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AMENDMENT 3

7 AUG 2025

CONSULT NOTAM FOR LATEST INFORMATION

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

AIP Amendment 3

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PAGE	DATE
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1.7−2	21 MAR 24
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PAGE	DATE
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ENR 2

PAGE	DATE
2−1	21 MAR 24

ENR 3

PAGE	DATE
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3.6−1	7 AUG 25

ENR 4

PAGE	DATE
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4.2−1	21 MAR 24

ENR 5

PAGE	DATE
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5.7−18	7 AUG 25
5.7−19	7 AUG 25

ENR 6

PAGE	DATE
6.1−1	21 MAR 24
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6.1−4	21 MAR 24
6.1−5	21 MAR 24
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6.1−8	21 MAR 24
6.2−1	7 AUG 25
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6.2−4	21 MAR 24
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ENR 7

PAGE	DATE
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7.1−6	21 MAR 24
7.1−7	20 FEB 25
7.1−8	20 FEB 25
7.2−1	20 FEB 25

PAGE	DATE
7.2−2	21 MAR 24
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ENR 8	
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8.3−1	21 MAR 24
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PAGE	DATE
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8.7−1	21 MAR 24
8.8−1	21 MAR 24
8.8−2	21 MAR 24
8.8−3	21 MAR 24
8.8−4	7 AUG 25

GEN 0.5 List of Hand Amendments to the AIP − Not applicable

GEN 0.6 Table of Contents to Part 1

GEN 1. National Regulations and Requirements

GEN 2. Tables and Codes

GEN 3. Services

GEN 4. Charges for Aerodromes/Heliports and Air Navigation Services

GEN 1.2 Flights Into or Over U.S. Territorial Airspace

1. General

1.1 All aircraft operators that conduct flights into or over U.S. territorial airspace must comply with the following:

1.1.1 National security requirements contained in AIP Section ENR 1.12, National Security and Intercept Procedures;

REFERENCE−
FAA Notices to Airmen (NOTAMS), Special Notices, at (http://www.faa.gov/pilots/flt_plan/notams/).
FAA Prohibitions, Restrictions, and Notices website located at https://www.faa.gov/air_traffic/publications/us_restrictions/.

1.1.2 All applicable sections of Title 14, Code of Federal Regulations (CFR), Part 91, General Operating and Flight Rules, particularly Subpart H, Foreign Aircraft Operations and Operations of U.S. Registered Civil Aircraft Outside of the United States; and Rules Governing Persons on Board Such Aircraft;

1.1.3 All applicable sections of Title 49, United States Code (USC), Transportation, particularly Subtitle VII, Aviation Programs (sections 40101 through 50105);

1.1.4 All applicable sections of U.S. Customs and Border Protection (CBP) and Transportation Security Administration (TSA) requirements in Title 19 USC Part 122, Air Commerce Regulations.

1.2 U.S. CBP designates the airport of entry or other location for international aircraft that land or depart within U.S. territorial airspace. For information pertaining to U.S. CBP Service Offices/Ports of Entry, see AIP GEN 1.1, paragraph 2.1.1.

1.3 Subject to the observance of the applicable rules, conditions, and limitations of the Federal Aviation Regulations and the Department of Transportation (DOT)/Office of the Secretary of Transportation (OST), Office of International Aviation, as described below, foreign civil aircraft registered and manufactured in any foreign country which is a member of the International Civil Aviation Organization (ICAO) may be navigated in the U.S. Foreign civil aircraft manufactured in a country which at the time of manufacture was not a member of ICAO may be navigated in the U.S. if the country has notified ICAO that the aircraft meets the standards described in the Chicago Convention or if a notice has been filed with the DOT/OST, Office of International Aviation, through diplomatic channels, that the aircraft meets the standards described in the Chicago Convention.

1.4 Aircraft registered under the laws of foreign countries, not members of the ICAO, may be navigated in U.S. territory only when authorized by the DOT/OST, Office of International Aviation.

1.5 All foreign civil aircraft operated to, from, or within the U.S. must carry on board effective certificates of registration and air worthiness issued by the country of registry. Also, each member of the flight crew must carry a valid airman certificate or license authorizing that member to perform their assigned functions in the aircraft.

1.6 Transportation of firearms by aircraft passengers. Regulations of the Alcohol, Tobacco and Firearms Division of the Internal Revenue Service make it unlawful for any person knowingly to deliver or cause to be delivered to any common or contract carrier for transportation or shipment in interstate or foreign commerce, to persons other than licensed importers, licensed manufacturers, licensed dealers, or licensed collectors, any package or other container in which there is any firearm or ammunition without written notice to the carrier that such firearm or ammunition is being transported or shipped; except that any passenger who owns or legally possesses a firearm or ammunition being transported aboard any common or contract carrier for movement with the passenger in interstate or foreign commerce may deliver said firearm or ammunition into the custody of the pilot, captain, conductor or operator of such common or contract carrier for the duration of the trip.

1.7 Miscellaneous Information

1.7.1 Commercial air transport operators in the U.S. must adhere to Annex 6 − Operation of Aircraft with the proviso that aircraft which have no operators' local representative available to them will be required to carry a fixed fuel reserve of not less than 45 minutes at the approved fuel consumption rate plus a variable reserve equivalent to 15% of the fuel required from departure to destination and to an alternate if an alternate is required; or where the reserve calculated in accordance with the above exceeds two hours at the approved fuel consumption rate − two hours reserve fuel.

2. Public Health

2.1 Public Health Measures Applied to Aircraft

2.1.1 At airports without Public Health Service Quarantine staff, the Customs, Immigration, or Agriculture Officer present will represent the Public Health Service.

2.1.2 No public health measures are required to be carried out with respect to aircraft entering U.S. territory except that disinfection of an aircraft may be required if it has departed from a foreign area that is infected with insect−borne communicable disease, and the aircraft is suspected of harboring insects dangerous to public health. Disinfection is defined as: "The operation in which measures are taken to kill the insect vectors of human disease present in carriers and containers."

2.1.3 Disinfection must be the responsibility of the air carrier and must be subject to monitoring by the Director of the Public Health Service.

2.1.4 Disinfection of the aircraft must be accomplished immediately after landing and blocking. The cargo compartment must be disinfected before the mail, baggage, and other cargo are discharged, and the rest of the aircraft must be disinfected after passengers and crew deplane.

2.1.5 Disinfection must be performed with an approved insecticide in accordance with the manufacturer's instructions. The current list of approved insecticides and sources may be obtained from the Division of Quarantine, Center for Prevention Services, Centers for Disease Control, Atlanta, GA 30333.

2.1.6 All food and potable water taken on board an aircraft at any airport and intended for human consumption thereon must be obtained from sources approved in accordance with Title 21 CFR Parts 1240 and 1250.

2.1.7 Aircraft inbound or outbound on an international flight must not discharge over the U.S. any excrement or waste water or other polluting materials. Arriving aircraft must discharge such matter only at servicing areas approved under regulations cited in paragraph 2.1.6 above.

2.1.8 Aircraft on an international voyage (that are in traffic between U.S. airports) must be subject to inspection when there occurs on board, among passengers or crew, any death, or any ill person, or when illness is suspected to be caused by insanitary conditions.

2.2 Public Health Requirements

2.2.1 Disembarking passengers are not required to present a vaccination certificate except when coming directly from an area infected with cholera, yellow fever, or smallpox. Smallpox vaccination is necessary only if, within the 14 days before arrival, the traveler has been in a country reporting smallpox.

2.2.2 The pilot in command of an aircraft destined for a U.S. airport must report immediately to the Quarantine Station at or nearest the airport at which the aircraft will arrive, the occurrence, on board, of any death or an ill person among passengers or crew. Ill person is defined as:

2.2.2.1 Temperature of 100 degrees Fahrenheit (38 degrees Celsius) or greater accompanied by rash, glandular swelling, or jaundice, or which has persisted for more than 48 hours; or

2.2.2.2 Diarrhea, defined as the occurrence in a 24−hour period of three or more loose stools or of a greater than normal (for the person) amount of loose stools.

2.2.3 The pilot in command is responsible for detaining the aircraft and persons and things arriving thereon and keeping them free from unauthorized contact pending release when required by the Foreign Quarantine Regulations of the Public Health Service described in Title 42 CFR Part 71.

GEN 1.3 Entry, Transit and Departure of Passengers and Crew

1. General

1.1 Visit the following sites for visa, passport, and other U.S. Customs information:

1.1.1 https://www.cbp.gov/travel/international−visitors

1.1.2 https://www.cbp.gov/travel/international−visitors/applying−admission−united−states

1.1.3 https://www.cbp.gov/travel/us−citizens/know−before−you−go/your−trip

1.1.4 https://www.cbp.gov/travel/trusted−traveler−programs/global−entry/international−arrangements

1.2 APIS: Advance Passenger Information System (APIS) enhances border security by providing officers with pre−arrival and departure manifest data on all passengers and crew members. For further APIS information, see the following website:
https://www.cbp.gov/travel/travel−industry−personnel/advance−passenger−information−system.

GEN 1.7 Differences From ICAO Standards, Recommended Practices and Procedures

NOTE−
See GEN 1.6 for the availability of Title 14 of the U.S. Code of Federal Regulations Parts 1−199.

ANNEX 1 − PERSONNEL LICENSING	
Chapter 1	**Definitions and General Rules Concerning Licences**
Remote co−pilot	Remote Piloted Aircraft Systems (RPAS)−specific operational for international operations are not currently implemented in 14 CFR regulations.
Remote flight crew member	Remote Piloted Aircraft Systems (RPAS)−specific operational for international operations are not currently implemented in 14 CFR regulations.
Remote pilot	Remote Piloted Aircraft Systems (RPAS)−specific operational for international operations are not currently implemented in 14 CFR regulations.
Remote pilot station (RPS)	Remote Piloted Aircraft Systems (RPAS)−specific operational for international operations are not currently implemented in 14 CFR regulations.
Remotely piloted aircraft (RPA)	The United States has not formally established a definition for the term "RPA." Instead, the FAA defines Unmanned Aircraft in 14 CFR 1.1. Unmanned aircraft means an aircraft operated without the possibility of direct human intervention from within or on the aircraft. The registration requirements established in 14 CFR parts 47 and 48 therefore apply to Unmanned Aircraft.
Remotely piloted aircraft system (RPAS) (Applicable until 25−Nov−2026)	Remote Piloted Aircraft Systems (RPAS)−specific operational for international operations are not currently implemented in 14 CFR regulations.
1.2.5.2	Balloon pilots exercising commercial pilot privileges are required to hold a second class medical certificate. Private balloon and glider pilots are not required to hold medical certificates but are prohibited from operating during periods of medical deficiency. The FAA does not provide operational rules specific to RPAS operations allowed internationally. Medical requirements are pending development of associated operational rules. Regarding certificates issued to Mechanics and Repairmen under 14 CFR part 65, Medical Assessment is NOT applicable. The FAA does not issue a multi−crew license.
1.2.5.2.2	U.S. commercial pilots engaging in single-crew commercial air transport operations carrying passengers have a 12-month validity on their medical assessments regardless of age.
1.2.5.2.3	U.S. commercial pilots have a 1−year validity on their medical assessments regardless of age.

1.2.5.2.4	Balloon pilots, at the private pilot certificate level, as well as glider pilots are not required to hold medical certificates but are prohibited from operating during periods of medical deficiency. Certain holders of U.S. private pilot licenses (operating domestically) are not required to hold an FAA medical certificate but must meet U.S. (“Basic Med”) regulations effective May 1, 2017. “Basic Med” requires a medical education course every 24 months and medical examination every 48 months. For operations of small Unmanned Aircraft systems under 14 CFR part 107, while medical certification is not a requirement, a participant for the operation must meet a performance−based requirement prohibiting participation in the operation *if he or she knows or has reason to know that he or she has a physical or mental condition that would interfere with the safe operation of the small unmanned aircraft system.* More complex UAS operations enabled under traditional aviation rules must meet applicable medical requirements unless otherwise exempted.
1.2.5.2.5	U.S. private pilots required to hold an FAA 3rd class certificate who have passed their 40th birthday have a 24-month validity on their medical assessments. Free balloon and glider pilots are not required to hold medical certificates but are prohibited from operating during periods of medical deficiency.
1.2.5.2.6	The United States does not defer medical examinations. However, the United States has not established the medical assessment appropriate to the license for a “remote flight crew member.” Remote Piloted Aircraft Systems (RPAS)−specific operational rules for international operations are not currently implemented in 14 CFR regulations.
1.2.9.6	During the student pilot application process, a practical test, flight review, instrument proficiency check (IPC), or pilot− in−command (PIC) proficiency check, the individual conducting testing, training, a review, or any required regulatory check should evaluate if the applicant for an FAA certificate or holder of an FAA certificate demonstrates the FAA Aviation English Language Standard (AELS).
Chapter 2	**Licences and Ratings for Pilots**
2.1.9.2	The FAA only allows pilots to log SIC flight experience in an aircraft that requires an SIC by type design or by an operational requirement.

