- 7.4.2.2**     In the NAT region:
- 7.4.2.2.1**   If you have received an oceanic clearance, you are expected to proceed to your oceanic entry point and enter at your cleared oceanic FL and airspeed, then fly your ATC-cleared routing, FL, and airspeed through oceanic airspace, picking up your filed flight plan route upon oceanic exit, even if your oceanic clearance differed from your flight planned oceanic routing.
- 7.4.2.2.2**   If you have not yet received an oceanic clearance, you are expected to proceed to your filed oceanic entry point and fly your filed oceanic routing, FL, and airspeed, then continue along your filed route upon exiting oceanic airspace.
- 7.4.2.3**     You can find specific direction in ICAO Doc 4444 and ICAO Doc 7030. This direction is not the same for every region, so make sure you understand the procedure for the region(s) through which you intend to operate, as well as those for the national airspace structure you will enter upon exiting oceanic airspace.
- 7.4.3 Unexpected Closure of an Oceanic ATC Facility.** See Appendix [F](#), paragraph [F.4](#) for considerations in the event of an oceanic ATC facility shutdown.
- 7.5 Normal Aircraft Tracking.** ICAO, in Annex [6](#), Part I, paragraph 3.5 established a requirement for an automated 4D (latitude, longitude, altitude, and time) tracking capability for oceanic operations involving aircraft above a certain weight and seating capacity. The FAA recommends all operators establish some automated capability to track the position of their aircraft during oceanic operations using a means that does not require direct flightcrew action. ICAO Circular 347, Aircraft Tracking Implementation Guidelines, provides additional information.

**APPENDIX A. ABBREVIATIONS AND DEFINITIONS****A.1 Abbreviations.**

<b>Acronym</b>	<b>Description</b>
14 CFR	Title 14 of the Code of Federal Regulations
AC	Advisory Circular
ACARS	Aircraft Communications Addressing and Reporting System
ACAS	Airborne Collision Avoidance System (same as TCAS)
ACID	Aircraft Identification
ADIZ	Air Defense Identification Zone
ADS	Automatic Dependent Surveillance (in older documents published before ADS-B existed, "ADS" generally refers to ADS-C)
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AFI	African-Indian Ocean Region (per ICAO)
AIM	Aeronautical Information Manual
AIP	Aeronautical Information Publication
AMU	Area of Magnetic Unreliability
AMVER	Automated Mutual-assistance Vessel Rescue
ANP	Actual Navigation Performance
ARTCC	Air Route Traffic Control Center
ATA	Actual Time of Arrival
ATC	Air Traffic Control
ATM	Air Traffic Management
ATOP	Advanced Technologies and Oceanic Procedures
ATS	Air Traffic Service
ATSP	Air Traffic Service Provider
CAA	Civil Aviation Authority
CEP	Central East Pacific
CFP	Computer Flight Plan
CMNPS	Canadian Minimum Navigation Performance Specifications
CPDLC	Controller-Pilot Data Link Communications



<b>Acronym</b>	<b>Description</b>
CTA	Control Area
DOS	Department of State
DR	Dead Reckoning
EDTO	Extended Diversion Time Operations
EFB	Electronic Flight Bag
ETA	Estimated Time of Arrival
ETOPS	Extended Operations
ETP	Equal Time Point
EWINS	Enhanced Weather Information Systems
FAA	Federal Aviation Administration
FANS 1/A	Future Air Navigation System 1/A (1=Boeing; A=Airbus)
FDE	Fault Detection and Exclusion
FIR	Flight Information Region
FL	Flight Level
FLT ID	Flight Identification
FMC	Flight Management Computer
FMS	Flight Management System
FRMS	Fatigue Risk Management System
GA	General Aviation
GNE	Gross Navigation Error
GNSS	Global Navigation Satellite System
GOLD	Global Operational Data Link Document
GPS	Global Positioning System
HF	High Frequency
HLA	High Level Airspace
hPa	Hectopascal
IAP	Instrument Approach Procedure
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFBP	In-Flight Broadcast Procedure
IFR	Instrument Flight Rules

<b>Acronym</b>	<b>Description</b>
IMC	Instrument Meteorological Conditions
INS	Inertial Navigation System
IRS	Inertial Reference System
LHD	Large Height Deviation
LNAV	Lateral Navigation
LOA	Letter of Authorization
LRC	Long Range Cruise
LRCS	Long-Range Communication System
LRNS	Long-Range Navigation System
MEL	Minimum Equipment List
MHz	Megahertz
MMEL	Master Minimum Equipment List
Mode S	Mode Select Secondary Radar With Data Link
MSpecs	Management Specifications
NAS	National Airspace System
NAT	North Atlantic
NAT HLA	North Atlantic High Level Airspace
NATO	North Atlantic Treaty Organization
NAV	Navigation
NAVAID	Navigational Aid
NavSpec	Navigation Specification
NM	Nautical Miles
NOPAC	North Pacific
NOTAM	Notice to Air Missions
NWS	National Weather Service
OAPS	Operations Approval Portal System
OCA	Oceanic Control Area
OESB	Oceanic Error Safety Bulletin
OFP	Operational Flight Plan
OpSpecs	Operations Specifications
OTS	Organized Track System

<b>Acronym</b>	<b>Description</b>
PBC	Performance-based Communication
PBCS	Performance-based Communication and Surveillance
PBN	Performance-based Navigation
PI	Principal Inspector
PIC	Pilot in Command
PIREP	Pilot Weather Report
POI	Principal Operations Inspector
PPO	Prior Permission Only
QFE	Atmospheric pressure at aerodrome elevation (or at runway threshold). (With the runway threshold QFE set in the subscale, your altimeter will read zero on the runway threshold.)
QNE	Pressure Altitude (Flight Level), obtained with Standard Pressure (29.92 in Hg or 1013.2 hPa) set in the altimeter subscale.
QNH	The pressure set on the subscale of the altimeter so that the instrument indicates its height above sea level.
RA	Resolution Advisory
RAIM	Receiver Autonomous Integrity Monitoring
RCP	Required Communication Performance
RD	Rapid Decompression
RNAV	Area Navigation
RNP	Required Navigation Performance
RSP	Required Surveillance Performance
RVSM	Reduced Vertical Separation Minimum
SAO	Special Area(s) of Operation
SAR	Search and Rescue
SARPs	Standards and Recommended Practices (ICAO)
SATCOM	Satellite Communications
SATVOICE	Satellite Voice
SELCAL	Selective Calling System
SIGWX	Significant Weather
SLOP	Strategic Lateral Offset Procedures
SMS	Safety Management System

Acronym	Description
SOP	Standard Operating Procedure
SSR	Secondary Surveillance Radar
SUA	Special Use Airspace
SUPPS	Regional Supplementary Procedures (ICAO Doc <a href="#">7030</a> )
SWPC	Space Weather Prediction Center
TAF	Terminal Aerodrome Forecast
TCAS	Traffic Alert and Collision Avoidance System
TIBA	Traffic Information Broadcasts by Aircraft
TSO	Technical Standard Order
UTC	Coordinated Universal Time
VAAC	Volcanic Ash Advisory Center
VFR	Visual Flight Rules
VHF	Very High Frequency
WebOPSS	Web-based Operations Safety System
WGS 84	World Geodetic System 1984

## A.2 Definitions.

- A.2.1** Advisory Airspace. Airspace of defined dimensions, or a designated route, within which air traffic advisory service is available.
- A.2.2** Aeronautical Information Manual (AIM). A primary FAA publication whose purpose is to provide the aviation community with basic flight information and ATC procedures for use in the NAS of the United States. The AIM contains items of interest to pilots concerning health and medical facts, factors affecting flight safety, a pilot/controller glossary of terms used in the ATC System, and information on safety and accident and hazard reporting.
- A.2.3** Aeronautical Information Publication (AIP) (ICAO). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.
- A.2.4** Aeronautical Telecommunication Station. An aeronautical station which forms part of a radio telephone network by providing air/ground communications and flight information service as an integral part of ATS. Aeronautical telecommunication stations are also known as international Flight Service Stations (FSS), Aeronautical Radio, or Aeradio Stations, depending on the State providing the service.

- A.2.5** Airborne Collision Avoidance System (ACAS) (ICAO). An aircraft system based on SSR transponder signals, which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.
- A.2.6** Air Defense Identification Zone (ADIZ). Airspace over land or water, extending upward from the surface, within which the ready identification, location, and control of aircraft are required in the interest of national security.
- A.2.7** Air Traffic Advisory Service (ICAO). A service provided within advisory airspace to ensure separation, in so far as practical, between aircraft that are operating on IFR flight plans.
- A.2.8** Air Traffic Management (ATM) (ICAO). The dynamic, integrated management of air traffic and airspace including ATS, airspace management, and air traffic flow management—safely, economically, and efficiently—through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.
- A.2.9** Air Traffic Management (ATM) System (ICAO). A system that provides ATM through the collaborative integration of humans, information, technology, facilities, and services, supported by air and ground- and/or space-based communications, navigation, and surveillance.
- A.2.10** Air Traffic Service (ATS) (ICAO). A generic term meaning variously flight information service, alerting service, air traffic advisory service, ATC service, area control service, or approach control service.
- A.2.11** Air Traffic Service (ATS) Surveillance System (ICAO). A generic term meaning variously, ADS-B, Primary Surveillance Radar (PSR), SSR, or any comparable ground-based system that enables the identification of aircraft. A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.
- A.2.12** Alerting Service (ICAO). A service provided to notify appropriate organizations regarding aircraft in need of SAR aid and to assist such organizations as required.
- A.2.13** Area Control Center (ACC) (ICAO). A unit established to provide ATC service to controlled flights in CTAs under its jurisdiction. ACCs are the international equivalent of U.S. ARTCC.
- A.2.14** Area of Magnetic Unreliability (AMU). As aircraft move towards the Earth's north or south magnetic pole, the horizontal field strength diminishes and the ability of the compass to accurately sense magnetic north is reduced. It is generally recognized that when the horizontal magnetic field strength falls below 6000 nanotesla, the magnetic compass can no longer be considered to be reliable.

- A.2.15** Area Navigation (RNAV) (ICAO). A method of navigation that permits aircraft operation on any desired flight path within the coverage of ground- or space-based NAVAIDS or within the limits of the capability of self-contained systems or a combination of these.
- A.2.16** Automatic Dependent Surveillance (ADS). A surveillance technique in which aircraft automatically provide, via a data link, data derived from onboard navigation and position fixing systems, including ACID, four-dimensional position, and additional data as appropriate.
- A.2.16.1** **Automatic Dependent Surveillance-Broadcast (ADS-B) (ICAO)**. A surveillance system by which aircraft, aerodrome vehicles, and other objects can automatically transmit and/or receive data such as identification, position, and additional data, as appropriate, in a broadcast mode via a data link.
- A.2.16.2** **Automatic Dependent Surveillance-Contract (ADS-C) (ICAO)**. A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated and what data would be contained in the reports. The abbreviated term “ADS contract” is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract, or an emergency mode.
- A.2.17** Conditional Clearances. 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. In oceanic and remote continental airspace, this usually involves a restriction to comply with the clearance “BY” or “AT” a certain geographic position or time.
- A.2.18** Control Area (CTA) (ICAO). A controlled airspace extending upwards from a specified limit above the Earth.
- A.2.19** Controller-Pilot Data Link Communications (CPDLC). A two-way digital communications system that conveys textual ATC messages between controllers and pilots using ground- or satellite-based radio relay stations.
- A.2.20** Cross-Checking. Cross-checking is the act of verification. Cross-checking involves matching a set of test data against a set of master data to detect deviations in sequence or content.
- A.2.21** Current Flight Plan (ICAO). The flight plan, including changes, if any, brought about by subsequent clearances.
- Note:** In this AC, we use the term “*currently effective route clearance*” to refer to what ICAO Annex 2 calls the “current flight plan.”
- A.2.22** Dead Reckoning (DR). The navigation of an airplane solely by means of computations based on airspeed, course, heading, wind direction, groundspeed, and elapsed time.

- A.2.23** Electronic Flight Bag (EFB). An EFB is any device, or combination of devices, actively displaying EFB applications. EFB applications are categorized as Type A or B, and can be hosted on either portable or installed components. A list of EFB applications can be found in the appendices of AC [120-76](#).
- A.2.24** Erosion of Longitudinal Separation. A loss of required horizontal separation between aircraft operating at the same altitude, on the same oceanic routing, usually due to improper speed control or failure to communicate to ATC in a timely manner any changes in ETAs in excess of 2 minutes.
- A.2.25** Extended Diversion Time Operations (EDTO) (ICAO). Any operation by an airplane with two or more turbine engines where the diversion time to an en route alternate aerodrome is greater than the threshold time established by the State of the Operator.
- A.2.26** Extended Operations (ETOPS). An airplane flight operation, other than an all-cargo operation in an airplane with two or more engines, during which a portion of the flight is conducted beyond a time threshold identified in 14 CFR part [121](#) or [135](#), that is determined using an approved one-engine-inoperative cruise speed under standard atmospheric conditions in still air.
- A.2.27** Fatigue Risk Management System (FRMS) (ICAO). FRMS is a data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge as well as operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.
- A.2.28** Flight Information Region (FIR) (ICAO). An airspace of defined dimensions within which Flight Information Service (FIS) and alerting services are provided.
- A.2.29** Flight Information Service (FIS) (ICAO). A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.
- A.2.30** Flight Level (FL) (ICAO). A surface of constant atmospheric pressure which is related to a specific pressure datum (i.e., Standard Pressure—29.92 in Hg or 1013.2 hPa) and is separated from other such surfaces by specific pressure intervals.
- A.2.31** Flight Operations Officer/Flight Dispatcher (ICAO). A person designated by the operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with ICAO Annex [1](#), who supports, briefs, and/or assists the PIC in the safe conduct of the flight.
- A.2.32** General Aviation (GA). That portion of civil aviation that does not include scheduled or unscheduled air carriers or commercial space operations.
- A.2.33** Global Navigation Satellite System (GNSS) (ICAO). A worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers, and system integrity monitoring, augmented as necessary to support the RNP for the intended operation.

- A.2.34** Global Positioning System (GPS). GPS refers to the worldwide positioning, navigation, and timing determination capability available from the U.S. satellite constellation. The service provided by GPS for civil use is defined in the GPS Standard Positioning Service Performance Standard. GPS is composed of space, control, and user elements.
- A.2.35** Gross Navigation Error (GNE). A GNE is a lateral deviation of 10 NM or more from the aircraft's cleared route. Previously, the threshold for a GNE was 25 NM.
- A.2.36** High Frequency (HF) Communications. Radio frequencies between 3 and 30 MHz used for air/ground voice communications in overseas operations. HF communications (or, if supported, SATVOICE) capability is required for all IFR operations in controlled airspace when out of the range of VHF communications. If you are in doubt as to the VHF coverage along your intended route of flight, your aircraft should be equipped with HF communications (or SATVOICE, if supported).
- A.2.37** High Seas. The seas beyond the 12 NM from the baseline of a shore. Airspace over the high seas is considered international airspace.
- A.2.38** Instrument Meteorological Conditions (IMC) (ICAO). Meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling, less than the minima specified for visual meteorological conditions (VMC).
- A.2.39** International Civil Aviation Organization (ICAO). ICAO is a specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport.
- A.2.40** Journey Logbook (ICAO). A record of the flight operation, which should be retained in order to maintain a continuous record of the last 6 months' operations.
- A.2.41** Large Height Deviations (LHD). A deviation from your cleared altitude by 300 feet or more.
- A.2.42** Lateral Navigation (LNAV). A function of RNAV equipment that calculates, displays, and provides lateral guidance to a profile or path.
- A.2.43** Long-Range Navigation System (LRNS). An electronic navigation unit that is approved for use under IFR as a primary means of navigation. An LRNS must have at least one source of navigational input suitable for oceanic and remote continental navigation, such as an INS or a GPS receiver.
- A.2.44** Mach Number Technique. Describes a control technique used by ATC whereby turbojet aircraft operating successively along suitable routes are cleared to maintain appropriate Mach numbers for a relevant portion of the en route phase of flight. The principal objective is to achieve improved utilization of the airspace and to ensure that separation between successive aircraft does not decrease below the established minima.



- A.2.45** Master Document. A copy of the OFP, labeled as “Master,” on which the *currently effective route clearance* is recorded, and which serves as the primary flightcrew reference for updating the progress of the flight. It should list sequentially the waypoints defining the route, the track and distance between each waypoint, and other information relevant to navigation along the cleared track.
- A.2.46** Master Minimum Equipment List (MMEL) (ICAO). A list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations, or procedures.
- A.2.47** Minimum Equipment List (MEL) (ICAO). A list that provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.
- A.2.48** Navigation Specification (NavSpec) (ICAO). A set of aircraft and flightcrew requirements needed to support PBN operations within a defined airspace. There are two kinds of NavSpecs:
- A.2.48.1** **Area Navigation (RNAV) Specification**. A NavSpec based on RNAV that does not include the requirement for onboard performance monitoring and alerting, designated by the prefix RNAV (e.g., RNAV 5, RNAV 1).
- A.2.48.2** **Required Navigation Performance (RNP) Specification**. A NavSpec based on RNAV that includes the requirement for onboard performance monitoring and alerting, designated by the prefix RNP (e.g., RNP 4, RNP APCH).
- A.2.49** North Atlantic High Level Airspace (NAT HLA). NAT HLA is that volume of airspace (as defined in ICAO Doc 7030) between FL 285 and FL 420 within the OCAs of Bodo Oceanic, Gander Oceanic, New York Oceanic East, Reykjavik, Santa Maria, and Shanwick, excluding the Shannon and Brest Ocean Transition Areas. Aircraft operators must obtain approval from their State of Registry to operate within NAT HLA.
- A.2.50** Notice to Air Missions (NOTAM) Domestic/International. 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. NOTAMs are distributed via two methods: telecommunications (Class I Distribution) and other than telecommunications (Class II Distribution).
- A.2.51** Oceanic Airspace. Airspace over the high seas. Generally, “oceanic” is included in the airspace designation (e.g., Oceanic Control Area (OCA)), and direct controller-pilot VHF voice communications are not available. ATC is provided using at least some elements of procedural control in accordance with ICAO.

- A.2.52** Oceanic Area Control Center (OACC). An ACC with responsibilities for providing ATS in oceanic airspace. Responsibility for the provisions of ATS is delegated by ICAO to various States based primarily upon geographic proximity and the availability of the required resources.
- A.2.53** Performance-based Communication (PBC) (ICAO). Communication based on performance specifications applied to the provision of ATS. An RCP specification includes communication performance requirements that are allocated to system components in terms of communication to be provided and associated, continuity, availability, integrity, safety, and functionality needed for the proposed operation in the context of a particular airspace concept.
- A.2.54** Performance-based Navigation (PBN) (ICAO). RNAV based on performance requirements for aircraft operating along an ATS route, on an IAP, or in a designated airspace. Performance requirements are expressed in NavSpecs (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability, and functionality needed for the proposed operation in the context of a particular airspace concept.
- A.2.55** Performance-based Surveillance (PBS) (ICAO). Surveillance based on performance specifications applied to the provision of ATS. An RSP specification includes surveillance performance requirements that are allocated to system components in terms of the surveillance to be provided and associated data delivery time, continuity, availability, integrity, accuracy of the surveillance data, safety, and functionality needed for the proposed operation in the context of a particular airspace concept.
- A.2.56** Pilot in Command (PIC) (ICAO). The pilot designated by the operator, or in the case of GA, the owner, as being in command and charged with the safe conduct of a flight.
- A.2.57** Procedural Control (ICAO). Term used to indicate that information derived from an ATS surveillance system is not required for the provision of ATC service.
- A.2.58** Procedural Separation (ICAO). The separation used when providing procedural control.
- A.2.59** Reduced Vertical Separation Minima (RVSM). RVSM separation minima are 1000 feet vertical separation between FL 290 and FL 410 inclusive. Operators and aircraft must be authorized by the Administrator to operate in RVSM airspace. An operator may be authorized without application to the FAA when meeting the standards of part [91](#), Appendix [G](#), section 9. Alternatively, OpSpec/MSpec/LOA B046, Operations in Reduced Vertical Separation Minimum (RVSM) Airspace, is available as a specific approval, when needed for international operations. For additional guidance, refer to AC [91-85](#), Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum (RVSM) Airspace.
- A.2.60** Remote Continental Airspace. Airspace over land where VHF voice communications, ATC surveillance (via radar or ADS-B), and reliable ground-based NAVAIDs are not available. ATC is provided using procedural control and procedural separation, with LRCS.

- A.2.61** Required Communication Performance (RCP) Specification (ICAO). A set of requirements for ATS provision, aircraft capability, and operations needed to support PBC within a defined airspace.
- A.2.62** Required Navigation Performance (RNP) Specification (ICAO). A NavSpec based on RNAV that includes the requirement for performance monitoring and alerting, designated by the prefix RNP (e.g., RNP 2, RNP 4, RNP APCH).
- A.2.63** Required Surveillance Performance (RSP) Specification (ICAO). A set of ATS provisions, including communication services and aircraft and operator requirements, needed for surveillance, supporting a performance-based operation within a defined airspace.
- A.2.64** Special Use Airspace (SUA). Consists of airspace of defined dimensions where activities must be confined because of their nature, or where limitations are imposed upon aircraft operations that are not a part of those activities, or both.
- A.2.64.1** **Prohibited Areas**. A prohibited area is an SUA designated under 14 CFR part [73](#), within which no person may operate an aircraft without the permission of the using agency.
- A.2.64.2** **Restricted Areas**. A restricted area is an SUA designated under part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction.
- A.2.64.3** **Warning Areas**. A warning area is airspace of defined dimensions, extending from 3 NM outward from the coast of the United States, which contains activity that may be hazardous to nonparticipating aircraft. The purpose of such a warning area is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.
- A.2.65** Target Level of Safety (TLS) (ICAO). A generic term representing the level of risk that is considered acceptable in particular circumstances.
- A.2.66** Very High Frequency (VHF). The frequency band between 30 and 300 MHz. Portions of this band, 108–118 MHz, are used for certain NAVAIDs, while 118–136 MHz are used for civil air/ground voice communications.
- A.2.67** Visual Meteorological Conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.
- A.2.68** Waypoint. A predetermined geographical position that is defined in terms of latitude/longitude coordinates. Waypoints may be a simple named point in space or associated with existing NAVAIDs, intersections, or fixes. A waypoint is most often used to indicate a change in direction, speed, or altitude along the desired path. For purposes of RNAV procedures, waypoints are identified as either:

- A.2.68.1 Flyby Waypoint.** Flyby waypoints are used when an aircraft should begin a turn to the next course prior to reaching the waypoint separating the two route segments. This is known as turn anticipation.
- A.2.68.2 Flyover Waypoint.** Flyover waypoints are used when the aircraft must fly over the point prior to starting a turn.

**APPENDIX B. SPECIAL AREAS OF OPERATION AND OPSPECS/MSPECS/LOAs**

**B.1 Special Areas of Operation (SAO).** SAOs are geographic areas having unique characteristics that require the use of special equipment, procedures, and/or techniques to safely conduct flight operations. The FAA requires certificated U.S. operators to obtain operational authorization to fly in oceanic and remote continental airspace. The FAA requires all operators to obtain operational authorization to fly in some or all of the SAOs, depending on operating part, as indicated in Table B-1, SAO-Related OpSpecs/MSpecs/LOAs, and Table B-2, Oceanic and Remote/General En Route OpSpecs/MSpecs/LOAs. Currently, the FAA considers the following areas SAOs:

1. NAT HLA;
2. Central East Pacific Airspace;
3. North Pacific (NOPAC) Airspace;
4. AMUs; and
5. North Polar Area.

**B.1.1** OpSpecs or MSpecs are the instruments for issuing operational authorization to U.S. certificated operators. U.S. GA operators (i.e., those operating solely under part 91 (excluding part 91K)) obtain authorization through an LOA.

**B.1.2** The tables below list the OpSpecs/MSpecs/LOAs associated with SAOs, as well as a number of OpSpecs and MSpecs related to the broader subject of oceanic and remote continental/general en route operations.

**B.1.3** Absence of an “X” in the MSpec and/or Part 91 LOA applicability column (e.g., OpSpec B041, North Atlantic Operations with Two-Engine Airplanes Under Part 121) indicates that an MSpec and/or LOA is not required for those operators who would ordinarily be issued MSpecs or LOAs.

**Table B-1. SAO-Related OpSpecs/MSpecs/LOAs**

Auth	Applicability			Title
	OpSpec	MSpec	Part 91 LOA	
B037	X	X		Operations in Central East Pacific (CEP) Airspace
B038	X	X		Operations in North Pacific (NOPAC) Airspace
B039	X	X	X <sup>1</sup>	Operations in North Atlantic High Level Airspace (NAT HLA)
B040	X	X		Operations in Areas of Magnetic Unreliability
B055	X	X		North Polar Operations
D098			X <sup>2</sup>	Short-Term Operations in Airspace Requiring Specific Approval

<sup>1</sup> Part 91, B039 is required for NAT/HLA operations.

<sup>2</sup> D098 can be used to authorize operations in oceanic/remote airspace, Reduced Vertical Separation Minimum (RVSM) airspace, and in SAOs.