2.1.9.3	ICAO Annex 1, Personnel Licensing. Chapter 2A, Licences and ratings for pilots, 2.1.9 Crediting of flight time, 2.1.9.3 sets forth that, "The holder of a pilot licence, when acting as co−pilot at a pilot station of an aircraft certificated to be operated with a co−pilot, shall be entitled to be credited in full with this flight time towards the total flight time required for a higher grade of pilot licence." However, ICAO standards do not recognize the crediting of flight time when a pilot is not required by the aircraft certification or the operating rules under which the flight is being conducted. Thus, § 61.51(f)(4) does not satisfy the standards specified by ICAO Annex 1, 2.1.9.3. Section 61.51(f)(4) – Paragraph (f)(4) of § 61.51, Pilot Logbooks, clarifies that a person designated as second−in−command (SIC) by a government entity may log SIC time during public aircraft operations (PAO) if the aircraft used is a large aircraft as defined in § 1.1, a turbo−jet powered airplane, or if the aircraft holds or originally held a type certificate that requires a second pilot. This language was adopted by the Public Aircraft Logging of Flight Time, Training in Certain Aircraft Holding Special Airworthiness Certificates, and Flight Instructor Privileges final rule 89 FR 80310, dated October 2, 2024. Paragraph (f)(4)(iii) provides that an applicant for an airline transport pilot certificate who logs second in command time under § 61.51(f)(4) of this section in an aircraft that is not type certificated for two pilots is issued an airline transport pilot certificate with the limitation, "Holder does not meet the pilot in command aeronautical experience requirements of ICAO," as prescribed under Article 39 of the Convention on International Civil Aviation if the applicant does not meet the ICAO requirements contained in Annex 1, Personnel Licensing, to the Convention on International Civil Aviation. Article 39 of the Convention on International Civil Aviation, Endorsement of certificates and licenses, states: a. Any aircraft or part thereof with respect to which there exists an international standard of airworthiness or performance, and which failed in any respect to satisfy that standard at the time of its certification, shall have endorsed on or attached to its airworthiness certificate a complete enumeration of the details in respect of which it so failed. b. Any person holding a license who does not satisfy in full the conditions laid down in the international standard relating to the class of license or certificate which he holds shall have endorsed on or attached to his license a complete enumeration of the particulars in which he does not satisfy such conditions. Therefore, an applicant is entitled to an airline transport pilot certificate without the ICAO limitation specified under this paragraph when the applicant presents satisfactory evidence of having met the ICAO requirements and otherwise meets the aeronautical experience requirements of § 61.159 or § 61.161, as applicable. Notably, no limitation will be applied to the pilot certificate if SIC hours were obtained in a PAO using an aircraft holding a type certificate that requires more than one pilot, provided that those hours were completed in compliance with all other applicable FAA regulations.
2.1.10	The United States currently limits all 14 CFR part 121 operations to age 65 but has no age restriction on all other commercial air transport operations (such as 14 CFR part 135 operations).
2.3.1.4	U.S. private pilots required to hold an FAA Third−Class medical certificate must meet the requirements of an FAA Third−Class medical certificate which are equivalent to ICAO Class 2 with exceptions specified in Chapter 6 under 6.4.2.6; 6.4.2.6.1; 6.4.2.6.2; 6.4.2.9.1; 6.4.3.2 (b); 6.4.3.2.1 (c); 6.4.3.2.3; 6.4.3.4; and 6.4.3.4.1.

2.4.1.4	U.S. commercial pilots must meet the requirements of an FAA Second−Class medical certificate which are equivalent to ICAO Class 1 with exceptions specified in Chapter 6 under 6.3.2.6.2; 6.3.2.9.1; 6.3.3.2 (b); 6.3.3.2.1 (c); 6.3.3.4; 6.3.3.4.1; 6.3.4.1.1; and 6.3.4.1.2.
2.5.1.1	The U.S. does not issue an MPL.
2.5.1.2	The U.S. does not issue an MPL.
2.5.1.3	The U.S. does not issue an MPL.
2.5.2.1	The U.S. does not issue an MPL.
2.5.2.2	The U.S. does not issue an MPL.
2.5.2.3	The U.S. does not issue an MPL.
2.5.3.1	The U.S. does not issue an MPL.
2.5.3.2	The U.S. does not issue an MPL.
2.5.3.3	The U.S. does not issue an MPL.
2.5.4.1	The U.S. does not issue an MPL.
2.5.4.2	The U.S. does not issue an MPL.
2.6.1.4	U.S airline transport pilots must meet the requirements of an FAA First−Class Medical Certificate which are equivalent to ICAO Class 1 with exceptions specified in Chapter 6 under 6.3.2.6.2; 6.3.2.9.1; 6.3.3.2 (b); 6.3.3.2.1 (c); 6.3.3.4; 6.3.3.4.1; 6.3.4.1.1; and 6.3.4.1.2. However, pilots exercising ATP privileges as Second−in−Command in 14 CFR part 121 need only hold a second class medical assessment.
2.7.1.3.1	U.S. private pilots required to hold an FAA Third−Class medical certificate who hold an airplane instrument rating are not required to comply with ICAO Class 1 hearing standards. U.S. hearing requirements for FAA First- and Third-Class medical certificates are equivalent to ICAO Class 1 with exceptions specified in Chapter 6.
2.8.2.2	The United States does not issue an MPL.
2.9.1.5	U.S. glider pilots are not required to hold a medical certificate but are prohibited from operating during periods of medical deficiency.
2.10.1.5	U.S. free balloon pilots who exercise commercial balloon privileges are required to hold a second class medical certificate but are prohibited from operating during periods of medical deficiency.
Chapter 3	**Licences for Flight Crew Members other than Licences for Pilots**
3.2.1.5	U.S. flight navigators must meet the requirements of an FAA Second−Class medical certificate which are equivalent to ICAO Class 1 with exceptions specified in Chapter 6 under 6.3.2.6.2; 6.3.2.9.1; 6.3.3.4; 6.3.3.4.1; 6.3.4.1.1; and 6.3.4.1.2.
3.3.1.5	U.S. flight engineers must meet the requirements of an FAA Second−Class medical certificate which are equivalent to ICAO Class 1 with exceptions specified in Chapter 6 under 6.3.2.6.2; 6.3.2.9.1; 6.3.3.2 (b); 6.3.3.2.1 (c); 6.3.3.4; 6.3.3.4.1; 6.3.4.1.1; and 6.3.4.1.2.
Chapter 4	**Licences and Ratings for Personnel other than Flight Crew Members**
4.2.1.3	The United States does not require 4 years of experience to qualify to take the written examination for a mechanic's airframe and powerplant license. The FAA does not require two years of experience in addition to a training course, for mechanic applicants. U.S. regulations require minimum experience of 30 months for an applicant/person to qualify to take the written test and practical test in order to obtain an airframe and powerplant certificate.
4.2.2.4	The United States does not allow an approved maintenance organization to appoint non-licensed personnel to exercise the privileges of 4.2.2 within the U.S.

4.3.2	Non−FAA air traffic controllers must meet the requirements of an FAA Second−Class medical certificate which meets the intent of ICAO Class 3 with exceptions specified in Chapter 6 under 6.5.2.6, 6.5.2.6.1, 6.5.3.2 (b), 6.5.3.2.1.(c), 6.5.3.2.3, 6.5.3.4, 6.5.3.4.1, 6.5.4.1.2.
4.4.1.1	The United States requires that an applicant be at least 18 years of age.
4.4.1.3.1	Minimum experience requirements for certification of operational positions vary within air traffic control facilities according to multiple factors, such as operational complexity.
4.4.1.4	Non−FAA air traffic controllers must meet the requirements of an FAA Second−Class medical certificate which meets the intent of ICAO Class 3 with exceptions specified in Chapter 6 under 6.5.2.6, 6.5.2.6.1, 6.5.3.2 (b), 6.5.3.2.1.(c), 6.5.3.2.3, 6.5.3.4, 6.5.3.4.1, 6.5.4.1.2.
4.6.1.1	The United States requires the applicant shall not be less than 23 years of age.
Chapter 5	**Specifications for Personnel Licences**
5.2.1	FAA Credentials and CTO Certificates issued to air traffic controllers do not contain the holder's date of birth due to restrictions related to the protection of personally identifiable information.
Chapter 6	**Medical Provisions for Licencing:** *Please note*: References containing 6.3 refer to airline transport pilots and commercial pilots; 6.4 refer to private pilots, free balloon pilots, glider pilots, student pilots, flight engineers, and flight navigators; and 6.5 refer to air traffic controllers.
6.1.1	The United States has not established a specific medical assessment standard for the remote pilot license.
6.2.3.2	The United States uses a variety of methods for testing visual acuity that meet the intent of ICAO Recommended Practice. Illumination levels are set by manufactured standards.
6.3.1.2	An FAA first-class medical certificate is required when exercising the privileges of an airline transport pilot and an FAA second-class medical certificate is required when exercising the privileges of a commercial pilot, a flight engineer, or a flight navigator. The United States has no provisions for MPL.
6.3.2.6	Electrocardiography is not required for airline transport pilots at first issue unless the individual is age 35 or older and not for commercial pilots, flight engineers, or flight navigators unless clinically indicated.
6.3.2.6.1	Electrocardiography is required in re-examination of airline transport pilot applicants over the age of 40 every 12 months. Electrocardiography is not specifically required for commercial pilots, flight engineers, or flight navigators unless clinically indicated.
6.3.2.6.2	Electrocardiography is required in re-examination of airline transport pilot applicants over the age of 40 every 12 months. Electrocardiography is not specifically required for commercial pilots, flight engineers, or flight navigators unless clinically indicated.
6.3.3.2 (b)	A specific requirement that a [spare] set of suitable correcting spectacles be kept readily available when exercising the privileges of the license is not established.
6.3.3.2.1 (c)	A specific requirement that a set of suitable correcting spectacles be kept readily available when exercising the privileges of the license [with contact lenses] is not established.
6.3.3.2.3	The demonstration of compliance with visual acuity by providing a full ophthalmic report is not required.
6.3.3.4	The demonstration of compliance with the visual requirements to be made with only one pair of corrective lenses is not specifically required.
6.3.3.4.1	A requirement that a second pair of near-correction spectacles be kept available when exercising the privileges of the license is not established.

6.3.4.1.1	Applicants are not required to demonstrate normal hearing against a background noise that reproduces or simulates the masking properties of flight deck noise upon speech and beacon signals.
6.3.4.1.2	Applicants are not required to take a practical hearing test.
6.4.1.1	U.S. free balloon pilots exercising commercial pilot balloon privileges must hold a second class medical certificate. Private free balloon pilots and glider pilots are not required to hold a medical certificate but are prohibited from operating during periods of medical deficiency.
6.4.1.2	U.S. free balloon pilots exercising commercial pilot balloon privileges must hold a second class medical certificate. Private free balloon pilots and glider pilots are not required to hold a medical certificate but are prohibited from operating during periods of medical deficiency. Certain holders of U.S. private pilot licenses (operating domestically) are not required to hold an FAA medical certificate but must meet U.S. ("Basic Med") regulations effective May 1, 2017. "Basic Med" requires a medical education course every 24 months and medical examination every 48 months.
6.4.2.6	Electrocardiography for applicants for third-class airman (private pilot) medical certification is not required at first issue unless clinically indicated.
6.4.2.6.1	Electrocardiography for applicants for FAA third−class airman (private pilot) medical certification is not required unless clinically indicated.
6.4.3.4	The demonstration of compliance with the visual requirements to be made with only one pair of corrective lenses is not specifically required.
6.4.3.4.1	A requirement that a second pair of near-correction spectacles be kept available when exercising the privileges of the license is not established.
6.5.1.1	The United States has not established a specific medical assessment standard for the remote pilot license, therefore a U.S. remote pilot would not undergo specific medical examination.
6.5.1.2	The United States has not established a specific medical assessment standard for the remote pilot license.
6.5.2.6	Electrocardiography is required for FAA air traffic controllers at first issue but not for non-FAA ATCs unless clinically indicated.
6.5.2.6.1	Electrocardiography is required for FAA ATCs but not for non-FAA ATCs unless clinically indicated.
6.5.3.2 (b)	A specific requirement that a [spare] set of suitable correcting spectacles be kept readily available when exercising the privileges of the license is not established.
6.5.3.2.1 (c)	A specific requirement that a set of suitable correcting spectacles be kept readily available when exercising the privileges of the license [with contact lenses] is not established.
6.5.3.2.3	The demonstration of compliance with visual acuity by providing a full ophthalmic report is not required.
6.5.3.4	The demonstration of compliance with the visual requirements to be made with only pair of corrective lenses is not specifically required.
6.5.3.4.1	A requirement that a second pair of near-correction spectacles be kept available when exercising the privileges of the license is not established.
6.5.4.1.1	Applicants are not required to demonstrate normal hearing against a background noise that reproduces or simulates an air traffic control working environment.
6.5.4.1.2	The FAA does not provide the option of a practical hearing test, but instead requires an FAA air traffic control specialist (ATCS) who does not initially meet hearing standards to undergo audiology evaluation for unaided pure tone audiogram at ATCS frequencies and other specified testing, for each ear separately.