**Table B-2. Oceanic and Remote/General En Route OpSpecs/MSpecs/LOAs**

Auth	Applicability			Title
	OpSpec	MSpec	Part 91 LOA	
A010	X	X		Aviation Weather Information
A014	X	X		Special En Route IFR Operations in Class G Airspace
A018	X			Scheduled Passenger Helicopter Operations
A056	X	X	X <sup>3</sup>	Data Link Communications
A317	X			Acceptance of a Fatigue Risk Management Plan
A354	X	X	X	In-Trail Procedures (ITP) Using ADS-B In
B030	X	X		IFR Navigation Using GPS/WAAS RNAV Systems
B034	X	X		IFR Class I Terminal and En Route Navigation using Area Navigation (RNAV) Systems
B036	X	X	X <sup>4</sup>	Oceanic and Remote Continental Navigation Using Multiple Long-Range Navigation Systems
B041	X			North Atlantic Operations with Two-Engine Airplanes Under Part 121
B043	X			Special Fuel Reserves in International Operations
B044	X			Planned Redispach or Rerelease En Route
B045	X			Extended Overwater Operations Using a Single Long-Range Communication System
B046	X	X	X <sup>3</sup>	Operations in Reduced Vertical Separation Minimum (RVSM) Airspace
B050	X	X	X <sup>5</sup>	Authorized Areas of En Route Operations, Limitations, and Provisions
B054	X	X	X <sup>4</sup>	Oceanic and Remote Airspace Navigation using a Single Long-Range Navigation System
B342	X			Extended Operations (ETOPS) with Two-Engine Airplanes Under Part 121/135
B344	X			Extended Operations (ETOPS) in Passenger-Carrying Airplanes with More Than Two Engines Under Part 121/135
B450	X	X		Sensitive International Areas
C055	X	X		Alternate Airport IFR Weather Minimums
D098			X <sup>6</sup>	Short-Term Operations in Airspace Requiring Specific Approval
H104	X	X	X	Helicopter Offshore Instrument Operations: Offshore Standard Approach Procedure (OSAP), Airborne Radar Approach (ARA), and Helicopter En Route Descent Area (HEDA) Operations

<sup>3</sup> Part 91, required for the respective operation outside the United States.

<sup>4</sup> Part 91, either B036 or B054 is required to indicate oceanic and remote continental RNP capability, depending on aircraft navigation system equipage.

<sup>5</sup> Part 91 B050 LOA is called "Special Authorizations for Certain Areas of Operations," and is used for areas where U.S. civil aviation operations are prohibited.

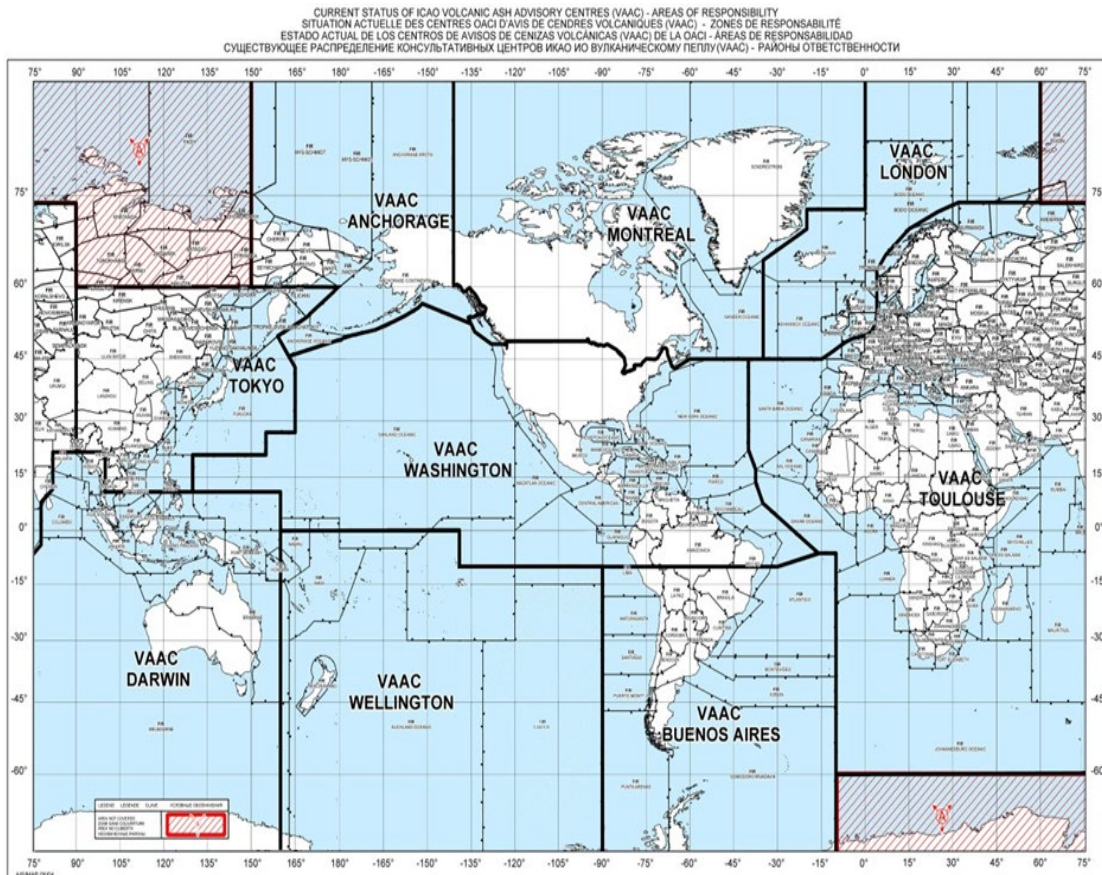
<sup>6</sup> D098 can be used to authorize operations in oceanic/remote airspace, RVSM airspace, and in SAOs.

## APPENDIX C. UNUSUAL WEATHER ACTIVITY

### C.1 Volcanic Ash.

**C.1.1** In 2010, a small volcano in Iceland erupted, spewing volcanic ash into the atmosphere. Eyjafjallajökull's eruption stranded 8 million travelers and resulted in the largest airspace shutdown since World War II. As a result, in 2012, ICAO produced the first edition of ICAO Doc [9974](#), Flight Safety and Volcanic Ash, which provides guidance for aircraft operators when volcanic ash contamination may be a hazard for flight operations. Whenever your flight planned route approaches the vicinity of a volcanic ash cloud, you should understand the potentially catastrophic effects ingesting volcanic ash could have on your aircraft engines. Currently, nine Volcanic Ash Advisory Centers (VAAC) offer worldwide coverage of volcanic activity and provide valuable information to assist your trip planning efforts. For more information on the VAACs, go to <https://www.ssd.noaa.gov/VAAC/vaac.html>.

**Figure C-1. ICAO Volcanic Ash Advisory Centers**



**C.1.2** Volcanic eruptions emit various gases along with magma, including sulfur dioxide (SO<sub>2</sub>) and hydrogen sulfide (H<sub>2</sub>S). When SO<sub>2</sub> gas combines with water in the atmosphere, a sulfate aerosol primarily composed of dilute sulfuric acid is formed. Flying through sulfuric acid aerosols has caused crazing of acrylic windows, fading of exterior paint, and

accumulation of sulfate deposits in engines. SO<sub>2</sub> gas is colorless, but under certain conditions of reflection and refraction of sunlight, a sulfuric acid aerosol may be a visible atmospheric feature, such as a layer of haze of variable color (brownish, yellowish, bluish, or whitish). Ash particles likely will be present in aerosol haze but possibly in minor or trace amounts.

- C.1.3** Volcanoes are the only sources of large quantities of sulfur gases at cruise altitudes, and both types of sulfur gas have a noticeable smell. SO<sub>2</sub> is identifiable as the sharp, acrid odor of a freshly struck match. H<sub>2</sub>S, also known as sewer gas, has the odor of rotten eggs. “Electrical smoke and fire” and SO<sub>2</sub> are two odors described as somewhat similar. Sulfur gases may be detectable only for a short period of time because of “olfactory fatigue” (temporary loss of the ability to smell a particular odor). Inhalation of SO<sub>2</sub>, even at low concentrations (<5 ppm), can cause respiratory tract irritation, especially in people with asthma and chronic obstructive pulmonary disease.
- C.1.4** If you smell sulfur gases in the cockpit, this may indicate volcanic activity that has not yet been detected or reported and/or your possible entry into an ash-bearing cloud. After determining there are no secondary indications that would result from and indicate an electrical fire, you should establish whether the sulfur odor is transient or not.
- C.1.5** You can best achieve this by donning your oxygen mask(s) and breathing 100 percent oxygen for the period of time that results in a complete change of air within the cockpit and also allows you to regain your sense of smell. After the appropriate time period, remove your oxygen mask(s) and determine if the odor is still present. If you confirm the continued presence of sulfur gas, you should inform the controlling ATS unit and dispatch center as soon as practicable to request information about any relevant volcanic activity and the whereabouts of possible volcanic clouds. You do not have the means to determine directly whether or not the cloud is hazardous; therefore, you should seek to exit the cloud.
- C.1.6** You might see other indications of volcanic ash such as fine dust in the aircraft, St. Elmo’s fire visible around your windshield, and/or a visible glow in the intake of your engines. Your airspeed indications may also become unreliable as the ash contaminates your pitot/static system. Chapter 7 of the [AIM](#) recommends, in the event of encountering an ash cloud, that pilots reverse course and reduce thrust (altitude permitting) to escape from the cloud, and to disengage autothrottles (as applicable), turn on continuous ignition, and turn on all bleed-powered systems so as to provide additional engine stall margin. In addition, the AIM discusses PIREPs related to volcanic ash activity and recommends you complete the Volcanic Activity Reporting (VAR) Form, found in appendix 2 of the AIM. You should avoid flying in the vicinity of known volcanic ash. Attempting to overfly an ash plume is also potentially perilous, as an emergency descent could place the aircraft into the plume.

## **C.2 Space Weather.**

- C.2.1** The effects of space weather on aviation have generated an increasing amount of interest in recent years. Space weather most commonly impacts radio communications between



your aircraft and ground stations. Space weather may also impact navigation signals from space-based and ground-based transmitters as well as onboard avionics components. Exposure to increased radiation levels during solar events has not been a noticeable issue, but it is a factor that you can plan for in order to protect your frequently flying crewmembers and passengers.

- C.2.2** The magnetic field around the Earth converges at the North and South Poles, allowing charged particles to access lower levels of the Earth’s atmosphere. These lower levels are the same levels used to fly international flights around the world. The aviation community has shown increasing interest in this phenomenon at the poles as the expansion of polar routes has seen more and more flights susceptible to space weather.
- C.2.3** The solar cycle is an approximately 11-year period that is characterized by solar activity that departs from the sun and has impacts on whatever celestial bodies are in the path of this space weather. The three effects of this weather are known as radio blackouts, geomagnetic storms, and solar radiation storms. These storms can have varying degrees of short- and long-term impact on ground-based navigation signals, aircraft and aircrew in flight, space-based transmitters, spacecraft, and space crew. The Space Weather Prediction Center (SWPC) tracks these storms and issues space weather watches, warnings, and alerts to inform the public of potential impacts.

**Figure C-2. Example of a National Oceanic and Atmospheric Administration Scales Activity Report**

<b>NOAA Scales Activity</b>		
NOAA Scale	Range 1 (minor) to 5 (extreme)	Current
<b>Geomagnetic Storms*</b>	<b>Past 24 hours</b> <b>G1</b>	<b>none</b>
<b>Solar Radiation Storms</b>	<b>S3</b>	<b>S3</b>
<b>Radio Blackouts</b>	<b>R2</b>	<b>none</b>

- C.2.4** Space weather alerts can be subscribed to through the SWPC Product Subscription Service and the following link: <https://www.swpc.noaa.gov/forecasts>.
- C.2.5** **Space Weather Advisory Information.** Amendment 78 to ICAO Annex 3 (November 2018) introduced a requirement to issue space weather advisory information when necessitated by space weather events. The space weather advisory message is similar in structure to advisory messages for tropical cyclones and volcanic ash clouds issued by the tropical cyclone advisory centers and VAACs concerned.
- C.2.6** Space Weather Advisory Centers issue space weather advisory information when there are impacts to HF communications, communications via satellite, GNSS-based navigation and surveillance systems, or when heightened radiation occurs.

**C.2.7** The advisory message informs the user of:

- The type of impact;
- The expected onset, or that the event is already in progress;
- The duration of the event;
- A generalized description of the spatial extent affected for the next 24 hours; and
- A description of the severity of the impact in moderate (MOD) or severe (SEV) categories.

**C.2.8** ICAO Annex 3, Meteorological Service for International Air Navigation, and ICAO Doc [10100](#), Manual on Space Weather Information in Support of International Air Navigation, published in 2019, are additional references.

## APPENDIX D. SAMPLE OCEANIC CHECKLIST

**D.1 Sample Abbreviated Oceanic Checklist.** This sample abbreviated checklist is provided for your reference. If you do not have an oceanic checklist, we encourage you to use this sample and tailor it to your specific needs and approvals. This checklist focuses on an orderly flow and ways to reduce oceanic errors. You should also review the expanded checklist at paragraph [D.2](#). An oceanic checklist should be published in your international operations manual and evaluated and kept up-to-date as part of your Safety Management System (SMS), as applicable. The International Civil Aviation Organization (ICAO) North Atlantic (NAT) oceanic checklists, which served as the foundation for our checklists, are available as a NAT OPS Bulletin, posted on the ICAO Europe/North Atlantic (EUR/NAT) region website, found at <https://www.icao.int/EURNAT/Pages/welcome.aspx>.

### **D.1.1 Flight Planning.**

1. Communications, navigation, and surveillance flight plan codes and planning documents.
2. Oceanic documents.
3. Plotting/orientation chart—plot route coast out to coast in.
4. Equal Time Points (ETP)—plot.
5. Track message (current copy available for all crossings).
6. Note nearest tracks on plotting/orientation chart.
7. Weather analysis—note en route wind, temperature, and turbulence forecasts as well as ETP airport weather.
8. Review suitable navigational aids (NAVAID) for accuracy check prior to coast out.

### **D.1.2 Preflight.**

1. Master clock for all estimated times of arrival (ETA)/actual times of arrival (ATA).
2. Maintenance log—check for any communications, navigation, and surveillance or Reduced Vertical Separation Minimum (RVSM) issues.
3. RVSM.
4. Altimeter checks (tolerance).
5. Wind shear or turbulence forecast.
6. Flight plan (check routing, fuel load, times, groundspeeds).
7. Dual long-range navigation system (LRNS) for oceanic and remote continental airspace operations.

8. Voice long-range communication system (LRCS) check (as applicable):
  - a. High frequency (HF) radio check.
  - b. Satellite Voice (SATVOICE) operability check.
9. Confirm present position coordinates (best source).
10. Master Document symbols ( $\oplus$ ,  $\checkmark$ ,  $\backslash$ , X).
11. LRNS programming:
  - a. Check navigation database currency and software version.
  - b. Independently verify navigation system/flight management system (FMS) programming.
  - c. Check expanded coordinates of oceanic waypoints.
  - d. Check leg course and distance ( $\pm 2^\circ$  and  $\pm 2$  nautical miles (NM)).
  - e. Upload winds, if applicable.
12. Groundspeed check.

**D.1.3** Taxi and Prior to Takeoff.

1. Groundspeed check.
2. Present position check.

**D.1.4** Climb Out.

1. Transition altitude—set altimeters to 29.92 inches (1013.2 hectopascals (hPa)).
2. Calculate/Update ETAs on Master Document as duties permit.

**D.1.5** Prior to Oceanic Entry.

1. Navigation accuracy check—record results on Master Document.
2. Voice LRCS (HF selective calling system (SELCAL) or SATVOICE Callback) check with aeronautical radio station.
3. Confirm satellite communications (SATCOM) data link is operational, if equipped.
4. Log on to Controller-Pilot Data Link Communication (CPDLC) and Automatic Dependent Surveillance-Contract (ADS-C) 10 to 25 minutes prior, if equipped, unless otherwise specified in the relevant Aeronautical Information Publication (AIP).
5. Verify your Required Navigation Performance (RNP) value is set.
6. Obtain oceanic clearance from appropriate clearance delivery and verify/cross-check loading of route clearance into the navigation system.
  - a. Confirm assigned oceanic flight level (FL) and request climb or descent to be at your assigned FL prior to oceanic airspace boundary.
  - b. Confirm FL, Mach, and route for crossing.

- c. Advise air traffic control (ATC) when able higher.
7. Revised clearance—update navigation system, Master Document, and plotting/orientation chart.

**Note:** Check expanded coordinates, course, and distance for new route.

8. Check altimeters—record readings on Master Document.
9. Compass heading check (inertial navigation system (INS))—record.

#### **D.1.6** After Oceanic Entry.

1. Squawk 2000—30 minutes after entry, if applicable.
2. Maintain assigned Mach.
3. Maintain assigned FL.
4. Very high frequency (VHF) radios—set to air-to-air and guard frequency.
5. Strategic Lateral Offset Procedures (SLOP)—Depending on standard operating procedures (SOP), fly cleared route or up to 2 NM to the right of ATC-cleared track. Confirm procedures in the applicable AIP.
6. Altimeter checks—hourly.

#### **D.1.7** Approaching Waypoints.

1. Confirm coordinates of subsequent waypoints.

**Note:** Verify that the active navigation system waypoint, as well as the next and subsequent (“next plus 1”) waypoints, match your *currently effective route clearance*. Confirm that the expanded (i.e., full latitude and longitude) coordinates of the next and subsequent waypoints, as well as the course/heading and distance to the waypoints, agree with your *currently effective route clearance*.

2. Confirm lateral navigation (LNAV)/navigation (NAV) is engaged.

#### **D.1.8** Overhead Waypoints.

1. Confirm aircraft transitions to next waypoint.

**Note:** Check magnetic heading and distance against Master Document.

2. Confirm time to next waypoint.

**Note:** ETA changes in excess of 2 minutes (“3 minutes or more” in the NAT) require ATC notification.

3. Make position report.

**Note:** Record fuel remaining and current time on your Master Document.

**D.1.9** Ten Minutes after Waypoint Passage. Cross-check navigational performance and course compliance via one of the following methods:

1. Plotting method (see paragraph [D.2.9](#)).
2. Navigation display method (see paragraph [D.2.9](#)).
3. Alternative method accepted by the FAA (see paragraph [6.4.8](#)).

**D.1.10** Midway Between Waypoints.

1. Cross-check winds between Master Document, LRNS, and winds aloft charts.
2. Confirm time to next waypoint.

**D.1.11** Coast In.

1. Remove strategic lateral offset prior to oceanic exit point.
2. Confirm routing beyond oceanic airspace.
3. Compare LRNS to ground-based NAVAID.

**D.1.12** Descent. Transition level—set altimeters to local altimeter setting (QNH).

**D.1.13** Destination/Block-In.

1. Navigation accuracy check.
2. Altimetry system write-ups.
3. Data communications (CPDLC) problem reports.

**D.2** **Sample Expanded Oceanic Checklist.** This sample expanded checklist is provided for your reference. If you do not have an expanded oceanic checklist, we encourage you to use this sample and tailor it to your specific needs and approvals. This checklist focuses on an orderly flow and ways to reduce oceanic errors. An oceanic checklist should be published in your international operations manual, and evaluated and kept up-to-date as part of your SMS, as applicable.

**D.2.1** Flight Planning.

**D.2.1.1** **Communications, Navigation, and Surveillance Flight Plan Codes and Planning Documents.**

1. Review your ATC flight plan with emphasis on items 10A, 10B, and 18. Ensure that you properly filed the appropriate communications, navigation, and surveillance descriptors in items 10 and 18 of your flight plan.

2. You should review your maintenance log and the minimum equipment list (MEL) for system deferrals that may affect the communications, navigation, and surveillance capabilities of your aircraft. The “remarks and exceptions” column should provide the specific guidance for flight plan filing.
3. Your flight manual should include procedures to make flight plan amendments (or cancellations as appropriate) when your communications, navigation, and surveillance capabilities change phase prior to departure.

**Note:** Items 10 and 18 of the flight plan require more detail to indicate your communications, navigation, and surveillance capabilities and authorizations. See paragraph [6.2.2](#).

**D.2.1.2 Oceanic Documents.** Operators are encouraged to develop a flight planning checklist to ensure they have the necessary documents before departure. The checklist should include, as a minimum, the following:

1. Master Document.
2. [Notices to Air Missions \(NOTAM\)](#) for departure, destination, alternate(s); Extended Operations (ETOPS) alternates (as applicable); and oceanic flight information regions (FIR).
3. Weather for departure, destination, alternate airports along the route of flight, and ETOPS alternates (as applicable).
4. Track message(s).
5. Significant Weather (SIGWX) chart.
6. ETP(s), wind tables, or winds aloft charts for FLs or altitudes.
7. [Global Positioning System \(GPS\) NOTAMs](#) (as applicable).
8. Any applicable space weather watches, warnings, and alerts (see Appendix C, Unusual Weather Activity).
9. Volcanic ash information.
10. Pilot Weather Reports (PIREP).
11. Plotting/orientation charts.

**D.2.1.3 Plotting/Orientation Chart.**

**D.2.1.3.1** You should use an oceanic plotting/orientation chart of appropriate scale that depicts published oceanic tracks.

**D.2.1.3.2** ICAO groups that review oceanic errors have determined that the routine use of a chart is an excellent way to reduce lateral errors. A chart can also help in the event of partial or total navigation system failure.

- D.2.1.3.3** You should read from the plotting/orientation chart back to the Master Document when verifying data. Reading from the Master Document to the chart can introduce “expectation bias,” where errors are missed because we see what we expect to see.
- D.2.1.3.4** Plot your *currently effective route clearance* from coast out to coast in. Make sure you update this whenever your route clearance changes.
- D.2.1.3.5** Note nearest oceanic tracks on your chart.
- D.2.1.4 ETPs.**
- D.2.1.4.1** You should compute ETPs for contingencies such as medical divert, engine loss, or rapid depressurization. You should also consider a simultaneous engine loss and rapid depressurization.
- D.2.1.4.2** Verify that planned ETP airports are adequate during time of flight operations.
- D.2.1.4.3** You should annotate the ETPs and associated alternates on your plotting/orientation chart. When crossing ETPs, you should review with other crewmembers the appropriate diversion airport(s).
- D.2.1.4.4** Your pilot procedures should also include a manual method for re-computing ETPs either manually or through the use of an Electronic Flight Bag (EFB) application. You should not enter ETPs in the active route of the LRNS because additional waypoints, even if along the route, can produce nuisance out-of-conformance alerts in ATC’s monitoring systems. Confusion about these additional waypoints can also lead to deviations from the cleared route.

**Note:** ETPs may need to be recalculated when the cleared route changes, when there are significant changes in FLs, and/or when estimated time en route (ETE) to destination differs by more than 15 minutes from planned.

**D.2.1.5 Track Message.**

1. You must have a current track message even if you have filed for a “random route” (where at least part of the oceanic route is not on a published track) or if you filed above North Atlantic High Level Airspace (NAT HLA). Reviewing the date, effective time, and track message identifier ensures having a current track message on board. The track message identifier is linked to the Julian date.
2. You should also ensure that your flight planning and operational control process includes timely notification of crewmembers of any amendments to the daily track message.
3. When flying a random route, plotting adjacent tracks and/or crossing tracks can help your situational awareness in case you need to execute a



contingency procedure. Monitoring traffic on the Traffic Alert and Collision Avoidance System (TCAS) or Automatic Dependent Surveillance-Broadcast (ADS-B) In will further help your situational awareness, as the same random routes are sometimes heavily used.

- D.2.1.6 Weather Analysis.** You should note en route wind, temperature, and turbulence forecasts, as well as ETP airport weather, diversion/emergency airport weather, volcanic activity, magnetic storms, and solar flares affecting your route of flight.
- D.2.1.7 NAVAIDs.** Review suitable NAVAIDs for accuracy check prior to coast out.
  - D.2.1.7.1** You should determine in advance a primary and secondary ground-based NAVAID that you will use to verify the accuracy of your LRNS.
  - D.2.1.7.2** This planning may help you identify intended NAVAIDs that are limited or NOTAM'd unusable and will help you when you depart airports close to oceanic airspace.
  - D.2.1.7.3** A latitude/longitude radar fix from ATC also meets the requirements for an accuracy check.

## **D.2.2** Preflight.

- D.2.2.1 Master Clock.** You must have a designated master clock on board synchronized to Coordinated Universal Time (UTC) (generally via GPS). You must use this single time source, typically the FMS, for all ETAs and ATAs.
- D.2.2.2 Maintenance Log.** Pay particular attention to any write-ups that affect communications, navigation, surveillance equipment, or RVSM requirements.
- D.2.2.3 RVSM.**
  - D.2.2.3.1** Required equipment to operate in RVSM airspace includes two primary independent altimetry sources, one altitude alert system, and one automatic altitude control system.
  - D.2.2.3.2** In most cases, you are also required to have a functioning transponder that can be linked to the primary altimetry source.
  - D.2.2.3.3** You should note any maintenance issues that could affect accurate altimetry.
- D.2.2.4 Altimeter Checks.**
  - D.2.2.4.1** Before taxi, you should set your altimeters to the airport QNH. Both primary altimeters must read within  $\pm 75$  feet of a known elevation (e.g., field elevation).

**D.2.2.4.2** The two primary altimeters must also agree with each other within the limits noted in the aircraft operating manual.

**D.2.2.5 Wind Shear or Turbulence Forecast.**

**D.2.2.5.1** You should review the operational flight plan (OFP) to determine where along the route wind shear and/or turbulence are forecasted.

**D.2.2.5.2** Forecast severe turbulence could lead ATC to stop using certain FLs.

**D.2.2.5.3** Forecast severe turbulence may be incompatible with flight manual or operator limitations.

**D.2.2.6 Flight Plan.**

1. Ensure the flight plan designated as the Master Document includes the date, type aircraft, fuel load, and performance requirements.
2. Cross-check the routing and forecast groundspeeds.
3. Ensure the Master Document and filed flight plan show the same routing.
4. Check the en route time on the Master Document against the distance to your destination to ensure it is based on a reasonable groundspeed.
5. Compare the en route time against the total distance to ensure you have planned a reasonable fuel load.