ANNEX 2 − RULES OF THE AIR	
Chapter 1	**Definitions**
Advisory Airspace	Advisory service is provided in terminal radar areas and the outer areas associated with Class C and Class E airspace areas.
Aerodrome Traffic Zone	There are no more Control Zones (Airport Traffic Zones) or Airport Traffic Areas (ATA). In the 7110.65, PCG, Controlled Airspace covers the defined dimensions of airspace. Class D was formerly the ATA (normally a 5NM radius around the airport). The old Control Zones were extensions of the ATA to encompass (ILS) Approach Paths.
Airborne Collision Avoidance System (ACAS)	The U.S. uses "traffic alert collision avoidance system (TCAS)." TCAS is an airborne collision avoidance system based on radar beacon signals and operates independent of ground−based equipment. TCAS−I generates traffic advisories only. TCAS−II generates traffic advisories and resolution (collision avoidance) advisories in the vertical plane.
Air−taxiing	The U.S. uses "air taxi" below 100 feet above ground level (AGL) and "hover taxi" for this maneuver actual height may vary, and some helicopters may require hover taxi above 25 feet AGL to reduce ground effect turbulence or provide clearance for cargo slingloads.
Air traffic services unit	References to this are embedded in AIP, ENR 7.1−3.1.1, ENR 7.1−3.1.5, and ENR 7.1−5.2 Note without an accompanying definition.
Alternate Aerodrome	1) The U.S. definition does not include the information that defines this concept. Additionally, the U.S. uses the term "airport" in place of "aerodrome." 2) The definition annotated as [ICAO] is not congruent with the Annex 2 Amdt 47 text.
Altitude	The U.S. defines "altitude" using the imperial measurement of feet.
Approach Control Service	The U.S. not only includes arriving and departing controlled flights but also includes en route controlled flights. Additionally, as opposed to Annex 2 Amdt 47, the U.S. specifies the control facility that provides the service.
Approach Control Unit	The U.S. defines "Approach Control Facility."
Appropriate ATS Authority	The U.S. does not define "Appropriate ATS Authority." The P/CG does contain a definition annotated as [ICAO] that adds "In the United States, the "appropriate ATS authority" is the Program Director for Air Traffic Planning and Procedures, ATP−1."
Apron	The U.S. adds reference to seaplane operations to the definition.
Area control centre	The U.S. equivalent facility for an Area Control Centre (ACC) is an Air Route Traffic Control Center (ARTCC).
Area control service	The U.S. does not use the term "area control service" to indicate controlled flight in controlled areas.
Automatic Dependent Surveillance−Broadcast (ADS−B)	1) The U.S. separately defines ADS−B, ADS−B Out, and ADS−B In. 2) The U.S. defines ADS−B as surveillance whereas Annex 2 Amdt 47 does not. 3) While the Annex 2 Amdt 47 definition specifies aircraft, aerodrome vehicles, and other objects, the U.S. specifies aircraft or vehicle, and makes no mention of other objects.
Ceiling	The U.S. specifies what the "lowest layer" consists of, which can include obscurations other than clouds. The U.S. imposes no altitude limit in its definition.
Changeover point	The U.S. defines the makeup of the point as "…a point along the route or airway segment between two adjacent navigation facilities or waypoints where changeover in navigation guidance should occur."
Command and Control (C2) Link	Remote Piloted Aircraft Systems (RPAS)−specific operational rules allowing for international operations are not currently addressed/implemented in 14 CFR regulations.
Control Area	The term is used throughout U.S. documentation without an actual FAA definition. The Annex 2 definition is included and annotated [ICAO].

Controlled aerodrome	The U.S. does not define “Controlled Aerodrome.” The terms Control Tower, Approach Control, etc. are used in lieu.
Controlled Flight	The U.S. does not define “Controlled Flight.”
Controller−pilot data link communications (CPDLC)	The U.S. specifies digital communications, textual messages, and radio relay stations.
Control Zone	The U.S. renamed “control zone” as “surface based controlled airspace.”
Danger Area	The term “danger area” is not used within the U.S. or any of its possessions or territories.
Data Link Communication s	While the U.S. does not define “Data Link Communications,” it does define “CPDLC” and “ADS−C.”
Detect and Avoid	The U.S. does not define “Detect and Avoid.”
Estimated Time of Arrival	The U.S. limits the applicability to airport landing operations.
Expected Approach Time	The U.S. does not define “Expected Approach Time.”
Flight information centre	The U.S. does not operate flight information centers (FICs). In the U.S., the services provided by FICs are performed by air traffic control (ATC) facilities, flight service stations (FSSs), and rescue coordination centers (RCCs).
Flight Level	The U.S. uses the measurement of a level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury instead of 1 013.2 hectopascals (hPa).
Heading	The U.S. does not define “Heading.”
Height	The U.S defines Height as the height above ground level (or AGL) expressed in meters or feet.
Instrument Approach Operations	The U.S. does not define “Instrument approach operations.”
Instrument Approach Procedures	The U.S. does not include a reference to “holding or en route obstacle clearance criteria” application in its definition.
Level	The U.S. uses “altitude” or “flight level” rather than “level” and “cruising altitude” rather than “cruising level.’’ The term “level” is not used to mean “height,” “altitude,” or “flight level.”
Manoeuvring Area	In the U.S., the term “movement area” means “the runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing, hover taxiing, air−taxiing, take−off and landing of aircraft, exclusive of loading ramps and parking areas. At those airport/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.” The U.S. does not use an all−inclusive term to denote the movement area plus loading ramps and parking areas of an airport, nor does the U.S. use the term “maneuvering area’’ in any related context.
Movement area	In the U.S., the term “movement area” means “the runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing, hover taxiing, air−taxiing, take−off and landing of aircraft, exclusive of loading ramps and parking areas. At those airport/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.” The U.S. does not use an all−inclusive term to denote the movement area plus loading ramps and parking areas of an airport, nor does the U.S. use the term “maneuvering area’’ in any related context.
Radiotelephony	The U.S. Does not define “Radiotelephony.”
Remote pilot station	Remote Piloted Aircraft Systems (RPAS)−specific operational for international operations are not currently implemented in 14 CFR regulations.

Remotely Piloted Aircraft (RPA)	The United States has not formally established a definition for the term "RPA." Instead, the FAA defines Unmanned Aircraft in 14 CFR § 1.1 as an aircraft operated without the possibility of direct human intervention from within or on the aircraft. The registration requirements established in 14 CFR parts 47 and 48 therefore apply to Unmanned Aircraft.
Remotely Piloted Aircraft System (RPAS)	Remote Piloted Aircraft Systems (RPAS)−specific operational for international operations are not currently implemented in 14 CFR regulations.
RPA observer	Rather than "RPA Observer" the FAA uses the term "Visual Observer."
Repetitive flight plan (RPL)	The U.S. uses the term "stored flight plan" for domestic operations.
Signal Area	The U.S. does not define "Signal Area."
Special VFR Flight	The U.S. uses the definition "Special VFR Operations" in place of "Special VFR Flight."
Taxiway	The U.S. does not define "Taxiway." It does define "Rapid Exit Taxiway" under "High Speed Taxiway" but not the other two definitions embedded in Annex 2 Am47.
Traffic Information	The U.S. uses the term Traffic Advisory.
Transition altitude	In U.S. domestic airspace, "transition altitude," "layer" and "level" are not used; however, in the U.S., flight levels begin at FL 180 where the reference datum of 29.92 inches of mercury is used as the constant atmospheric pressure. Below FL 180, altitudes are based on barometric pressure readings. QNH and QFE altimeter settings are not provided in domestic U.S. airspace.
Unmanned Free Balloon	The U.S. does not define "Unmanned Free Balloon." The U.S. definition of Unmanned Aircraft (UA) states Unmanned Free Balloon is not a UA.
Visual line−of−sight (VLOS) operation	The United States defines "Visual line−of−sight aircraft operation" as follows: "With vision that is unaided by any device other than corrective lenses, the remote pilot in command, the visual observer (if one is used), and the person manipulating the flight control of the small unmanned aircraft system must be able to see the unmanned aircraft throughout the entire flight in order to: (1) Know the unmanned aircraft's location; (2) Determine the unmanned aircraft's attitude, altitude, and direction of flight; (3) Observe the airspace for other air traffic or hazards; and (4) Determine that the unmanned aircraft does not endanger the life or property of another. (b) Throughout the entire flight of the small unmanned aircraft, the ability described in paragraph (a) of this section must be exercised by either: (1) The remote pilot in command and the person manipulating the flight controls of the small unmanned aircraft system; or (2) A visual observer."
Chapter 3	**General Rules**
3.1.8	In addition, aircraft shall not be flown in formation flight when passengers are carried for hire.
3.1.9	The United States has not specified safety requirements applicable to international RPAS operations.
3.1.10	14 CFR part 101 prescribes rules governing the operation in the United States, of any unmanned free balloon that— (i) Carries a payload package that weighs more than four pounds and has a weight/size ratio of more than three ounces per square inch on any surface of the package, determined by dividing the total weight in ounces of the payload package by the area in square inches of its smallest surface; (ii) Carries a payload package that weighs more than six pounds; (iii) Carries a payload, of two or more packages, that weighs more than 12 pounds; or (iv) Uses a rope or other device for suspension of the payload that requires an impact force of more than 50 pounds to separate the suspended payload from the balloon.

3.2.2	When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right−of−way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.
3.2.3.2 d)	The U.S. national regulations do not require aircraft on the movement area of an airport, whose engines are running, to display lights which indicate that fact from sunset to sunrise.
3.2.5	Unless otherwise authorized or required by ATC, no person may operate an aircraft within a Class B, C, or D surface area except for the purpose of landing at, or taking off from, an airport within that area. In addition, in the case of a helicopter approaching to land, avoid the flow of fixed−wing aircraft. In addition, no person may, within a Class B, C, or D surface area operate an aircraft to, from, or on an airport having a control tower operated by the U.S. unless two−way radio communications are maintained between that aircraft and the control tower.
3.3.1.2	In the U.S., ATC flight plans are not required for VFR flight in Class C, D, or E airspace.
3.3.1.2 e)	Requirements pertaining to filing flight plans for flights operating across U.S. borders and for identification purposes are described in 14 CFR Part 9l (Section 91.84) and Part 99.
3.6.2.4	When meteorological conditions fall below the minimum specified for en route VFR flights, the pilot of the aircraft shall not continue his/her flight in such conditions, except in emergency, beyond the extent necessary to return to his/her departure point or to the nearest suitable landing point.
3.6.5.2 (Communication Failure)	Two−way Radio Communications Failure a. It is virtually impossible to provide regulations and procedures applicable to all possible situations associated with two−way radio communications failure. During two−way radio communications failure, when confronted by a situation not covered in the regulation, pilots are expected to exercise good judgment in whatever action they elect to take. Should the situation so dictate they should not be reluctant to use the emergency action contained in 14 CFR Section 91.3(b) b. Whether two−way communications failure constitutes an emergency depends on the circumstances, and in any event, it is a determination made by the pilot. 14 CFR Section 91.3(b) authorizes a pilot to deviate from any rule in Subparts A and B to the extent required to meet an emergency. c. In the event of two−way radio communications failure, ATC service will be provided on the basis that the pilot is operating in accordance with 14 CFR Section 91.185. A pilot experiencing two−way communications failure should (unless emergency authority is exercised) comply with 14 CFR Section 91.185 quoted below 1. General. Unless otherwise authorized by ATC, each pilot who has two−way radio communications failure when operating under IFR shall comply with the rules of this section.

3.6.5.2.2	In the event of two−way communications failure in the U.S., ATC service is predicated on pilot compliance with the provisions of 14 CFR Part 91 (Section 91.185). If the failure occurs in IMC, or if VFR cannot be complied with, each pilot is to continue the flight according to the following: Route a) By the route assigned in the last ATC clearance received; b) If being radar vectored, by the direct route from the point of failure to the fix, route, or airway specified in the vector clearance; c) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or d) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan. Altitude − At the **HIGHEST** of the following altitudes or flight levels **FOR THE ROUTE SEGMENT BEING FLOWN:** a) The altitude or flight level assigned in the last ATC clearance received; b) The minimum altitude/flight level as prescribed for IFR operations; or c) The altitude or flight level ATC has advised may be expected in a further clearance. IFR conditions − If the failure occurs in IFR conditions, or if subparagraph 2 above cannot be complied with, each pilot shall continue the flight according to the following: (a) Route. (1) By the route assigned in the last ATC clearance received; (2) If being radar vectored, by the direct route from the point of radio failure to the fix, route, or airway specified in the vector clearance; (3) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or (4) In the absence of an assigned route of a route that ATC has advised may be expected in a further clearance by the route filed in the flight plan. (b) Altitude. At the HIGHEST of the following altitudes or flight levels FOR THE ROUTE SEGMENT BEING FLOWN: (1) The altitude or flight level assigned in the last ATC clearance received; (2) The minimum altitude (converted, if appropriate) to minimum flight level as prescribed in 14 CFR Section 91.121(c) for IFR operations; or (3) The altitude or flight level ATC has advised may be expected in a further clearance.