**D.2.2.7 LRNS.**

1. You are typically required to have two independent operational LRNSs for oceanic and remote continental airspace operations. Operations Specification (OpSpec)/Management Specification (MSpec)/Letter of Authorization (LOA) B054/MB054, Oceanic and Remote Airspace Navigation Using a Single Long-Range Navigation System, identifies the oceanic and remote continental areas authorized for operations with a single LRNS.
2. A single FMS receiving inputs from two navigation sensors does not qualify as two LRNSs.

**D.2.2.8 HF Check.**

1. You should conduct an HF check on the primary and secondary HF radios (if equipped with two).
2. If possible, you should accomplish the HF checks on the ground or before entering oceanic airspace.

**D.2.2.9 SATVOICE Check.** You should perform the appropriate functional check if you intend to use SATVOICE on your flight.

**D.2.2.10 Confirm Present Position Coordinates.**

1. Both pilots should independently verify the present position coordinates using either published ramp coordinates or by determining your position from the airfield diagram.
2. You should not rely on the present position resident in your FMS from the previous flight.

**D.2.2.11 Master Document Annotations.** You should use consistent annotations on your Master Document. See paragraph [6.4.4.2](#) for samples of this suggested annotation scheme.

1. A circle next to the waypoint designator indicates both pilots verified the coordinates, courses, and distances. This would normally be done during initial navigation system loading.
2. A backslash (“\”) over the circle denotes confirming a subsequent waypoint’s coordinates and the track and distance to it. This would normally be done approaching the active waypoint.
3. A forward slash (“/”) over the previously annotated backslash creates an “X.” This indicates waypoint passage.

**D.2.2.12 LRNS Programming.****D.2.2.12.1** Check navigation database currency and software version.

1. You should not fly with an expired database.
2. You should also confirm the software version of the database, to ensure the correct version is loaded.

**D.2.2.12.2** Independently verify navigation system programming.

1. Two pilots should independently coordinate the loading and verification of flight plan entries.
2. Prior to loading the route, carefully cross-check the waypoint routing on your Master Document against your filed flight to verify they are consistent.
3. One pilot should load the route with all waypoints using the Master Document. That same pilot should verify the route has been loaded correctly. Use a means independent of the data you loaded, such as checking the course/distance between waypoints against the Master Document.
4. A second pilot should independently check the entries by recalling and confirming the waypoint data against source information. This cross-check should include comparing the waypoints loaded in the navigation system

against both your filed flight plan and the Master Document. Cross-checking course and distance against the Master Document will further confirm the waypoints were loaded correctly.

5. The pilot accomplishing the cross-check should read from the navigation system screen back to the Master Document when verifying data.

**Note:** Reading from the Master Document to the FMS can introduce “expectation bias” where errors are missed because we see what we expect to see.

#### **D.2.2.12.3** Check waypoint expanded coordinates (degrees and minutes).

1. Most navigation systems allow entering abbreviated oceanic coordinates. There have been cases when there was an error in the minutes, but crews only checked the 7-character display label, or the 5 alphanumeric-character waypoint name, neither of which displays minutes.
2. If you only verify the abbreviated coordinates, this could lead to a lateral error. You should check the expanded (i.e., degrees and minutes) coordinates of all oceanic waypoints.

#### **D.2.2.12.4** Check course and distance.

1. To minimize oceanic errors, you should check magnetic course and distance between waypoints from oceanic entry to oceanic exit. You should establish a tolerance such as  $\pm 2^\circ$  and  $\pm 2$  NM.
2. The course and distance checks comparing the Master Document against the LRNS can help detect errors that you may not have noticed by simply checking coordinates.
3. A discrepancy of more than  $2^\circ$  between the course in the Master Document and that in the LRNS may be due to the Master Document listing the mid-leg course, instead of the *initial* course. You should recheck and verify any difference outside the  $\pm 2^\circ$  or  $\pm 2$  NM tolerance.

**Note 1:** Flight plan vendors typically allow an operator to list initial, mid-leg, and/or end-point magnetic course in the Master Document. An LRNS normally displays the present position magnetic course. Both the Master Document and the LRNS use great circle routing between points. However, unless you are flying along a line of longitude or along the equator, your LRNS true course will gradually increase or decrease as you progress along the great circle course. On a typical oceanic leg (traversing  $10^\circ$  of longitude), the true course changes as much as  $8^\circ$  between the initial and end-points.

**Note 2:** Small discrepancies between the course in the LRNS and in the Master Document can in some cases also be attributed to differences in magnetic variation.

4. You should also refer to a master source such as an en route chart to confirm the accuracy of coordinates at the oceanic boundaries.
5. Confirm the total distance computed by the LRNS is consistent with your Master Document.
6. If your navigation system waypoint sequencing is limited, number the Master Document waypoints. Use the same numbering sequence for all navigation systems in use.

**D.2.2.12.5** Upload winds. Some LRNS units allow the crew to upload projected winds. This procedure allows more accurate reporting of ETA.

**D.2.2.13 Groundspeed Check.** You should note the groundspeed before taxiing the aircraft. You should expect the groundspeed to read zero knots.

**Note:** This procedure is a good practice to detect an error that may be developing in the LRNS.

### **D.2.3** Taxi and Prior to Takeoff.

**D.2.3.1 Groundspeed Check.** During taxi, pilots should again check the groundspeed to see if it is reasonable.

**D.2.3.2 Present Position Check.** You should also conduct a present position check after leaving the gate.

1. Check for a gross difference between this present position and your gate coordinates.
2. This check may alert you to a possible error in the LRNS database that you can investigate/correct prior to takeoff.

### **D.2.4** Climbout.

#### **D.2.4.1 Transition Altitude.**

1. You should brief the transition altitude published on the departure or approach charts, or provided via Automatic Terminal Information Service (ATIS).
2. After climbing through the transition altitude, you should reset the altimeters to 29.92 inches or 1013.2 hPa.

**D.2.4.2 Calculate/Update ETAs on Master Document.** If the departure airport is near the oceanic entry point, you should calculate/update your ETAs from departure to destination, time and duties permitting, during climb out, or otherwise prior to oceanic entry, by adding the ETEs to the most recent actual time of arrival (ATA). You should note these updated ETAs on the Master Document.

**Note:** This is an excellent cross-check of ETAs computed by your LRNS.

## **D.2.5** Prior to Oceanic Entry.

### **D.2.5.1** **Navigation Accuracy Check.**

**D.2.5.1.1** Before oceanic entry, you should check the accuracy of your LRNS against a suitable ground-based NAVAID, as applicable. A latitude/longitude radar fix from ATC can also support a navigation accuracy check in lieu of a NAVAID.

**D.2.5.1.2** You should record the results of the accuracy check on the Master Document, with the time and position.

1. A large discrepancy between the ground-based NAVAID, or ATC radar fix, and your LRNS should cause you to consider whether your navigation system will navigate within the degree of accuracy you indicated in your flight plan (e.g., RNP 4 or 10), or that is otherwise expected by ATC. If you have any doubts about your navigation accuracy, it is better to notify ATC early, so the controller can adjust separation accordingly.

**Note:** Crews should not attempt to correct an error by performing an air alignment or by manually updating the position of the LRNS, because this has often resulted in worsening the problem.

2. You should establish a navigation accuracy check tolerance based on your type of LRNS. In any case, follow flight manual procedures. As applicable, rank each navigation system by accuracy.
3. Record aircraft compass/inertial/radio magnetic indicator (RMI) headings and note differences and deviations. A compass deviation check is particularly important if your aircraft is not equipped with an FMS.

**D.2.5.1.3** Select the most accurate navigation system for coupling to the autopilot.

### **D.2.5.2** **HF Checks.**

1. If you were unable to accomplish the HF checks on the ground, you should accomplish these checks before oceanic entry.
2. Accomplish a SELCAL check prior to oceanic and remote continental airspace entry and then again at each control area (CTA) boundary. Check your SELCAL even when your CPDLC is working normally.

### **D.2.5.3** **SATVOICE Callback Check.**

1. When using SATVOICE to communicate with ATC via New York Radio or San Francisco Radio, the FAA requires a SATVOICE Callback Check.

2. Contact the appropriate aeronautical radio station and request a SATVOICE Callback Check, indicating which satellite provider you are using if you filed both Inmarsat and Iridium (codes M1 and M3). See sample transcript in paragraph [4.3.3.2](#).

**D.2.5.4 SATCOM Data Link Check.** If you plan on using SATCOM data link, you should check that your SATCOM data link is operational before oceanic entry.

**D.2.5.5 Log on to CPDLC and/or ADS-C.** If you are approved to use CPDLC and/or ADS-C, you should log on to the appropriate data authority 10 to 25 minutes prior to the boundary, unless otherwise specified in the relevant AIP.

**D.2.5.6 Verify Your RNP Value.** Verify that the RNP value set in your flight management computer (FMC) is no higher than that required for the route of flight and reflects the RNP capability you indicated in your flight plan. For example, if you filed indicating RNP 4 capability, you should set an RNP value of 4.0 even though the route may only require RNP 10.

**D.2.5.7 Obtain Oceanic Clearance.**

1. At least two pilots should be involved in the clearance receipt and read-back process, one actively and one monitoring. When obtaining the clearance via radio, we recommend both pilots wear headsets because they typically have better acoustic quality than loudspeakers.

**Note:** Consult the AIP for the oceanic FIR you are transiting to determine how and when to obtain your oceanic clearance. Timing differs depending on whether you receive your clearance via voice or data link.

2. You should include your requested FL, as well as the maximum FL you are able to accept, in your initial clearance request.
3. Both pilots should independently copy the clearance. Each pilot then cross-checks the routing, FL, and Mach number assigned for the crossing. If there are any differences, contact the Air Traffic Service (ATS) provider for clarification.
4. Read all waypoint coordinates back to the ATS provider in detail. Ensure the ATS provider acknowledges your correct read back. Always cross-check each detail of the clearance with your Master Document.
5. Pilots should ensure the aircraft enters oceanic airspace at the altitude assigned in the oceanic clearance (this may be different than the domestic cleared FL). Request climb or descent, as required, in order to be at your cleared oceanic FL prior to entering oceanic airspace.
6. Verify/cross-check the route clearance is properly programmed into LRNS.

**D.2.5.8 Revised Clearance.** (See also paragraph [6.4.1.7.](#))

1. The number one scenario that leads to a pilot deviation from the assigned routing is when the ATC clearance is different from the oceanic route requested with the filed flight plan.
2. When issuing revised clearances, ATC often, but not always, notes that “route (/altitude) has been changed.” You should be particularly cautious when receiving such a revised clearance.
3. Both pilots should separately copy and confirm the new routing, comparing with each other and confirming any inconsistencies with the ATS provider.
4. One pilot reprograms (and executes) your navigation system and updates the Master Document and plotting/orientation chart, crossing out the old waypoints and plotted route and replacing them with the updated information.
5. A second pilot cross-checks the revised clearance with the reprogrammed route in the navigation system (checking the expanded coordinates: degrees and minutes), the updated Master Document, and the updated chart.
6. You should check the expanded coordinates, magnetic course, and distance between the new waypoints as noted in paragraph [D.2.2.12](#) above. Unless you receive a new Master Document from your dispatcher, you should update the Master Document with the new courses and distances. Some operators use commercially available tables specifically made for this purpose, or use an onboard flight planning system (e.g., an application in an EFB) to independently calculate course and distance, for comparison against the navigation system.
7. Thoroughly brief relief pilots on the new clearance prior to them assuming cockpit duties. We highly recommend the relief pilots also independently cross-check the *currently effective route clearance* against the navigation system, Master Document, and chart.

**D.2.5.9 Altimeter Checks.**

1. Prior to oceanic entry, you must check the two primary altimeters are reading within 200 feet of each other (or lesser value if specified in your flight manual). Conduct this check while at level flight.
2. You should also note the stand-by altimeter reading.
3. Record the altimeter readings and time on the Master Document.

**Note:** Cross-checking altimeters and airspeed indicators can reveal pitot-static discrepancies and is especially advisable in areas of known or forecast icing.



**D.2.5.10 Compass Heading Check (INS).**

1. If inertial systems are your only means of long-range navigation (LRN), we recommend you conduct a compass heading check and record the results.
2. If a problem develops over water, this check can also aid you in determining the most accurate compass.

**D.2.6 After Oceanic Entry.****D.2.6.1 Squawk 2000.**

1. Thirty minutes after oceanic entry, you should change your squawk to 2000, if applicable.
2. There may be regional differences in transponder requirements. For example, aircraft transiting through in the New York West oceanic control area (OCA) or the Reykjavik OCA are expected to maintain the last assigned squawk.