3.6.5.2.2 a)	Annex 2 references maintaining last assigned speed, level, or minimum flight altitude for a specified amount of time depending on radar coverage. 91.185 does not require last assigned speeds and altitudes be maintained for specified amounts of time.
3.9	There is no Class F airspace in the U.S. Basic VFR weather minimums are listed in the table below. Except as otherwise authorized by the appropriate air traffic control unit for special VFR flights within Class B, C, D, or E surface areas, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less than that prescribed for the corresponding altitude and class of airspace in the table below. Class G Airspace: Notwithstanding the provisions of paragraph a) of this section, the following operations may be conducted in Class G airspace below 1,200 feet above the surface: 1) Helicopter. A helicopter may be operated clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstruction in time to avoid collision. 2) Airplane. When the visibility is less than 3 statute miles but not less than 1 statute mile during night hours, an airplane may be operated clear of clouds if operated in an airport traffic pattern within one−half mile of the runway. Except as provided in 4.2, no person may operate an aircraft under VFR within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport when the ceiling is less than 1,000 feet. Except as provided in 4.2, no person may take−off or land an aircraft, or enter the traffic pattern area of an airport under VFR, within the lateral boundaries of the surface area of Class B, Class C, Class D, or Class E airspace designed for an airport: 1) unless ground visibility at that airport is at least 3 statute miles; or 2) if ground visibility is not reported at that airport, unless flight visibility during landing or takeoff, or while operating in the traffic pattern is at least 3 statute miles

Basic VFR Weather Minimums

Airspace	Flight Visibility	Distance from Clouds
Class A	Not Applicable	Not Applicable
Class B	3 statute miles	Clear of Clouds
Class C	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class D	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class E Less than 10,000 feet MSL	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
At or above 10,000 feet MSL	5 statute miles	1,000 feet below 1,000 feet above 1 statute mile horizontal
Class G 1,200 feet or less above the surface (regardless of MSL altitude). For aircraft other than helicopters:		
Day, except as provided in §91.155(b)	1 statute mile	Clear of clouds
Night, except as provided in §91.155(b)	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
For helicopters:		
Day	½ statute mile	Clear of clouds
Night, except as provided in §91.155(b)	1 statute mile	Clear of clouds
More than 1,200 feet above the surface but less than 10,000 feet MSL.		
Day	1 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
Night	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface and at or above 10,000 feet MSL.	5 statute miles	1,000 feet below 1,000 feet above 1 statute mile horizontal

Chapter 4	Visual Flight Rules
4.2	In the U.S., no person may operate an aircraft beneath the ceiling under VFR within the lateral boundaries of controlled airspace designated to the surface for an airport when the ceiling is less than 1,000 feet. No person may take−off or land an aircraft (other than a helicopter) under special VFR (SVFR) unless ground visibility is at least 1 statute mile or if ground visibility is not reported, unless flight visibility is at least 1 statute mile. The U.S. restricts the ceiling to 1,000 ft. and ground visibility of 3 miles and greater.
4.3	The U.S. does not prohibit VFR flight between sunset and sunrise.

4.4	In the U.S., VFR flight is not permitted within Class A airspace designated in 14 CFR Part 71 unless otherwise authorized by ATC. In the U.S., an ATC clearance is needed for VFR flight only in Class B airspace area. The U.S. limits VFR flights up to FL 180.
4.5	The U.S. limits VFR flights up to FL 180.
4.7	In addition, grid tracks are not used to determine cruising altitudes in polar areas. True tracks are used to determine cruising levels above FL 230 in the area north of Alaska bounded by the true North Pole to 72°00′00″N, 141°00′00″W; to 72°00′00″N, 158°00′00″W; to 68°00′00″N, 168°58′23″W; to point of beginning. The U.S. has named this area the Anchorage Arctic CTA/FIR for national reference purposes.
4.8	In U.S. Class C and D airspace/areas, an ATC clearance is not required for VFR flights.
Chapter 5	**Instrument Flight Rules**
5.1.2	In the U.S., minimum altitudes for IFR flights are 2,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown in mountainous terrain and 1,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown in non−mountainous terrain.
5.2.2	See difference under paragraph 4.7.
5.3.1	See difference under paragraph 4.7.
Further differences which exist by virtue of the fact that the Annex contains no comparable standards for the U.S. national regulations.	1) The regulations covering the selection and use of alternate airports in respect to ceiling and visibility minima, require that: Unless otherwise authorized by the FAA Administrator, no person may include an alternate airport in an IFR flight plan unless current weather forecasts indicate that, at the estimated time of arrival at the alternate airport, the ceiling and visibility at that airport will be at or above the alternate airport weather minima.
	2) Operation under IFR in Class A, B, C, D, or E airspace malfunction reports: a) The pilot−in−command of each aircraft operated in Class A, B, C, D or E airspace under IFR shall report as soon as practical to ATC any malfunctions of navigational, approach, or communication equipment occurring in flight. b) In each report the pilot−in−command shall include: 1) aircraft identification. 2) equipment affected. 3) degree to which the capability of the pilot to operate under IFR in the ATC system is impaired; and 4) nature and extent of assistance desired from ATC.
	3) When an aircraft has been cleared to maintain ‘‘VFR conditions on top,’’ the pilot is responsible to fly at an appropriate VFR altitude, comply with VFR visibility and distance from cloud criteria, and to be vigilant so as to see and avoid other aircraft.
	4) Aircraft speed: a) Unless otherwise authorized by the FAA Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 kt (288 m.p.h.). b) Unless otherwise authorized or required by ATC, no person may operate an aircraft within Class B, C, or D surface area at an indicated airspeed of more than 200 kt (230 m.p.h.). This paragraph 4b) does not apply to operations within Class B airspace. Such operations shall comply with paragraph 4a) of this section. c) No person may operate an aircraft in the airspace underlying Class B airspace, or in a VFR corridor designated through Class B airspace, at an indicated airspeed of more than 200 kt (230 m.p.h.). d) If the minimum safe airspeed for any operation is greater than the maximum speed prescribed in this section, the aircraft may be operated at that minimum speed.

	5) Operating rules and pilot and equipment requirements for flight in Class B airspace. a) Operating rules. No person may operate an aircraft within Class B airspace except in compliance with the following rules: 1) No person may operate an aircraft within Class B airspace unless that person has received an appropriate authorization from ATC prior to operation of that aircraft in that area. 2) Unless otherwise authorized by ATC, each person operating a large turbine engine−powered airplane to or from a primary airport shall operate at or above the designated floors while within the lateral limits of the Class B airspace. 3) Any person conducting pilot training operations at an airport within Class B airspace shall comply with any procedures established by ATC for such operations in Class B airspace. b) Pilot requirements. No person may take off or land a civil aircraft at an airport within Class B airspace or operate a civil aircraft within Class B airspace unless: 1) The pilot−in−command holds at least a private pilot certificate; or 2) The aircraft is operated by a student pilot who has met the requirements (14 CFR Part 61 (Section 61.95)). c) Communications and navigation requirements. Unless otherwise authorized by ATC, no person may operate an aircraft within Class B airspace unless that aircraft is equipped with: 1) For **IFR** operations, an operable VOR or TACAN receiver, and 2) For **all** operations, an operable two−way radio capable of communications with ATC on appropriate frequencies for that Class B airspace. d) Transponder requirements. No person may operate an aircraft in Class B airspace unless the aircraft is equipped with the applicable operating transponder and automatic altitude reporting equipment.
	6) Operating rules and pilot and equipment requirements for operating in Class C airspace. a) General. For the purpose of this section, the primary airport is the airport designated in 14 CFR Part 71, for which the Class C airspace is designated. A satellite airport is any other airport within the Class C airspace. b) Deviations. An operator may deviate from any provisions of this section under the provisions of an ATC authorization issued by the ATC facility giving jurisdiction of the Class C airspace. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate. c) Arrivals and overflights. No person may operate an aircraft in Class C airspace unless two−way radio communication is established with the ATC facility having jurisdiction over the Class C airspace prior to entering that area and is thereafter maintained with the ATC facility having jurisdiction over the Class C airspace while within that area. d) Departures. No person may operate an aircraft within Class C airspace except as follows: 1) From the primary airport or satellite airport with an operating control tower, unless two−way radio communication is established and maintained with the control tower, and thereafter as instructed by ATC while operating in the Class C airspace. 2) From a satellite airport without an operating control tower, unless two−way radio communication is established as soon as practical after departing and thereafter maintained with the ATC facility having jurisdiction over the Class C airspace. e) Traffic patterns. No person may take off or land an aircraft at a satellite airport within Class C airspace except in compliance with FAA arrival and departure traffic patterns. f) Equipment requirements. Unless otherwise authorized by the ATC facility having jurisdiction over the Class C airspace, no person may operate an aircraft within Class C airspace unless that aircraft is equipped with the applicable equipment specified in 14 CFR Part 91 (Section 91.215).

	7) Except for persons operating gliders below the floor of Class A airspace, no person may operate an aircraft in Class B, C, D, or E airspace of the 48 contiguous States and the District of Columbia above 10,000 feet MSL, excluding that airspace at and below 2,500 feet AGL, unless that aircraft is equipped with an operable radar beacon transponder having at least a Mode 3/A 4096−code capability, replying to Mode 3/A interrogation with the code specified by ATC, and automatic altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100−foot increments.
	8) Compliance with ATC clearances and instructions: a) When an ATC clearance has been obtained, no pilot−in−command may deviate from that clearance, except in an emergency, unless an amended clearance is obtained. A pilot−in−command may cancel an IFR flight plan if that pilot is operating in VFR weather conditions outside of Class A airspace. If a pilot is uncertain of the meaning of an ATC clearance, the pilot shall immediately request clarification from ATC. b) Except in an emergency, no person may operate an aircraft contrary to an ATC instruction in an area in which ATC is exercised. c) Each pilot−in−command who, in an emergency, deviates from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible. d) Each pilot−in−command who is given priority by ATC in an emergency shall submit a detailed report of that emergency within 48 hours to the manager of that ATC facility, if requested by ATC. e) Unless otherwise authorized by ATC, no person operating an aircraft may operate that aircraft according to any clearance or instruction that has been issued to the pilot of another aircraft for radar ATC purposes.
Appendix 1	**SIGNALS**
4.1.1	The flashing white signal to aircraft in flight, meaning ‘‘land at this aerodrome and proceed to apron’’ is not used in the United States. In addition, the alternating red and green signal to aircraft on the ground or in flight means exercise extreme caution.
Appendix 5	**UNMANNED FREE BALLOONS** *(Note.—See Chapter 3, 3.1.10 of the Annex)*
1.	14 CFR part 101 prescribes rules governing the operation in the United States, of any unmanned free balloon that— (i) Carries a payload package that weighs more than four pounds and has a weight/size ratio of more than three ounces per square inch on any surface of the package, determined by dividing the total weight in ounces of the payload package by the area in square inches of its smallest surface; (ii) Carries a payload package that weighs more than six pounds; (iii) Carries a payload, of two or more packages, that weighs more than 12 pounds; or (iv) Uses a rope or other device for suspension of the payload that requires an impact force of more than 50 pounds to separate the suspended payload from the balloon.