**D.2.6.2 Maintain Assigned Mach.** Some oceanic clearances include a specific Mach. In such cases, ATC expects you to maintain the exact Mach assigned (i.e., there is not an implied speed range you can fly).

1. Longitudinal separation standards applied by ATC frequently require crews to maintain the assigned Mach until otherwise advised. Economy (ECON) or Long Range Cruise (LRC) modes of the FMS may cause the aircraft to deviate from the assigned Mach.
2. Controllers will assign a true Mach. In most cases, the true Mach is the indicated Mach. Some aircraft may require a correction factor.

**D.2.6.3 Maintain Assigned FL.** You must report to ATC when departing your current FL.<sup>24</sup>**D.2.6.4 VHF Radios.** After going beyond the range of the assigned VHF frequency, you should set your radios to air-to-air (123.45) and guard frequency (121.5).**D.2.6.5 SLOP.** Your SOPs should include SLOP for all oceanic crossings. NOTAMs, State AIPs, and other flight planning guidance will indicate where exceptions apply and where procedures differ.

1. Executing SLOP reduces the risk associated with two aircraft using their highly accurate navigation systems to navigate head-on between the same two points, where one of those aircraft is at the wrong altitude.

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<sup>24</sup> Regulatory references are § [91.183](#) and ICAO Annex [2](#), paragraph 3.6.3. U.S. [AIM](#), paragraph 5-3-2, describes when ATC specifies these reports.

2. Executing SLOP also helps aircraft avoid wake turbulence. Depending upon winds aloft, coordination between aircraft may be necessary.
3. This procedure, which distributes traffic between the route centerline and up to 2 NM right of centerline, greatly reduces collision risk by the nature of its randomness.
  - a. Operators that have an automatic offset capability should fly up to 2 NM right of the centerline.
  - b. Aircraft that do not have an automatic offset capability (that can be programmed in the navigation system) should fly the centerline only.

**D.2.6.6 Hourly Altimeter Checks.** The two primary altimeters should continue to read within 200 feet of each other (or lesser value if specified in your flight manual).

**Note:** We recommend that you record these hourly checks on the Master Document with the readings and times. This information can help you determine the most accurate altimeter if you develop an altimetry problem. Some operators incorporate these altimeter checks into their “overhead waypoint” checks.

**D.2.6.7 Routine Monitoring.**

1. Specify which FMS pages, or other displays of navigation information, that individual flightcrew members are charged with monitoring (e.g., a cross-track error or time/distance).
2. You should use the non-steering navigation system to display cross-track error and track angle error, if available.
3. If your navigation system provides a predicted ETA capability, you should take full advantage of that function in order to track the accuracy of ETAs and provide reminders for performing the “approaching waypoint” and “10 minutes following waypoint passage” cross-checking procedures.

**D.2.7 Approaching Waypoints.** Confirm coordinates of subsequent waypoints.

**D.2.7.1** Within a few minutes prior to crossing an oceanic waypoint, you should confirm the expanded coordinates of the next and subsequent (“next + 1”) oceanic waypoints.

**D.2.7.2** You should accomplish this check by comparing the coordinates in your navigation system against your Master Document (as updated based on your *currently effective route clearance*), as well as verifying that the course/heading and distance in the navigation system matches your Master Document. Draw a diagonal through the circle next to the waypoint on your Master Document.

**D.2.7.3** Confirm your autopilot steering is appropriately engaged (LNAV/NAV).

**D.2.8** Overhead Waypoints.

**D.2.8.1** Confirm aircraft transitions to the next waypoint.

1. When overhead an oceanic waypoint, you should ensure that your aircraft properly transitions to the next leg.
2. You can confirm this by noting the magnetic heading and distance to the next waypoint as compared against the Master Document (as updated based on your *currently effective route clearance*).

**D.2.8.2** Position report:

1. Use the standard format for voice position reports to ATC.
2. You should also note and record your fuel status on the Master Document at each oceanic waypoint.

**Note:** This is especially important if the cleared route and FL differ significantly from the filed flight plan.

**D.2.9** Ten Minutes After Waypoint Passage. Cross-check navigational performance and course compliance by one of the following methods:

**D.2.9.1** The “plotting” method is appropriate for all aircraft navigation configurations.

1. Verify your plotting/orientation chart reflects the *currently effective route clearance*.
2. Plot your present latitude/longitude and record the time on your chart.
3. You should plot your position using coordinates from the nonsteering LRNS.
4. Investigate/take corrective action if your plotted position does not agree with your currently effective route clearance.
5. Using the steering LRNS, verify the next waypoint is consistent with the currently effective route clearance.
6. Verify your autopilot steering mode is in LNAV/NAV or other appropriate mode to ensure steering to the next intended waypoint.

**D.2.9.2** The “navigation display” method is appropriate for and available for use in aircraft equipped with an operable FMS.

1. Confirm the aircraft symbol is on the programmed route on the navigation display (at smallest scale).

2. Check system-generated cross-track deviation or similar indication of any deviation from the programmed route of flight.
3. Using the steering LRNS verify the “TO” waypoint is consistent with your currently effective route clearance.
4. Investigate/take correction action to address any anomalies or unexpected deviations.
5. Verify your autopilot steering mode is LNAV/NAV or other appropriate mode to ensure steering to the next intended waypoint.

**D.2.9.3** You may use an alternate method with FAA acceptance.

**D.2.10** Midway Between Waypoints.

**D.2.10.1** **Cross-Check Winds.**

1. We recommend you cross-check the winds midway between oceanic waypoints by comparing the Master Document, LRNS, and winds aloft chart.
2. This cross-check will also assist with situational awareness and in the event your navigation capability is degraded to the point where you need to dead reckon (DR).

**D.2.10.2** **Confirm ETA.** We recommend you confirm your ETA to the next waypoint.

**Note:** Promptly advise ATC if your ETA has changed greater than 2 minutes (“3 minutes or more” in the NAT) (for aircraft providing automatic position reporting via an ADS-C logon, pilots should discontinue voice position reports).

**D.2.11** Coast In.

**D.2.11.1** Remove strategic lateral offset. You must remove the strategic lateral offset prior to exiting oceanic airspace at coast in. We recommend you include this as a checklist item.

**D.2.11.2** Confirm routing beyond oceanic airspace. Before entering the domestic route structure, confirm your routing and speed assignment.

**Note:** Crews experiencing loss of communication leaving oceanic airspace should follow guidance published in the applicable State AIP.

**D.2.11.3** Compare LRNS to ground-based NAVAID (as applicable depending on your equipage).

1. When departing oceanic airspace and acquiring ground-based NAVAIDs, you should note the accuracy of your LRNS compared to the position information provided by those NAVAIDs.
2. You should note discrepancies in your maintenance log.

**D.2.12** Descent.

**D.2.12.1 Transition Level.** During the approach briefing, you should note the transition level on the approach plate or verify with ATC. Reset your altimeters to QNH (or QFE, if used) when descending through the transition level. You should confirm whether the altimeter setting is based on inches of mercury, hectopascal (hPa), or (less common) millimeters (mm) of mercury.

**D.2.13** Destination/Block-In.

**D.2.13.1 Navigation Accuracy Check.** When arriving at your destination gate, you should note any drift or circular error in your LRNS.

1. A GPS primary means system normally should not exceed 0.27 NM for the flight.
2. Some inertial systems may drift as much as 2 NM per hour.

**Note:** If tolerances are exceeded, make an appropriate entry in the maintenance log.

**D.2.14** Altimetry System Write-Ups. Record any problems in the altimetry system, altitude alert, or altitude hold in the maintenance log.

**Note:** ATS authorities closely monitor RVSM airspace for any large height deviations (LHD). If your aircraft no longer meets RVSM standards, you must not flight plan into RVSM airspace.

**D.2.15** CPDLC Write-Ups. As applicable, note problems with the data communication system, providing sufficient detail so a problem report can be submitted to the data link monitoring agency, if warranted. FMS and SATCOM logs are helpful in investigating anomalies, and sometimes are available only for the most recent activity.

## APPENDIX E. IATA IN-FLIGHT BROADCAST PROCEDURE

- E.1 Introduction.** The International Air Transport Association (IATA) developed the following procedures to promote flight safety over portions of the African continent and some adjacent waters. IATA last updated the procedures in 2019. You should check the [IATA website](#) for any further updates prior to flight in the affected airspace.
- E.2 Background.** In many flight information regions (FIR) in the African-Indian Ocean Region (AFI), both fixed and mobile aviation communication systems have either not been implemented or operate well below the required reliability. This has an impact on the proper provision of Air Traffic Services (ATS), especially with regard to flight information services (FIS). Consequently, an AFI Regional Technical Conference has determined that the IATA In-Flight Broadcast Procedure (IFBP) should be used within AFI designated FIRs as an interim measure, until such time as communications facilities affecting the FIRs in question have been improved.
- E.3 Designated Frequency in AFI.** In the AFI region, the designated frequency for the IFBP is 126.9 MHz.
- E.4 Area of Application.** It is recommended that the IFBP be applied in the following FIRs and airspaces:

Asmara	<i>Lusaka</i>
Brazzaville*	Mogadishu
Kano	Niamey*
Khartoum	N'Djamena*
Kinshasa	Tripoli**
Luanda	Dakar

\* Brazzaville, Niamey, and N'Djamena FIRs provide CPDLC service; however these FIRs are maintained in the IFBP area of applicability to accommodate users' requirement for linear boundaries to the extent feasible.

\*\* Tripoli FIR mandated IFBP within their entire FIR, hence their IFBP region extended from north of latitude 30° N to cover the entire Tripoli FIR.

**Figure E-1. Map of IFBP Area of Applicability****E.5 Listening Watch.**

**E.5.1** A listening watch should be maintained on the designated frequency (126.9 MHz) 10 minutes before entering the designated airspace until leaving this airspace.

**E.5.2** For an aircraft taking off from an aerodrome located within the lateral limits of the designated airspace, listening watch should start as soon as appropriate and be maintained until leaving the airspace.

**E.6 Broadcast Intervals.**

**E.6.1** A broadcast should be clearly pronounced in English:

- Ten minutes before entering a FIR within an IFBP region;
- Upon entering a FIR within the IFBP region;
- As soon as practicable when departing from an aerodrome located within the IFBP region;
- Ten 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).

**E.7 Broadcast Procedure.**

A broadcast message should be structured as follows:

“ALL STATIONS”

“THIS IS ABC123 [flight number] in the XXX [FIR name] FIR”

Position <i>AAAAA</i> ( <i>current position</i> )	at ... : ... UTC	FL ... ( <i>Altitude maintaining</i> )
“ <i>DIRECTION</i> Bound” ( <i>direction</i> )	on <i>XX987</i> ( <i>airway</i> )	
Estimating <i>BBBBB</i> ( <i>next position; waypoint or crossing airway if no waypoint</i> )	at ... : ... UTC	
<i>CCCCC</i> NEXT ( <i>subsequent position; way point or crossing airway if no waypoint</i> )		

**E.8 Additional Operating Procedures.**

**E.8.1 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 which would improve the visual detection of the aircraft should be displayed while changing levels.

**E.8.2 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 their aircraft, and this cannot be achieved in accordance with the right-of-way provisions of ICAO Annex [2](#), they should:



- Unless an alternative maneuver appears more appropriate, climb or descend 500 ft.
- Display all available aircraft lighting which would improve the visual detection of the aircraft.
- As soon as possible, reply to the broadcast advising action being taken, and specify altitude maintaining.
- Notify the action taken on the appropriate ATS frequency.
- As soon as your situation has been rectified, resume allocated FL, notifying the action on the appropriate ATS frequency.

**E.8.3** 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.

**E.8.4** Operation of Transponders. Pilots shall ensure that transponder procedures as contained in ICAO Doc [8168](#), Procedures for Air Navigation Services—Aircraft Operations, are complied with and, in the absence of other directions from ATC, operate the transponder on Mode A and C code 2000.

**E.8.5** Use of TCAS. In accordance with ICAO Doc [7030](#), Regional Supplementary Procedures, Airborne Collision Avoidance System (ACAS) II shall be carried and operated in the AFI region by all civil fixed-wing turbine-engine aircraft having a maximum takeoff mass exceeding 5,700 kg or maximum approved passenger seating configuration of more than 19. IATA therefore promotes the use of a working TCAS for aircraft when operating within the AFI region; and pilots shall select traffic advisory/Resolution Advisory (RA) mode at maximum range.

**E.8.6** Use of Strategic Lateral Offset Procedures (SLOP). Use of SLOP is promoted in the AFI region.

## **E.9 Enforcement.**

**E.9.1** All airlines operating in the AFI region are requested to:

- Ensure that their air crews are fully briefed on the procedure and area of application described.
- Ensure that charts and flight documentation are fully amended to reflect the procedures.

**E.9.2** Any operator reported to IATA as not applying the procedure shall be contacted immediately, informed of the procedure, and requested to apply it.

**E.9.3** 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 adopting the IFBP.

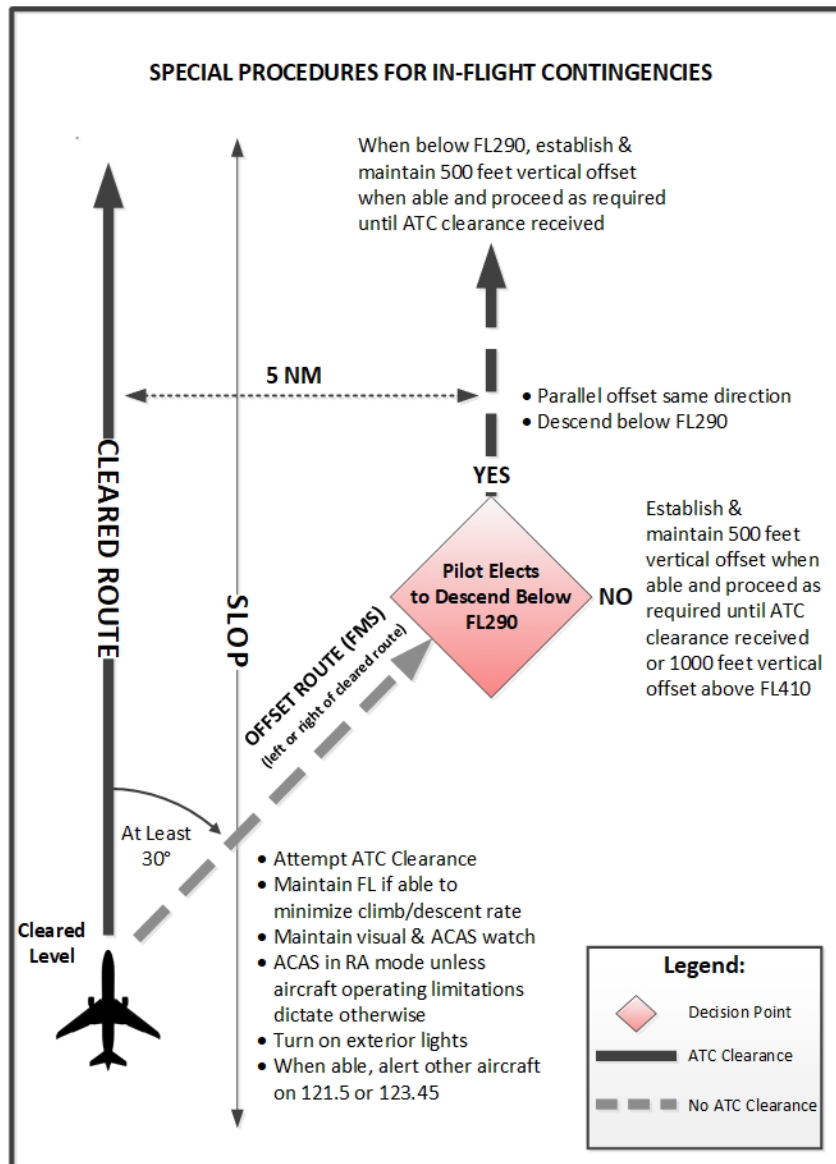
**E.10 Review.** The procedure and its area of applicability are reviewed by the IATA AFI Regional Coordination Group (RCG) from time to time and the FIRs in which the procedure is to be applied may be included or excluded as necessary.

**APPENDIX F. SPECIAL PROCEDURES FOR IN-FLIGHT CONTINGENCIES IN OCEANIC AIRSPACE**

**Note 1:** The source document for these procedures is ICAO Doc [4444](#), Procedures for Air Navigation Services—Air Traffic Management. The U.S. Aeronautical Information Publication (AIP) publishes these procedures as well. There are slight format or wording differences, but the procedures are identical in substance.

**Note 2:** The FAA recommends that operators carry a quick reference card containing the applicable contingency procedures. Figure F-1, Special Procedures for In-Flight Contingencies in Oceanic Airspace (Non-Weather) provides a useful graphic and can be used for this purpose.

**Figure F-1. Special Procedures for In-Flight Contingencies in Oceanic Airspace (Non-Weather)**



**F.1 Introduction.** Although all possible contingencies cannot be covered, these procedures provide for the 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.
- 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.

**F.1.1** The procedures are applicable primarily when descent and/or turn back or diversion is required. The pilot shall take action as necessary to ensure the safety of the aircraft, and the pilot's judgment shall determine the sequence of actions to be taken, having regard to the prevailing circumstances. Air traffic control (ATC) shall render all possible assistance.

**F.1.2** While the procedures described here are applicable in "high seas" (international) oceanic areas, pilots operating in remote continental airspace may also at times need to deviate from an ATC clearance. In U.S. sovereign airspace, "captain's authority" is granted via 14 CFR part [91](#), § [91.123](#) to deviate in an emergency. ICAO Annex [2](#) generally forms the basis of flight rules in sovereign airspace throughout the world, and grants the same deviation authority in Paragraph 3.6.2, Adherence to Current Flight Plan. Given that in remote continental airspace, long-range communication systems (LRCS) are used, the oceanic contingency procedures described here may be useful in instances where relevant State Aeronautical Information Publication (AIP) procedures are not available. Oceanic contingency procedures help when a pilot urgently needs to deviate from an ATC clearance but is unable to coordinate the deviation quickly enough with ATC.

## **F.2 General Procedures (5 Nautical Miles (NM)).**

**Note:** On November 5, 2020, the International Civil Aviation Organization (ICAO) changed oceanic contingency procedures globally, to use 5 NM offsets for the general procedures, and an altitude deviation beginning at 5 NM for the weather contingency procedures.

**F.2.1** If an aircraft is unable to continue the flight in accordance with its ATC clearance, a revised clearance should be obtained, whenever possible, prior to initiating any action.

**F.2.2** If prior clearance cannot be obtained, the following contingency procedures should be employed until a revised clearance is received.

1. Leave the cleared route or track by initially turning at least 30 degrees to the right or to the left in order to intercept and maintain a parallel, same direction track or route offset of 9.3 km (5.0 NM). 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 FLs 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 an FL 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 the Airborne Collision Avoidance System (ACAS) (if equipped) leaving ACAS in Resolution Advisory (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 Secondary Surveillance Radar (SSR) transponder on at all times and, when able, squawk 7700, as appropriate.
  6. As soon as practicable, the pilot shall advise ATC of any deviation from assigned clearance.
  7. Use whatever means is appropriate (i.e., voice and/or Controller-Pilot Data Link Communications (CPDLC)) to communicate during a contingency or emergency.
  8. If voice communication is used, the radiotelephony distress signal (MAYDAY) or urgency signal (PAN PAN), preferably spoken three times, shall be used, as appropriate.
  9. 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.
  10. Additional guidance on emergency procedures for controllers and radio operators, and flightcrew, in data link operations can be found in ICAO Doc 10037, Global Operational Data Link (GOLD) Manual.
  11. Establish communications with and alert nearby aircraft by broadcasting, at suitable intervals on 121.5 megahertz (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 (ACID), the nature of the distress condition, intention of the person in command, position (including the Air Traffic Service (ATS) route designator or the track code, as appropriate) and flight level (FL).
  12. The controller should attempt to determine the nature of the emergency and ascertain any assistance that may be required. Subsequent ATC action with respect to that aircraft shall be based on the intentions of the pilot and overall traffic situation.

**F.2.3** Actions to Be Taken Once Offset From Track. The pilot's judgment of the situation and the need to ensure the safety of the aircraft will determine if the actions outlined in paragraph F.2.3.2, item 1 or 2, will be taken. Factors for the pilot to consider when diverting from the cleared route or track without an ATC clearance include, but are not limited to:

- Operation within a parallel track system;
- The potential for User Preferred Routes (UPR) parallel to the aircraft's track or route;
- The nature of the contingency (e.g., aircraft system malfunction); and
- Weather factors (e.g., convective weather at lower FLs).

**F.2.3.1** If possible, maintain the assigned FL 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.

**F.2.3.2** Once established on a parallel, same direction track or route offset by 9.3 km (5.0 NM), either:

1. Descend below FL 290, establish a 150 m (500 ft) vertical offset from those FLs 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 FL 290 is considered particularly applicable to operations where there is a predominant traffic flow (e.g., east–west) or parallel track system where the aircraft's diversion path will likely cross adjacent tracks or routes. A descent below FL 290 can decrease the likelihood of conflict with other aircraft, ACAS RA events, and delays in obtaining a revised ATC clearance.

2. Establish a 150 m (500 ft) vertical offset (or 300 m (1000 ft) vertical offset if above FL 410 from those FLs 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 procedure above is applied. In addition, with the 500 ft vertical offset applied, ACAS RAs may occur.

**F.3** **General Weather Deviation Procedures (5 NM).** The following procedures are intended for deviations around adverse meteorological conditions.

**Note:** On November 5, 2020, ICAO changed oceanic contingency procedures globally, to use 5 NM offsets for the general procedures, and an altitude deviation beginning at 5 NM for the weather contingency procedures.

**F.3.1** General.

**F.3.1.1** When weather deviation is required, the pilot should initiate communications with ATC via voice or CPDLC. A rapid response may be obtained by either:

1. Stating “WEATHER DEVIATION REQUIRED” to indicate that priority is desired on the frequency and for ATC response; or
2. Requesting a weather deviation using a CPDLC lateral downlink message.

**F.3.1.2** When necessary, the pilot should initiate the communications using the urgency call “PAN PAN” (preferably spoken three times) or by using a CPDLC urgency downlink message.

**F.3.1.3** 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.

**F.3.2** Actions to Be Taken When Controller–Pilot Communications Are Established.

**F.3.2.1** The pilot should notify ATC and request clearance to deviate from track or route, advising when possible, the extent of the deviation requested. The flightcrew will use whatever means is appropriate (i.e., CPDLC and/or voice) to communicate during a weather deviation.

**Note:** Pilots are advised to contact ATC as soon as possible with requests for clearance in order to provide time for the request to be assessed and acted upon.

**F.3.2.2** ATC should take one of the following actions:

1. When appropriate separation can be applied, issue clearance to deviate from track; or
2. If there is conflicting traffic and ATC is unable to establish appropriate separation, ATC should:
  - a. Advise the pilot of inability to issue clearance for the requested deviation;
  - b. Advise the pilot of conflicting traffic; and
  - c. Request the pilot’s intentions.

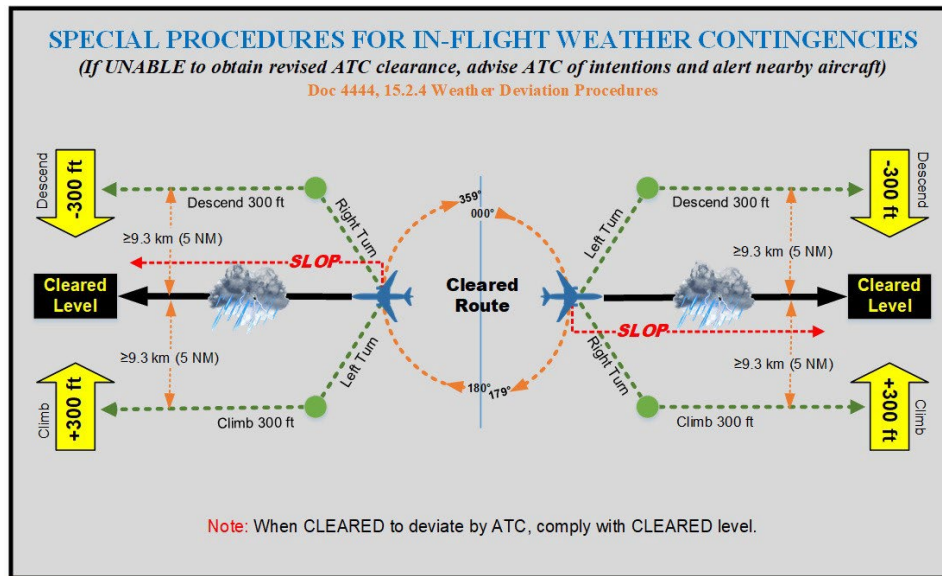
**F.3.2.3** The pilot should take one of the following actions:

1. Comply with the ATC clearance issued; or
2. Advise ATC of intentions and execute the procedures provided in paragraph [F.3.3](#) below.

### F.3.3 Actions to Be Taken if a Revised ATC Clearance Cannot Be Obtained.

**Note:** The provisions of this paragraph apply to situations where a pilot needs to exercise the authority of a pilot-in-command under the provisions of ICAO Annex 2, paragraph 2.3.1.

**Figure F-2. Special Procedures for In-Flight Weather Contingencies**



**F.3.3.1** If the aircraft is required to deviate from track or route to avoid adverse meteorological conditions, and prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time. Until an ATC clearance is received, the pilot shall take the following actions:

**Note:** Figure F-2 provides a general illustration of the weather deviation scenario. Table [F-1](#) shows the altitude offset portion of the procedures.