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CHAPTER 1	**DEFINITIONS**
Advisory Airspace	The U.S. does not define, it refers to Advisory Service.
Advisory Route	The U.S. does not define, it refers to Advisory Service.
Aerodrome Traffic	The U.S. does not define.
Air Traffic Advisory Service	In the U.S., “Advisory Service” is intended for IFR and VFR aircraft.
Airborne Collision Avoidance System	The U.S. uses traffic alert and collision avoidance system (TCAS).
Aircraft	U.S. uses “Aircraft” to mean the airframe, crew members, or both.
AIRMET	In the U.S., AIRMET stands for Airmen’s Meteorological Information which is a concise description of an occurrence or expected occurrence of specified en route weather phenomena that may affect the safety of aircraft operations, but at intensities lower than those that require the issuance of a SIGMET. An AIRMET may be issued when moderate turbulence, low-level wind shear, strong surface winds greater than 30 knots, moderate icing, freezing level, mountain obscuration, or IFR conditions are occurring or are expected to occur.
Air-report	The U.S. does not normally use the term “air-report.” Pilot weather reports (PIREPs), position, and operational reports are used. PIREPs include reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence) of moderate or greater intensity, volcanic eruptions and volcanic ash clouds, and other conditions pertinent to flight safety. They may include information on ceilings, visibility, thunderstorms, icing of light degree or greater, wind shear and its effect on airspeed, or volcanic ash clouds, but do not usually include air temperature.
Air-taxiing	The U.S. uses “air taxi” below 100 feet above ground level (AGL) and “hover taxi” for this maneuver actual height may vary, and some helicopters may require hover taxi above 25 feet AGL to reduce ground effect turbulence or provide clearance for cargo slingloads.
Air Traffic Flow Management	U.S. defines as Air Traffic Control System Command Center.
Altitude	U.S. uses “Altitude” to mean indicated altitude mean sea level (MSL), flight level (FL), or both.
Approval Request	U. S. uses “APREQ.”
Area control service	The U.S. does not use the term “area control service” to indicate controlled flight in controlled areas.
ATS route	In U.S. domestic airspace, the term “ATS route” is not used. Routes in the U.S. include VOR airways, jet routes, substitute routes, off-airway routes, RNAV routes and colored airways. The U.S. also uses instrument departure procedures (DPs), and standard terminal arrivals (STARs).
Control zone	The U.S. uses “surface area” in place of the ICAO term “control zone.” Surface area is defined as the airspace contained by the lateral boundary of the Class B, C, D or E airspace designated for an airport that begins at the surface and extends upward.
Controlled airspace	The U.S. uses the following definition of controlled airspace found in 14 CFR Section 1.1: “Controlled airspace means an airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification.”
Course, bearing, azimuth, heading, and wind direction	U.S. uses “Course, bearing, azimuth, heading, and wind direction” information and it shall always be magnetic unless specifically stated otherwise.
Cruising level	The U.S. uses the term “cruising altitude.”

Decision altitude	Approach with vertical guidance (VNAV).
Emergency Phase	The U.S. does not utilize classification system of emergency phases
Expedite	U.S. uses **"EXPEDITE"** by ATC when **prompt compliance** is required to avoid the development of an imminent situation. Expedite climb/descent normally indicates to a pilot that the approximate best rate of climb/descent should be used without requiring an exceptional change in aircraft handling characteristics.
Flight information centre	In the U.S., the services provided by flight information centers (FICs) are conducted by air traffic control (ATC) facilities, flight service stations (FSSs), and rescue coordination centers (RCCs).
Ground Effect	The U.S. does not define, but is referred to in "Hover Taxi."
Holding procedure	In the U.S., a hold procedure is also used during ground operations to keep aircraft within a specified area or at a specified point while awaiting further clearance from air traffic control.
Hot Spot	This is a known term , but not specifically defined in 7110.65.
Level	The U.S. uses "altitude" or "flight level" rather than "level."
Miles	U.S. uses "Miles" to mean nautical miles unless otherwise specified, and means statute miles in conjunction with visibility.
Minute	U.S. uses "minute plus 30 seconds", except when time checks are given to the nearest quarter minute.
Movement area	In the U.S., the "movement area" is equivalent to the ICAO "maneuvering area" which does not include parking areas.
Near Parallel Runways	In the U.S., these are not defined as non-intersecting runways aligned 15 degrees or less apart
Position Symbol	The U.S. definition differs in that it refers to mode of tracking, rather than position of an aircraft or vehicle
Repetitive flight plan (RPL)	The U.S. uses the term "stored flight plan" for domestic operations.
Runway Incursion	This is a well−known term in NAS, but is not defined in the 7110.65
Stopway	The U.S. does not define a "stopway" as a rectangular area.
Taxiway a) *Aircraft stand taxilane* *b) Apron taxiway* *c) Rapid exit taxiway*	Ref (a), the US does not define as "portion of an apron designated as a taxiway intended to provide access to aircraft stands only." Ref (b), the US does not define as "portion of a taxiway system located on an apron, providing taxi route across an apron." Ref (c), the US defines as High Speed Taxiway.
Terminal control area	In the U.S., the term "terminal control area" has been replaced by "Class B airspace." Standard IFR services should be provided to IFR aircraft operating in Class B airspace.
Transition altitude, transition layer, and transition level	In U.S. domestic airspace, transition altitude, layer, and level are not used. U.S. flight levels begin at FL 180 where a barometric altimeter setting of 29.92 inches of mercury is used as the constant atmospheric pressure. Below FL 180, altitudes are based on barometric pressure readings.
Uncertainty Phase	The U.S. does not utilize emergency phase classifications.
Visibility	Definitions are different.
Visual Approach	In the U.S., aircrews may execute visual approaches when the pilot has either the airport or the preceding aircraft in sight and is instructed to follow it.
Will	U.S. uses "Will" means futurity, not a requirement for the application of a procedure.

CHAPTER 4	GENERAL PROVISIONS FOR AIR TRAFFIC SERVICES
4.2	In the U.S., flight information and alerting services are provided by ATC facilities, FSSs, and RCCs.
4.3.2.1.1	Transfer of control points vary depending on numerous factors.
4.3.2.1.3	Transfer of control varies.
4.3.2.1	Transfer of control points vary depending on numerous factors.
4.3.3.1	Transfer of control varies.
4.3.3.1a/ b	The U.S. does not "release" aircraft. Handoff is used.
4.4.1	In the U.S., flight information and alerting services are provided by ATC facilities, FSSs, and RCCs.
4.4.1.3	The U.S. uses a flight plan format different from the ICAO model discussed in Appendix 2. The U.S. ATS facilities will transmit ICAO repetitive flight plans (RPLs) even though a different format is used for stored flight plans.
4.4.2.1.1	The U.S. accepts flight plans up to 24 hours prior to Estimated Off –Block Time (EOBT).
4.5.6.2	U.S. ATS controllers do not normally include clearance for transonic acceleration in their ATC clearances.
4.5.7.3 and 4.10.4	In U.S. domestic airspace, transition altitude, layer, and level are not used. U.S. flight levels begin at FL180 where a barometric altimeter setting of 29.92 inches of mercury is used as the constant atmospheric pressure. Below FL 180, altitudes are based on barometric pressure readings. QNH and QFE altimeter settings are not provided in domestic U.S. airspace.
4.5.7.5	The flight crew shall read back to the air traffic controller safety-related parts of ATC clearances.
4.6.1.5	The U.S. allows speed adjustments to be assigned in 5 knot increments.
4.6.3.2	The U.S. uses different speed control phraseologies. Specifically, Doc 4444 uses "Maximum Speed" whereas the US uses "Maximum Forward Speed". Doc 4444 uses "Minimum Clean Speed" whereas the US uses "Slowest Practical Speed."
4.6.3.7	In the US, speed control is not to be assigned inside Final Approach Fix or 5 NM from runway end.
4.8.2	U.S. Controller phraseology differs slightly and does not include a time check.
4.8.3	ATS units are not required to advise a pilot who has canceled an IFR flight plan that IMC conditions are likely to be encountered along the route of flight; however, if a pilot informs a controller of a desire to change from **IFR** to VFR, the controller will request that the pilot contact the appropriate FSS.
4.9.1.1	FAA uses different wake turbulence categories and weight groups for wake turbulence separation minimums.
4.9.1.2	FAA uses different wake turbulence categories and weight groups for wake turbulence separation minimums. Not all FAA facilities are authorized to use the provisions of FAA JO 7110.126.
4.9.2	In the U.S., the word "heavy" is **used in all communications** with or about heavy jet aircraft in the terminal environment. In the en route environment, "heavy" is used in all communications with or about heavy jet aircraft with a terminal facility, when the en route center is providing approach control service, when the separation from a following aircraft may become less than five miles by approved procedure, and when issuing traffic advisories.
4.10.1.1, 4.10.1.2, 4.10.4.6	Flight levels (at or above 18,000msl, except oceanic) and in feet below 18,000 ft MSL, including around airports (vs. ICAO QFE – height above field/threshold when near airports).
4.11.2.2 4.11.3 d)	Reporting the assigned speed with each frequency change by pilots is not a requirement. Controllers are required to forward this information to the next controller.
4.11.1.1	The U.S. has different criteria to make position reports. FAA Order JO 7110.65, 5−1−12. Position Reporting.

4.11.1.3	After an aircraft receives the statement “radar contact” from ATC, it discontinues reporting over compulsory reporting points.
4.12.2 and 4.12.3	The U.S. does not normally use the term “air-report.” Pilot weather reports (PIREPs), position, and operational reports are used. PIREPs include reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence) of moderate or greater intensity, volcanic eruptions and volcanic ash clouds, and other conditions pertinent to flight safety. They may include information on ceilings, visibility, thunderstorms, icing of light degree or greater, wind shear and its effect on airspeed, or volcanic ash clouds, but do not usually include air temperature.
4.13.4	The difference is the length of time for retention.
CHAPTER 5	**SEPARATION METHODS AND MINIMA**
5.2.1	In U.S. airspace, only conflict resolution (not separation) is provided between IFR and VFR operations. Separation is provided between IFR and Special VFR (SVFR) aircraft only within the lateral boundaries of Class B, C, D, or E control zones (the U.S. term is surface areas) below 10,000 feet MSL.
5.2.1.1	In U.S. Class A and B airspace, separation is provided for all aircraft. In U.S. Class C airspace, separation is provided between IFR and SVFR aircraft; conflict resolution is provided between IFR and VFR operations.
5.4.1.2.1.2	U.S. Lateral separation criteria and minima values differ somewhat.
5.4.2.2.1.1 c/ d	The U.S. uses 22 kt instead of 20 kt and 44 kt instead of 40 kt.
5.4.2.4.1	FAA uses Mach number technique for application of longitudinal separation with turbojet aircraft only.
5.4.2.5.1	FAA uses Mach number technique for application of longitudinal separation with turbojet aircraft only.
5.4.2.7.3.2 d)2).	The FAA’s Advanced Technologies and Oceanic Procedures (ATOP) automation platform is designed to ensure that separation will not decrease below required minima for same track aircraft should either the reference or maneuvering aircraft turn during the ITP. This allows the controller to issue a clearance to perform an ADS−B ITP climb/descent maneuver if required separation is maintained or increased and either the reference or maneuvering aircraft has a turn in its flight plan.
5.5.2	Whenever the other aircraft concerned are within 5 minutes flying time of the holding area.
5.6	U.S. Allows 2 minute separation standard when courses diverge within 5 minutes after departure.
5.7	U.S. Requires departing aircraft to be established on a course diverging by at least 45 degrees from the reciprocal of the final approach course.
5.8.2.1	FAA uses different wake turbulence categories and differing minima. FAA requires 3 minutes separation for a Large or Heavy aircraft landing behind a Super aircraft.
5.8.3.1	FAA uses different wake turbulence categories and differing minima. For Heavy, Large, or Small aircraft departing behind a Super aircraft, taking off from the same runway or a parallel runway separated by less than 2,500 feet, FAA requires that takeoff clearance may not be issued to following aircraft until 3 minutes after the preceding aircraft begins takeoff roll.
5.8.3.2	FAA Consolidated Wake Turbulence (CWT) is based on nine weight groups. FAA time-based wake turbulence separation minima differs from ICAO standards.
5.8.3.4	FAA Consolidated Wake Turbulence (CWT) is based on nine weight groups. FAA time-based wake turbulence separation minima differs from ICAO standards.

5.8.4.1	The U.S. includes B757 in heavy category for wake turbulence purposes. DOC 4444 does not stipulate. For Heavy, Large, or Small aircraft taking off behind a departing Super aircraft on an intersecting runway or nonintersecting runway if flight paths will cross; FAA requires 3 minutes wake turbulence separation.
5.8.4.2	FAA Consolidated Wake Turbulence (CWT) is based on nine weight groups. FAA time-based wake turbulence separation minima differs from ICAO standards.
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5.8.5.2	FAA Consolidated Wake Turbulence (CWT) is based on nine weight groups. FAA time-based wake turbulence separation minima differs from ICAO standards.
CHAPTER 6	**SEPARATION IN THE VICINITY OF AERODROMES**
6.3.2.4	In the U.S.: a) An altitude to maintain is not normally issued in conjunction with a climb via clearance. If no altitude is assigned, pilots should climb to the “Top Altitude” depicted on the SID. ATC will assign an altitude when the “Top Altitude” is identified as “Assigned by ATC”; b) While on a climb via clearance, if a new clearance is issued to an altitude to maintain (for example, “Climb and maintain flight level one eight zero”), all published altitude restrictions on the SID are cancelled; c) A clearance to “climb via SID except maintain” cancels all remaining published altitudes on the SID that are above the cleared altitude; d) A clearance to “climb via SID except cross” instructs pilots to comply with the issued crossing restriction and all other restrictions on the SID; e) The phraseology “climb unrestricted” is not used. A climb and maintain (altitude) authorizes the pilot to climb unrestricted to the assigned altitude.
6.3.2.5	In the U.S., if the communications failure occurs in IFR conditions, or if VFR cannot be complied with, each pilot shall continue the flight according to the following requirements: Route a) By the route assigned in the last ATC clearance received; b) If being radar vectored, by the direct route from the point of failure to the fix, route, or airway specified in the vector clearance; c) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or d) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan. Altitude - At the highest of the following altitudes or flight levels for the route segment being flown: a) The altitude or flight level assigned in the last ATC clearance received; b) The minimum altitude as prescribed in 14 CFR Part 91 (Section 91.121(c)) for IFR operations; or c) The altitude or flight level ATC has advised may be expected in a further clearance.
6.3.3.3	Arriving aircraft − delay of 10 minutes or more.

6.5.2.4	In the U.S.: a) A descend via clearance authorizes pilots to descend at pilot discretion to meet published restrictions on a STAR. Pilots are not authorized to descend without being issued an altitude; b) An altitude to maintain is not normally issued in conjunction with a descend via clearance. If no altitude is issued, the pilot is expected to descend to the lowest published altitude on the STAR; c) While on a descend via clearance, if a new clearance is issued to an altitude to maintain (for example, "Descend and maintain flight level two eight zero"), all published altitude restrictions on the STAR are cancelled; d) A clearance to "descend via STAR except maintain" cancels all remaining published altitudes on the STAR that are below the cleared altitude; e) A clearance to "descend via STAR except cross" instructs pilots to comply with the issued crossing restriction and all other restrictions on the STAR; f) The phraseology "descend unrestricted" is not used. A descend and maintain (altitude) authorizes the pilot to descend unrestricted to the assigned altitude.
6.5.3.1	The 7110.65 does not stipulate flight crew concurrence of Controller initiated Visual Approach.
6.5.3.5	U.S. requires ATC to inform following aircraft behind Heavy/B757 aircraft of manufacturer and model information.
6.5.5.2	Onward clearance time. 7110.65 PG EXPECT FURTHER CLEARANCE (TIME)- The time a pilot can expect to receive clearance beyond a clearance limit.
6.7.3.1.2	U.S. has no criteria for separate radar controllers in conducting Parallel approaches.
6.7.3.2.1 a) Table 6−1	When conducting Dual and Triple Simultaneous Independent Approaches using High Update Rate Surveillance, the FAA allows the minimum distance between runway centerlines to be 3100 feet.
6.7.3.2.4 c	The United States does not require the final vector to final to enable the aircraft to be established on the final approach course track, in level flight for at least 3.7 km (2.0NM) prior to intercepting the glide path or vertical path for the selected instrument approach procedure.
6.7.3.2.10	U.S. has no parallel approach obstacle assessment surfaces (PAOAS) Criteria.
6.7.3.2.10	The U.S. has no criteria for a "45 degree track".
6.7.3.2.11 (a)	The U.S. has no criteria for both controllers to be advised when visual separation is applied.
6.7.3.4.1 (f)	The U.S. requires that adjacent missed approach procedures do not conflict.
6.7.3.6.3 (b)	The U.S. has no surveillance radar approach (SRA).
6.7.3.6.3 (c)	In the U.S., aircrews may execute visual approaches when the pilot has either the airport or the preceding aircraft in sight and is instructed to follow it. A contact approach is one wherein an aircraft on an IFR flight plan, having an air traffic control authorization, operating clear of clouds with at least 1 mile flight visibility and a reasonable expectation of continuing to the destination airport by visual reference in those conditions, may deviate from the instrument approach procedure and proceed to the destination airport by visual reference to the surface. This approach will only be authorized when requested by the pilot and the reported ground visibility at the destination airport is at least 1 statute mile.
CHAPTER 7	**PROCEDURES FOR AERODROME CONTROL SERVICE**
7.4.1.1	U.S. has no start up procedures, taxi clearance.
7.4.1.2.1 (f)	U.S. does not require time check prior to taxi.
7.6.3.1.1.3	In the U.S. the FAA does not publish standard taxi routes to be used at an airport in the national AIP.
7.6.3.2.3.2	In the U.S., for movements of other than aircraft traffic (i.e., vehicles, equipment, and personnel), steady green means cleared to cross, proceed, go; flashing green is not applicable; flashing white means return to starting point on airport; and alternating red and green means a general warning signal to exercise extreme caution.
7.6.3.2.3.3	U.S. controllers do not flash runway or taxiway lights to instruct aircraft to "vacate the runway and observe the tower for light signal."

7.10.2	In the U.S., landing clearance to a succeeding aircraft in a landing sequence need not be withheld if the controller observes the positions of the aircraft and determines that prescribed runway separation will exist when the aircraft crosses the landing threshold. Controllers issue traffic information to the succeeding aircraft if it has not previously been reported.
7.11.4 and 7.11.6	U.S. category 1, 2, & 3 (SRS) aircraft weights differ. Separation standards are greater, due to increased size and weight categories.
7.13.1.1.2	U.S. does not specify separation standards on taxiways.
7.15	Special VFR operations may be conducted in the U.S. under the following weather minimums and requirements below 10,000 feet MSL within the airspace contained by the upward extension of the lateral boundaries of the controlled airspace designated to the surface for an airport. These minimums and requirements are found in 14 CFR Section 91.157. Special VFR operations may only be conducted: (1) With an ATC clearance; (2) Clear of clouds; (3) Except for helicopters, when flight visibility is at least 1 statute mile; and (4) Except for helicopters, between sunrise and sunset (or in Alaska, when the sun is 6 degrees or more below the horizon) unless: (i) The person being granted the ATC clearance meets the applicable requirements for instrument flight; and (ii) The aircraft is equipped as required in 14 CFR Sec. 91.205(d).
7.15	No person may take off or land an aircraft (other than a helicopter) under special VFR: (1) Unless ground visibility is at least 1 statute mile; or (2) If ground visibility is not reported, unless flight visibility is at least 1 statute mile.
CHAPTER 8	**ATS SURVEILLANCE SERVICES**
8.5.5.1	U.S. validation of mode C readouts allow up to 300 feet variance from pilot reported altitudes.
8.6.5.2	The U.S. has not implemented cold temperature corrections to the radar minimum vectoring altitude.
8.7.3.2 (b)	The U.S. only allows visual observance of runway turn-off points.
8.7.3.4	Separate a Heavy aircraft operating directly behind a Super aircraft or following a Super aircraft conducting an instrument approach by 6 miles unless the Super aircraft is operating above FL 240 and above 250 knots. Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake
8.7.3.5	FAA Consolidated Wake Turbulence (CWT) is based on nine weight groups. FAA distance-based wake turbulence separation minima differs from ICAO standards.
8.7.3.6	Separate a Heavy aircraft operating directly behind a Super aircraft or following a Super aircraft conducting an instrument approach by 6 miles unless the Super aircraft is operating above FL 240 and above 250 knots. Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake.

8.8.3.2	In the U.S., if the communications failure occurs in IFR conditions, or if VFR cannot be complied with, each pilot shall continue the flight according to the following requirements: Route a) By the route assigned in the last ATC clearance received; b) If being radar vectored, by the direct route from the point of failure to the fix, route, or airway specified in the vector clearance; c) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or d) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan. Altitude − At the highest of the following altitudes or flight levels for the route segment being flown: a) The altitude or flight level assigned in the last ATC clearance received; b) The minimum altitude as prescribed in 14 CFR Part 91 (Section 91.121(c)) for IFR operations; or c) The altitude or flight level ATC has advised may be expected in a further clearance.
8.8.4.2	The U.S. does not specify that applicable separation can be utilized during emergency situations.
8.9.3.6	U.S. specifies maximum intercept angle of 30 degrees for fixed wing aircraft vectored to final approach course.
CHAPTER 9	**FLIGHT INFORMATION SERVICE AND ALERTING SERVICE**
9.1.3.2.1	ATC facilities in the CONUS will no longer receive AIRMET advisories to broadcast and will therefore not broadcast AIRMETs; operators have other methods, such as the G−AIRMET, of receiving AIRMET information over the CONUS.
9.1.3.7	The U.S. does not have special procedures for the transmission of information to supersonic aircraft.
9.1.4.1.1	Class F airspace is not used in the U.S. Traffic advisories are provided in Class C airspace and, workload permitting, in Class D, Class E, and Class G airspace.
9.2.1.2	The U.S. does not use "operations normal" or "QRU" messages. U.S. controllers are not normally familiar with the term "uncertainty phase."
CHAPTER 10	**COORDINATION**
10.1.3.1	Except for a VFR aircraft practicing an instrument approach, an IFR approach clearance in the U.S. automatically authorizes the aircraft to execute the missed approach procedure depicted for the instrument approach being flown. No additional coordination is normally needed between the approach and en route controllers. Once an aircraft commences a missed approach, it may be radar vectored.
10.1.4.2.2	U.S. does not require ETA to be forwarded at least 15 minutes prior to ETA.
CHAPTER 11	**AIR TRAFFIC SERVICES MESSAGES**
11.1.2	U.S. uses different emergency messages. FAA Order JO 7110.10, Chapter 3, Emergency Services.
CHAPTER 12	**PHRASEOLOGIES**
12.2.7	US ATC does not allow conditional clearances described for example: "SAS 941, BEHIND DC9 ON SHORT FINAL, LINE UP BEHIND." *Note − This implies the need for the aircraft receiving the conditional clearance to identify the aircraft or vehicle causing the conditional clearance.*

12.3.1.2 m) General to require action when convenient m) WHEN READY *(instruction)*;	U.S. does not use this phraseology. 7110.65 4-5-7. ALTITUDE INFORMATION PHRASEOLOGY CLIMB/ DESCEND AT PILOT'S DISCRETION 1. The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates specified in the AIM, 4-4-9, Adherence to Clearance, until reaching FL 280. At that point, the pilot is authorized to continue descent to FL 240 within the context of the term "at pilot's discretion" as described in the AIM. f. When the "pilot's discretion" portion of a climb/descent clearance is being canceled by assigning a new altitude, inform the pilot that the new altitude is an "amended altitude." EXAMPLE- "American Eighty Three, amend altitude, descend and maintain Flight Level two six zero."
12.3.1.2 (n) MAINTAIN OWN SEPARATION AND VMC [FROM *(level)*] [TO *(level)*]; and (o) MAINTAIN OWN SEPARATION AND VMC ABOVE (*or* BELOW, *or* TO) *(level)*;	U.S. does not use "maintain own separation and VMC 'from,' 'above,' or 'below' . . . ," U.S. controllers say "maintain visual separation 'from' that traffic." Meteorological conditions are expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.
12.3.1.2 aa) Clearance to cancel level restriction(s) of the vertical profile of a SID during climb." **(z)** CLIMB TO *(level)* [LEVEL RESTRICTION(S) *(SID designator)* CANCELLED *(or)* LEVEL RESTRICTION(S) *(SID designator)* AT *(point)* CANCELLED];	The U.S. does not have specific phraseology examples that cover this issue. However, phraseology contained in the 7110.65 covers how to change altitudes and altitude restriction in a SID.

12.3.1.2 ff) Clearance to cancel level restriction(s) of the vertical profile of a STAR during descent. **gg)** DESCEND TO *(level)* [LEVEL RESTRICTION(S) *(STAR designator)* CANCELLED *(or)* LEVEL RESTRICTION(S) *(STAR designator)* AT *(point)* CANCELLED].	The U.S. does not have specific phraseology examples that cover this issue. However, phraseology contained in the 7110.65 covers how to amend or cancel altitude restrictions.
12.3.1.2 a) 2) TO AND MAINTAIN BLOCK *(level)* TO *(level);*	U.S. uses “MAINTAIN BLOCK (altitude) THROUGH (altitude).” 7110.65, Para 4-5-7. g. ALTITUDE INFORMATION
12.3.1.6 CHANGE OF CALL SIGN	U.S. has no phraseology or approved procedure to advise aircraft to change call signs. The U.S. has procedures for a duplicate aircraft identification watch and notification to airline operators but does not publish national procedures for on-the-spot temporary changes to aircraft call signs in accordance with ICAO guidelines.
12.3.1.7 TRAFFIC INFORMATION	The U.S. requires issuance of azimuth, distance, direction, type, and altitude.
12.3.1.8 b) METEOROLOGICAL CONDITIONS	In the U.S., the criterion for a variable wind is: wind speed greater than 6 kt and direction varies by 60 degrees or more. If the wind is >1 kt but <6 kt, the wind direction may be replaced by ”VRB” followed by the speed or reported as observed. “VRB” would be spoken as “wind variable at <speed>.”
12.3.1.8 d), e), and f) METEOROLOGICAL CONDITIONS	U.S. controllers do not give wind speed, visibility, or RVR values in metric terms. RVR values are given in 100- or 200-foot increments while RW values are given in Venule increments.
12.3.1.8 j)	U.S. controllers do not use the term “CAVOK.” However, the ceiling/sky condition, visibility, and obstructions to vision may be omitted if the ceiling is above 5,000 feet and the visibility is more than 5 miles.
12.3.1.8 l) and m)	In the US, controllers and pilots exchange altimeter setting by reference to inches Hg. ICAO describes altimeter setting by reference to millibars, QNH or QFE. (where QNH – above mean sea level and QFE – height above aerodrome)
12.3.2.2 INDICATION OF ROUTE AND CLEARANCE LIMIT	U.S. will issue a clearance “direct” to a point on the previously issued route. PHRASEOLOGY CLEARED DIRECT (fix). NOTE Clearances authorizing “direct” to a point on a previously issued route do not require the phrase “rest of route unchanged.” However, it must be understood where the previously cleared route is resumed. When necessary, “rest of route unchanged” may be used to clarify routing. 7110.65, paragraph 4−4−1. ROUTE USE & 4−2−5. ROUTE OR ALTITUDE AMENDMENTS 3.