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: ACID, 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);
3. Watch for conflicting traffic both visually and by reference to ACAS (if equipped);
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 Table F-1, Altitude Offset When Denied Clearance to Deviate 9.3 km (5.0 NM) or More (5 NM Procedures);
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 Table F-1 before deviating beyond the cleared distance;
8. When returning to track or route, be at its assigned FL when the aircraft is within approximately 9.3 km (5.0 NM) of the centerline; and
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.

**Note:** If, as a result of actions taken under the provisions of paragraph [F.3.3.1](#), the pilot determines that there is another aircraft at or near the same FL with which a conflict may occur, then the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.

**Table F-1. Altitude Offset When Denied Clearance to Deviate 9.3 km (5.0 NM) or More (5 NM Procedures)**

Originally Cleared Track or Route Center Line	Deviations $\geq$ 9.3 km (5.0 NM)	Level Change
EAST (000°- 179° magnetic)	LEFT	DESCEND 90 m (300 ft)
	RIGHT	CLIMB 90 m (300 ft)
WEST (180°- 359° magnetic)	LEFT	CLIMB 90 m (300 ft)
	RIGHT	DESCEND 90 m (300 ft)

#### **F.4 Contingency Considerations for Unexpected Closure of an Oceanic ATC Facility.**

**F.4.1 Flights Within Any Oceanic Airspace.** Continue as last cleared and contact the next ATC unit as soon as possible with a position report. Flightcrews should use extreme caution and use all available means to detect any conflicting traffic.

**F.4.2** Flights Approaching Any Oceanic Airspace When the Contingency Is Activated.

**F.4.2.1 Not in Receipt of an Oceanic Clearance (Where Applicable).** Flights not in receipt of an oceanic clearance should land at an appropriate aerodrome or, if feasible, request clearance to avoid the affected oceanic control area (OCA).

**F.4.2.2 In Receipt of an Acknowledged Oceanic Clearance (Where Applicable).**

**F.4.2.2.1** Aircraft operating with a received and acknowledged oceanic clearance can, at the flightcrew's discretion, continue, 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.

**F.4.2.2.2** Flightcrews are requested to broadcast traffic information in the blind to other flights/stations on 121.5 MHz and on 123.45 MHz (or 126.9 MHz as appropriate in designated International Air Transport Association (IATA) broadcast areas), in order to exchange position information. A continuous air-ground voice communication watch, per ICAO Annex 2, paragraph 3.6.5, must be maintained.

**F.4.2.2.3** Operators and flightcrews should be advised that ATC may invoke the ICAO traffic information broadcast by aircraft (TIBA) procedure, with flightcrew member 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 a flightcrew member at the following times:

1. Ten minutes before entering the designated airspace or, for a flightcrew member taking off from an aerodrome located within the lateral limits of the designated airspace, as soon as appropriate after takeoff;
2. Ten minutes prior to crossing a reporting point;
3. Ten minutes prior to crossing or joining an ATS route;
4. At 20-minute intervals between distant reporting points;
5. Two to five minutes, where possible, before a change in FL;
6. At the time of a change in FL; and
7. At any other time considered necessary by flightcrew.

**F.4.3** Additional Considerations:

1. Flights involved in level change should complete the maneuver as soon as possible in accordance with the clearance.
2. Mandatory position reports should be accomplished via high frequency (HF) or Satellite Voice (SATVOICE) until directed by ATC.
3. Flights equipped with Future Air Navigation System 1/A (FANS 1/A) or equivalent should communicate using HF voice or SATVOICE while attempting to reestablish CPDLC connection in airspace where ATC services are suspended.
4. Flights may request their flight dispatch offices provide traffic information and/or forward position reports to the relevant OCA.

**F.4.4** Additional Recommendations. Consistent with AIP recommendations, should flightcrews encounter situations that are not covered by regulation, they are expected to exercise good judgment in whatever action they elect to take. Additionally, flightcrews should take the following actions:

1. Monitor for traffic visually and by using Traffic Alert and Collision Avoidance System (TCAS) or Automatic Dependent Surveillance-Broadcast (ADS-B) In.
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 data link.

**F.4.5** References:

- IATA's In-Flight Broadcast Procedures (IFBP) (see Appendix [E](#) of this AC).
- TIBA (refer to ICAO Annex [11](#), Attachment B).
- Two-way radio communications failure (refer to § [91.185](#) and [AIP](#), GEN 3.4, paragraphs 12 and 13).
- North Atlantic (NAT) communications failure (refer to AIP, ENR 7.8, paragraph 4 and ICAO NAT Doc [006](#), Air Traffic Management Operational Contingency Plan, North Atlantic Region).
- Pacific communications failure (refer to ICAO Annex [2](#), paragraph 3.6.5.2.2, and ICAO Doc [7030](#), Regional Supplementary Procedures, PAC paragraph 9.3).
- Special Procedures for In-Flight Contingencies in Oceanic Airspace (refer to the U.S. AIP, ENR 7.3).

## APPENDIX G. SUGGESTED SUBJECTS FOR INCLUSION IN OCEANIC AND INTERNATIONAL PROCEDURES AND/OR AN OPERATIONS MANUAL

**Note 1:** This list is for reference only. It is not intended to be all-inclusive. You are encouraged to use this list when creating procedures and/or operations manuals and keeping them current. The complexity of your operations and operational approvals will dictate which items on this list are applicable or need to be expanded. Please see the [North Atlantic \(NAT\) Resource Guide for United States Operators](#); [Pacific Resource Guide for U.S. Operators](#); or [West Atlantic, Gulf of Mexico, and Caribbean Resource Guide for U.S. Operators](#) for the most current version of this list.

**Note 2:** You should establish and maintain a robust process to remain current in oceanic and international operations. This continuous analysis or process is one component of an operator's SMS.

### G.1 Regulations, ICAO Guidance, and References.

#### G.1.1 Title 14 CFR.

#### G.1.2 Applicable ICAO Documents (current editions). Find the following documents at the ICAO store at <https://store.icao.int>:

- ICAO Doc 4444, Procedures for Air Navigation Services—Air Traffic Management.
- ICAO Doc 7030, Regional Supplementary Procedures.
- ICAO Doc 9574, Manual on a 300 m (1000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive.
- ICAO Doc 9613, Performance-based Navigation (PBN) Manual.
- ICAO Doc 10037, Global Operational Data Link (GOLD) Manual (CPDLC, ADS-C).
- ICAO Annex 2, Rules of the Air.
- ICAO Annex 6, Operation of Aircraft (Parts I, II, and III, as applicable).
- ICAO NAT Doc [007](#), North Atlantic Operations and Airspace Manual.

#### G.1.3 Aeronautical Information Publication (AIP), United States of America—Relevant Material.

#### G.1.4 Applicable FAA ACs (current editions):

- AC [90-105](#), Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System and in Oceanic and Remote Continental Airspace.<sup>1</sup>

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<sup>1</sup> See, in particular, AC 90-105, Chapter 8, Paragraph 8.4.3, Pilot Knowledge.

- AC [90-117](#), Data Link Communications.
- AC 91-70, Oceanic and Remote Continental Airspace Operations.
- AC [91-85](#), Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum (RVSM) Airspace.
- AC [120-42](#), Extended Operations (ETOPS and Polar Operations) (also refer to 14 CFR part [121](#), § [121.161](#)).
- AC [135-42](#), Extended Operations (ETOPS) and Operations in the North Polar Area (also refer to 14 CFR part [135](#), § [135.364](#)).

#### **G.1.5** Miscellaneous:

- FAA [North Atlantic \(NAT\) Resource Guide for United States Operators](#); [Pacific Resource Guide for U.S. Operators](#); or [West Atlantic, Gulf of Mexico, and Caribbean Resource Guide for U.S. Operators](#), Required Navigation Performance (RNP) PDF, ICAO Paris, and Eurocontrol (SKYbrary).
- State Department Travel Alerts and Transportation Safety Administration (TSA) Alerts.
- Electronic Flight Bag (EFB) instructions and procedures; applications (as applicable).

#### **G.1.6** NOTAMs, GPS NOTAMs, FAA International Notices, and Special Federal Aviation Regulations (SFAR).

**G.2 Navigation.** Continental (formerly Class I) versus Oceanic and Remote navigation; and navigation by means of DR.

#### **G.3 Flight Planning.**

##### **G.3.1** North American Routes (NAR).

##### **G.3.2** Track Messages.

##### **G.3.3** ATC Flight Plans. Explanation and correct codes.

##### **G.3.4** Operational Flight Plan (OFP) (also known as Computer Flight Plan (CFP)):

- Comparison to ATC flight plan.
- Basic cross checks (fuel, groundspeed, winds).
- ETP and points of safe return.
- Fuel requirements (in particular, ICAO Annex 6) and reduced fuel (OpSpecs B043, B044, and B343).

##### **G.3.5** SAO Requirements.

**G.3.6** Use of Plotting/Orientation Chart and Master Document.**G.3.7** Weather Radar (WX) Charts:

- TAF, Aviation Routine Weather Report (METAR), and SIGWX.
- 700 millibars (mb), 500 mb, 400 mb, 300 mb, 250 mb.
- Approved source(s): NWS and EWINS.

**G.3.8** Driftdown—Terrain, Alternates, ETOPS.**G.3.9** WGS 84 or Approved Equivalent Compliance.**G.4** **State Operating Restrictions.****G.5** **Reduced Vertical Separation Minimum (RVSM):**

- General description.
- Metric assignments (e.g., China).
- Minimum required equipment.
- Contingencies.
- Forecasts, tropopause, temperature deviations.

**G.6** **Accident/Incident.****G.6.1** Title 49 of the Code of Federal Regulations (49 CFR):

- Part [175](#), Carriage by Aircraft (Hazardous Materials Regulations).
- Part [830](#), Notification and Reporting of Aircraft Accidents or Incidents and Overdue Aircraft, and Preservation of Aircraft Wreckage, Mail, Cargo, and Records (National Transportation Safety Board).

**G.6.2** Contingencies:

- Weather deviations.
- General contingencies.
- Lost communications, TIBA, IFBP.
- Degraded navigation, DR.
- Activation of AMVER system, emergency locator transmitter (ELT).
- Depressurization/Oxygen supply.
- Intercept, hijack.

**G.6.3** Use of Navigation System:

- Review of Airplane Flight Manual Supplements (AFMS) for capabilities/limitations.
- Description of GPS, GPS NOTAMs, RAIM prediction, FDE.
- Description of INS, time limits.
- Currency/software version of database.
- Loading and cross-checks.
- Independent verification.
- Contingencies/fault codes.

**G.6.4** Oceanic Crossing:

- Oceanic checklist (Appendix [D](#)).
- Master time source.
- Clearance-FIR differences.
- Navigation accuracy check.
- RVSM checks.
- Approaching, overhead, and post-position waypoint checks.
- Position report—ETA tolerance.
- Ten-minute post-position check.

**G.6.5** Altimetry:

- QNH, QNE, and QFE.
- Transition altitude (TA)/transition level (TL).
- MB, hPa.

**G.6.6** Transponder Operations. Regional (e.g., NAT, Pacific) requirements.**G.6.7** Communications, Navigation, and Surveillance.

1. Airspace requirements (RNP 10/4/2).
2. Data link (ADS-C, CPDLC).
3. Voice communications and aeronautical radio stations (VHF, HF, SATVOICE).
4. Reduced separation—trials and implementations.

**G.6.8** Strategic Lateral Offset Procedures (SLOP).**G.6.9** Volcanic Ash. Source of information and crew notification.

**G.6.10** Space Weather. Warnings, alerts, and advisories (see Appendix [C](#), Unusual Weather Activity).

**G.6.11** Operational Control:

- OpSpec A008—Operational Control.
- OpSpec A009—Airport Aeronautical Data.
- OpSpec/MSpec A010—Aviation Weather Information.

**G.6.12** Oceanic Speed Control:

- Tolerance, areas applicable.
- ATC Mach Number Technique.
- Operations Without Assigned Fixed Speed (OWAFS).

**G.6.13** Oceanic Errors:

- Revised clearance/conditional clearances.
- CPDLC route clearances.



### Advisory Circular Feedback Form

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by contacting the Flight Technologies and Procedures Division (AFS-400) at 9-AWA-AFS400-Coord@faa.gov or the Flight Standards Directives Management Officer at 9-AWA-AFB-120-Directives@faa.gov.

Subject: AC 91-70C, Oceanic and Remote Continental Airspace Operations

Date: \_\_\_\_\_

*Please check all appropriate line items:*

An error (procedural or typographical) has been noted in paragraph \_\_\_\_\_ on page \_\_\_\_\_.

Recommend paragraph \_\_\_\_\_ on page \_\_\_\_\_ be changed as follows:

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In a future change to this AC, please cover the following subject:  
*(Briefly describe what you want added.)*

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Other comments:

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I would like to discuss the above. Please contact me.

Submitted by: \_\_\_\_\_

Date: \_\_\_\_\_