12.3.2.4 Specification of Cruise Levels, (c) Cruise climb between. *(levels)* or above *(level)*	The U.S. does not have equivalent cruise climb between levels/altitudes. However, in ICAO regions for supersonic flight 8- 8-3a(1), U.S. has adopted ICAO phraseology.
12.3.2.5	U.S. has no phraseology or instruction for emergency descent:
12.3.2.8, Separation Instructions (b) ADVISE IF ABLE TO CROSS (significant point) AT (time or level)	U.S. has no phraseology for "ADVISE IF ABLE." U.S. does have phraseology "Advise if unable..."
12.3.4.7, Taxi procedures, after landing (n), (o), & (p)	U.S. has no phraseology using "BACKTRACK." U.S. does use BACK-TAXI (7110.65) − A term used by air traffic controllers to taxi an aircraft on the runway opposite to the traffic flow. The aircraft may be instructed to back-taxi to the beginning of the runway or at some point before reaching the runway end for the purpose of departure or to exit the runway.
12.3.4.11 TAKE-OFF CLEARANCE when take-off clearance has not been complied with c) Vacate 12.3.4.20 RUNWAY VACATING AND COMMUNICATIONS AFTER LANDING b)	U.S. uses **CLEAR OF THE RUNWAY** **a.** Taxiing aircraft, which is approaching a runway, is clear of the runway when all parts of the U.S. uses aircraft are held short of the applicable runway holding position marking. **b.** A pilot or controller may consider an aircraft, which is exiting or crossing a runway, to be clear of the runway when all parts of the aircraft are beyond the runway edge and there are no restrictions to its continued movement beyond the applicable runway holding position marking. **c.** Pilots and controllers shall exercise good judgment to ensure that adequate separation exists between all aircraft on runways and taxiways at airports with inadequate runway edge lines or holding position markings.
12.3.4.11 (e) HOLD POSITION, CANCEL TAKE−OFF I SAY AGAIN CANCEL TAKE−OFF *(reasons)*;	U.S. uses different phraseology to cancel a take off. 3-9-10. CANCELLATION OF TAKEOFF CLEARANCE PHRASEOLOGY If circumstances require, cancel a previously issued take-off clearance and, when appropriate, inform the aircraft of the reason. ***PHRASEOLOGY*** *CANCEL TAKEOFF CLEARANCE (reason)*

12.3.5.7 a) EXPEDITE CLEARANCE *(aircraft call sign)* EXPECTED DEPARTURE FROM *(place)* AT *(time)*; b) EXPEDITE CLEARANCE *(aircraft call sign)* [ESTIMATED] OVER *(place)* AT *(time)* REQUESTS *(level or route, etc.)*.	U.S. has no phraseology to expedite clearance.
12.3.5.6 HANDOVER	U.S. does not use radar handover. 7110.65, Para 5-4-3. METHODS PHRASEOLOGY HANDOFF/ POINT OUT/TRAFFIC (aircraft position) (aircraft ID),or (discrete beacon code point out only) (altitude, restrictions, and other appropriate information, if applicable). c. When receiving a handoff, point out, or traffic restrictions, respond to the transferring controller as follows: PHRASEOLOGY- (Aircraft ID) (restrictions, if applicable) RADAR CONTACT, or (aircraft ID or discrete beacon code) (restrictions, if applicable) POINT OUT APPROVED, or TRAFFIC OBSERVED,
12.4.1.1 IDENTIFICATION OF AIRCRAFT f)	U.S. controllers do not say “will shortly lose identification” or “identification lost.” 7110.65, Para 5-3-7 5-3-7. IDENTIFICATION STATUS a. Inform an aircraft of radar contact when: 1. Initial radar identification in the ATC system is established. 2. Subsequent to loss of radar contact or terminating radar service, radar identification is re-established. *PHRASEOLOGY* *RADAR CONTACT (position if required).* b. Inform an aircraft when radar contact is lost. *PHRASEOLOGY* *RADAR CONTACT LOST (alternative instructions when required).*
12.4.2.1 VECTORING FOR APPROACH (b)	U.S. would use “airport or runway” rather than “field.” 7-4-2. VECTORS FOR VISUAL APPROACH PHRASEOLOGY- (ACID) FLY HEADING OR TURN RIGHT/LEFT HEADING (degrees) VECTOR FOR VISUAL APPROACH TO (airport name). 7110.65, Para 5-11-2, VISUAL REFERENCE REPORT: Aircraft may be requested to report the runway, approach/runway lights, or airport in sight. Helicopters making a “point-in-space” approach may be requested to report when able to proceed to the landing area by visual reference to a prescribed surface route. *PHRASEOLOGY* *REPORT* *(runway, approach/runway lights or airport)* *IN SIGHT.* *REPORT WHEN ABLE TO PROCEED VISUALLY TO AIRPORT/HELIPORT.*

12.4.2.4.2 a) COMMENCE DESCENT NOW [TO MAINTAIN A (*number*) DEGREE GLIDE PATH]	The U.S uses only “begin descent” and does not speak to “Maintain a (number) Degree Glide Path.”
12.4.2.5.1 PAR APPROACH	U.S. controllers say “this will be a P-A-R/surveillance approach to runway (number) or airport/runway (number) or airport/heliport.” U.S. controllers do not say ”approach completed.” U.S. controllers say “your missed approach procedure is (missed approach procedure)” and, if needed, ”execute missed approach.” For PAR approaches, U.S. controllers say “begin descent” and for surveillance approaches, U.S. controllers say “descend to your minimum descent altitude.” 7110.65, Para 5-12-8. APPROACH GUIDANCE TERMINATION lights in sight and requested to or advised that he/she will proceed visually, and has been instructed to proceed visually, all PAR approach procedures shall be discontinued. d. Continue to monitor final approach and frequency. Pilots shall remain on final controller’s frequency until touchdown or otherwise instructed. 5-12-9. COMMUNICATION TRANSFER PHRASEOLOGY CONTACT (terminal control function) (frequency, if required) AFTER LANDING
12.4.2.4.4 CHECKS; (a)	U.S. uses “CHECK WHEELS DOWN”. 7110.65, Par 2-1-24. WHEELS DOWN CHECK PHRASEOLOGY
12.4.2.5.8 MISSED APPROACH a)	US ATC does not allow conditional clearances described.
12.4.3.12 and 12.4.3.13	U.S., for aircraft above FL 180, U.S. controllers would say, “confirm using two niner niner two as your altimeter setting, verify altitude” or “stop altitude squawk” “stop altitude squawk; altitude differs by (number) feet.” U.S. controllers would not say “stop squawk Charlie.” 7110.6, Para 5-2-22. BEACON TERMINATION Inform an aircraft when you want it to turn off its transponder.
12.3.4.13 - ENTERING AN AERODROME TRAFFIC CIRCUIT b)	U.S. uses PHRASEOLOGY: ENTER LEFT/RIGHT BASE. STRAIGHT-IN. MAKE STRAIGHT-IN. STRAIGHT-IN APPROVED. RIGHT TRAFFIC. MAKE RIGHT TRAFFIC. RIGHT TRAFFIC APPROVED. CONTINUE. b. Runway in use. c. Surface wind. d. Altimeter setting. REFERENCE FAA Order 7110.65, Current Settings, Para 2-7-1. e. Any supplementary information. f. Clearance to land. g. Requests for additional position reports. Use prominent geographical fixes which can be easily recognized from the air, preferably those depicted on sectional charts. This does not preclude the use of the legs of the traffic pattern as reporting points.
12.4.3.14	U.S. controllers would say “verify at (altitude)” and/or “verify assigned altitude.” 7110.65 Para, 5-2-17. 1. Issue the correct altimeter setting and confirm the pilot has accurately reported the altitude. PHRASEOLOGY- (Location) ALTIMETER (appropriate altimeter), VERIFY ALTITUDE.
12.6.1 Alerting phraseologies	U.S. controllers would issue MEA/MVA/MOCA/MIA instead of QNH. 7110.65.
CHAPTER 15	**PROCEDURES RELATED TO EMERGENICES, COMMUNICATION FAILURE AND CONTINGENCIES**
15.1.3 Unlawful interference and aircraft bomb threat	U.S. has difference updated. 5−2−13, Code Monitor Note 1. & 2. “10−2−6 HIJACKED AIRCRAFT 10−2−6. HIJACKED AIRCRAFT Hijack attempts or actual events are a matter of national security and require special handling. Policy and procedures for hijack situations are detailed in FAA Order JO 7610.4, Special Operations. FAA Order JO 7610.4 describes reporting requirements, air crew procedures, air traffic procedures and escort or interceptor procedures for hijack situations. REFERENCE: FAA Order JO 7610.4, Hijacked/Suspicious Aircraft Reporting and Procedures, Chapter 7. FAA Order 7110.65, Code Monitor, paragraph 5−2−13.

15.3.3 b) 1, 2	7110.65 defers to the AIM for what to expect an aircraft to do when loss of two-way communication has been encountered. The expectations in the AIM differ from what a pilot is expected to do in accordance with PANS-ATM 15.3.3 b) 1 and 2. The U.S. does not specify a time that an aircraft would maintain its last assigned heading, speed, or altitude. PANS-ATM uses 20 min. in a non-radar environment and 7 min. in a radar environment.
15.3.10	When neither communications nor radar contact can be established for 30 minutes (or prior, if appropriate), U.S. controllers will consider an aircraft overdue and will initiate overdue aircraft procedures including reporting to the ARTCC or FSS.
15.4.1	U.S. does not use the terms "strayed" or "unidentified" aircraft. 7110.65, paragraph 10-3-1. OVERDUE AIRCRAFT
15.5.3.2	Separate known aircraft from the aircraft dumping fuel as follows: a. IFR aircraft by one of the following: 1. *1,000 feet* above it; or in accordance with paragraph 4−5−1, Vertical Separation Minima, whichever is greater. 2. 2,000 feet below it. 3. 5 miles radar. 4. 5 miles laterally. b. VFR radar-identified aircraft by *5 miles* and in accordance with paragraph 5−6−1, Application.
15.7.1.1	The PANS-ATM states: "If, during an emergency situation, it is not possible to ensure that the applicable horizontal separation can be maintained, emergency separation of half the applicable vertical separation minimum may be used" Pilots must be advised that emergency separation is being applied and traffic information must be given. There is no equivalent emergency separation procedure in the U.S.
APPENDIX 1	**INSTRUCTIONS FOR AIR-REPORTING BY VOICE COMMUNICATIONS**
AIREP Form of Air-report	U.S. uses Pilot Reports (UAs), or Urgent Pilot Reports (UUAs).
APPENDIX 2	**FLIGHT PLAN**
ITEM 9	ICAO aircraft wake turbulence categories (heavy, medium, light) and FAA weight classes (heavy, large, small) differ. Also, for landing aircraft, wake turbulence separation is defined differently. The U.S. makes special provisions for any aircraft landing behind a B-757 (4 miles for a large aircraft behind or 5 miles for a small aircraft behind).
ITEM 15	U.S. ATS units do not accept cruising speeds nor filed altitudes/flight levels in metric terms. The U.S. accepts filed Mach Number expressed as M followed by 3 figures.
ITEM 18	The U.S. accepts the non-standard indicator IRMK/in filed flight plans.
APPENDIX 4	**AIR TRAFFIC INCIDENT REPORT**
Appendix 4	U.S. has their accident/incident report in FAA Order JO 8020.16C.
APPENDIX 6	**ATS INTERFACILITY DATA COMMUNICATIONS (AIDC) MESSAGES**
1. INTRODUCTION 1.1 General	7110.65; 8-2-3. AIR TRAFFIC SERVICES INTERFACILITY DATA COMMUNICATIONS (AIDC) Where interfacility data communications capability has been implemented, its use for ATC coordination should be accomplished in accordance with regional Interface Control Documents, and supported by letters of agreement between the facilities concerned.

ANNEX 3 − METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION	
PART I (Core SARPs)	
Chapter 2	**General Provisions**
2.2	The U.S. has implemented a quality management system (QMS) for the majority of the meteorological information supplied to users. WAFC Washington and MWO Kansas City (a.k.a. Aviation Weather Center) are ISO 9000. MWOs Anchorage and Honolulu and all 122 Weather Forecast Offices have a QMS that is governed under the following National Weather Service (NWS) directives: NWS Instruction 10−1601 (Verification), NWS Instruction 10−1602 (Service Evaluation), NWS Instruction 10−1606 (Service Assessment), NWS Instruction 10−1607 (Office Evaluation), and NWS Instruction 10−815 (Aviation Meteorologist Training and Competencies). No QMS is in place for the augmentation of the surface observing program.
Chapter 3	**World Area Forecast System and Meteorological Offices**
3.2.1	SIGWX forecasts are not disseminated in IWXXM form (Appendix 2, 1.2.1.3).
3.7 b)	Tropical Cyclone Advisories issued by Miami and Honolulu TCACs differ from Table A2−2 in Appendix 2 as they contain forecasts valid at 3−, 9−, 15− 21− and 27−hours instead of 6−, 12−, 18−, and 24−hours.
3.8.1 a) 2)	Space weather advisories are not issued for communication via satellite (SATCOM).
Chapter 4	**Meteorological Observations and Reports**
4.3.2 a)	The U.S. does not issue local routine reports or local special reports. This difference is applicable to subsequent paragraphs that relate to the provision of local routine and special reports in Annex 3. The U.S. provides METAR to departing and arriving aircraft and provides wind and altimeter information in accordance with Federal Aviation Administration (FAA) Order JO 7110.65Y Section 9 (3−9−1) and Section 10 (3−10−1).
4.5.1 d)	This field is also used to denote a correction to the METAR/SPECI by “COR.”
4.6.2.1	The U.S. reports visibility in statute miles.
4.6.3.3	RVR values in the METAR/SPECI code forms are reported in feet.
4.6.4.1	The U.S. automated surface observing systems (ASOS, AWOS) do not generate an automated report for the occurrence of drizzle or freezing drizzle. The ASOS does allow the manual augmentation of these elements to the observations.
4.6.7	The U.S. provides atmospheric pressure in inches of mercury. METAR and SPECI contains an Altimeter Setting (A) instead of QNH, for example, A3010 for 30.10 inches of mercury. The U.S. does not provide QFE.
Chapter 5	**Aircraft observations and reports**
5.5	Urgent Pilot Reports (UUA) are used in lieu of Special Aircraft Observations, to include Hail, Low Level Wind Shear (within 2,000 ft of surface), severe icing, severe and extreme turbulence, tornado, funnel cloud or waterspout, and volcanic eruption and/or volcanic ash. In addition, Pilot Reports (UA) and UAA identify the location of the weather phenomenon by NAVAIDS. Pilot Reports are used in lieu of Special Aircraft Observations, to include moderate turbulence and moderate icing. Braking action may be included in the remarks section of the UUA/UA, but is reported to air traffic control when worse than reported.
Chapter 6	**Forecasts**
6.3.1	Landing forecasts are provided by the TAF.
6.3.3	The U.S. does not provide trend forecasts.
6.5	The U.S. provides an Area Forecast (FA) and Graphical Forecast for Aviation (GFA) in place of a GAMET. The FA is provided by MWOs Anchorage and Honolulu while the GFA is provided by WFO Kansas City. The format and content of the FA and GFA differs from the GAMET. The FA and GFA are valid from the surface up to FL450. The GFA is a web−based interactive information service.

Chapter 7	**SIGMET and AIRMET Information, Aerodrome Warnings and Wind Shear Warnings**
7.1.3	The period of validity is 4-hour for volcanic ash SIGMETs issued by the MWO Kansas City over the contiguous U.S.
7.1.4	Volcanic ash SIGMETs issued by the MWO Kansas City over the contiguous U.S. are coordinated with the VAAC but are not based solely on the advisory information due to the period of validity.
7.1.6	Volcanic ash SIGMETs issued by the MWO Kansas City over the contiguous U.S. are updated every 4−hours.
7.2.1	The vertical domain of U.S. AIRMETs is from the surface up to FL450. The content, order, and format of U.S. AIRMETs are not in accordance with Table A6−1A due to national practices, which are described in National Weather Service Instruction 10−811. Traditional Alphanumeric Code AIRMETs are no longer in use over the contiguous U.S., but continue to be used over Alaska and Hawaii. The AIRMET sequence number is not restricted to FIRs. AIRMETs in the U.S. are issued on a routine schedule when moderate turbulence, non-convective low-level wind shear, strong surface winds greater than 30 knots, moderate icing, freezing level, mountain obscuration, or IFR conditions are occurring or are expected to occur. The US does not issue AIRMETs for thunderstorms. AIRMET information is not restricted to FL100 and below and can be provided up to FL450 depending on the phenomena. The U.S. does not use flight level (FL) when describing the altitudes in AIRMETs except for those above FL180. The U.S. uses VORs instead of latitude and longitude to describe the area within an AIRMET.
7.2.3	AIRMETs over the contiguous U.S. and Hawaii are valid for 6 hours and are issued every 6 hours on a scheduled basis. AIRMETs over Alaska are valid for 8 hours and are issued every 8 hours on a scheduled basis. The vertical domain of AIRMETs is from the surface up to FL450. The U.S. also provides a graphical version of the AIRMET (G−AIRMET) that contains 3−hourly time steps valid from 0−hour to 12−hours.
7.4.1	The U.S. does not provide wind shear warnings. The U.S. believes wind shear alerts are timelier to flight crews in landing and takeoff than wind shear warnings and thus provide a greater level of safety. In addition, the information is duplicative in nature in that wind shear warnings could be delayed while wind shear alerts are provided via automated systems that allow for immediate data link to flight crews through ATS systems.
Chapter 9	**Service for operators and flight crew members**
9.2.3 & 9.2.4	U.S. meteorological offices have no means to communicate directly to flight crews if there is a divergence in the forecast from what is provided in the flight document folder.
9.3.3	U.S. meteorological offices have no means to provide updates to flight document folders or to contact the operator.
PART II	**APPENDICES and ATTACHMENTS**
APPENDIX 2	**Technical specifications related to global systems, supporting centers and meteorological offices**
Table A2−2	U.S. TCACs do not provide observed CB clouds in the tropical cyclone advisory message.
5.1.4	U.S. TCACs do not provide observed CB clouds in the tropical cyclone advisory (TCA) message. The U.S. does not provide a graphical version of the TCA.
APPENDIX 3	**Technical specifications related to meteorological observations and reports**
2.1.2	U.S. METARs and SPECIs are not issued in accordance with Table A3−2 due to national practices, which are described in FAA Order JO 7900.5 and Federal Meteorological Handbook No. 1 (FMH−1). Ranges and resolution for numerical elements included in METAR and SPECI differ from Table A3−5.
2.2	The U.S. does not use the term CAVOK in meteorological reports.

2.3	U.S. practices require SPECI for wind shift when wind direction changes by 45 degrees or more in less than 15 minutes and the wind speed is 10 knots or more throughout the wind shift. Practices do not require SPECI for increases of mean surface wind speed. Practices require SPECI for squall, where squall is defined as a strong wind characterized by a sudden onset in which the wind speed increases at least 16 knots and is sustained at least 22 knots or more for at least one minute. Practices do not require SPECI for wind direction changes based on local criteria. Practices do not require SPECI for the onset, cessation or change in intensity of: freezing fog; low drifting dust, sand or snow; blowing dust, sand or snow (including snowstorm); dust storm; or sandstorm. Practice provides a SPECI when a layer of clouds or obscurations aloft is present below 1000 ft and no layer aloft was reported below 1000 ft in the preceding report. A SPECI is also reported when the ceiling (ceiling is defined in the U.S. as the lowest broken or overcast layer) decreases or increases at these markers: 3000, 1500, 1000, 500 ft or lowest published instrument approach procedures. SPECI is made when referenced weather phenomena cause changes in the visibility, ceiling, sky condition, freezing precipitation (including intensity), hail, or ice pellets.
2.3.3 c)	The U.S. does not issue SPECI for the equivalents in feet of 50, 175, 300, 550 or 600 meters. RVR is measured in increments of 100 feet up to 1,000 feet, increments of 200 feet from 1,000 feet to 3,000 feet, and increments of 500 feet above 3,000 feet to 6,000 feet. SPECI is made when the highest value from the designated RVR runway decreases to less than or if below, increases to equal or exceeds 2,400 feet during the preceding 10 minutes.
3.1.4	Practice to disseminate SPECI for improving conditions as soon as possible after the observation.
4.1.1.2	The U.S. does not provide wind representatives for specific runways but does provide a wind representative for the aerodrome.
4.1.3.1 b)	The United States provides a 2−minute average wind observation for the METAR/SPECI.
4.1.5	The wind direction may be considered variable if, during the 2−minute evaluation period, the wind speed is 6 knots or less. Also, the wind direction must be considered variable if, during the 2−minute evaluation period, it varies by 60 degrees or more when the wind speed is greater than 6 knots. Practices define wind gusts as rapid fluctuations in wind speed with a variation of 10 knots or more between peaks and lulls. Wind speed data for the most recent 10 minutes is examined and a gust, the maximum instantaneous wind speed during that 10−minute period, is reported if the definition above is met during that period.
4.2.4.4	Surface visibility is derived from an automated sensor system and is reported as prevailing visibility in the METAR and SPECI. Tower visibility is the prevailing visibility determined from the airport control tower at locations that also report surface visibility. When visibility is reported from both surface and tower, the lower value (if below 4 miles) is reported in the body of the METAR/SPECI and the other value is reported in the remarks section of the METAR/SPECI.
4.3.4b)	The U.S. does not report in METAR or SPECI marked discontinuity values when RVR passes through values of 800, 550, 300 and 175 meters.
4.3.6	The U.S. reports RVR in increments of 100 feet up to 1,000 feet, increments of 200 feet from 1,000 feet to 3,000 feet, and increments of 500 feet above 3,000 feet to 6,000 feet. The U.S. reports RVR for a single designated runway in the METAR/SPECI. RVR tendency is not reported.
4.4	The following weather elements are augmented manually at designated automated stations observation sites: FC, TS, GR, GS, and VA. At selected airports, additional present weather elements may be provided. With the exception of volcanic ash, present weather is reported when prevailing visibility is less than 7 statute miles or considered operationally significant. Volcanic ash is always reported when observed.
4.4.2.3	GR refers to all hail. All reports of hail include hailstone size diameter in the Remarks (RMK) section of the METAR/SPECI in increments of 1/4 inch. If no hail size is reported it will be assumed to be small hail. Small hail will result in the issuance of a SPECI. GS is used only when snow pellets are observed. The U.S. automated surface observing systems (ASOS, AWOS, AWSS) do not generate an automated report for the occurrence of drizzle or freezing drizzle. The ASOS and AWSS do allow the manual augmentation of these elements to the observations.
4.4.2.8	The practice with respect to the proximity indicator VC is between 5 to 10 statute miles from point of observation.

4.4.2.10	The U.S. does not use “//” to denote the present weather is missing at an automated observing site. The U.S. uses “PWINO” in the remarks section of the METAR and SPECI to denote the present weather is unavailable.
4.5.3	Practice does not provide adjustments for runway thresholds more than 50 feet lower than aerodrome elevation. Applies to KDEN runways 7, 8, 16L, 16R, 17L, 17R, 25, 26, 34L, 34R and 35R, KCLT runway 36C, KCVG runway 36C, KDFW runways 13L and 31R, KLAS runways 25L and 25R, KMEM runways 9 and 18C, KPIT runways 10R, 28L and 32, KSTL runways 6, 12R, 24 and 29, KIND runway 5L, and KRDU runway 5L.
4.5.4	The United States reports only up to 3 layers at automated sites and up to 6 layers at manual sites. Cloud layer amounts are a summation of layers at or below a given level, utilizing cumulative cloud amount. In addition, at automated sites, which are unstaffed, cloud layers above 12,000 ft are not reported. At staffed automated sites, clouds above 12,000 ft may be augmented. CAVOK and NSC are not used. In addition, the US does not use ”///” when cloud type cannot be observed; ”NCD” when no clouds are detected; or ”//////” for CB or TCU when not detected by automated observing systems. In the US, the symbol ”///”, when used in the cloud section of METAR, refers to a mountain station where the layer is below the station level. The US refers to a cloud Ceiling, with the abbreviation CIG, as the lowest layer reported as broken or overcast, or the vertical visibility into an indefinite ceiling. The US refers to a Variable Ceiling in the METAR and SPECI Remarks (RMK) when the ceiling layer is variable and below 3,000 feet. The range of variability (V) between the two values is included in the Remark, for example “CIG 005V010”. This difference is also applicable to Table A3−2, METAR and SPECI.
4.5.4.6 d)	The United States does not provide supplemental section for the METAR rather the U.S provides a Remarks Section (RMK) that contains similar information. U.S. METAR and SPECI contain Remarks that are intended for all operational decision−making. FMH−1 contains the complete description of Remarks. Wind shear is not included in the METAR/SPECI code form in the U.S remarks. Practice is to not use RE and to use beginning and ending times in the remarks section for only recent precipitation and thunderstorms. Sea−surface temperature, the state of the sea and state of the runway are not provided in the METAR/SPECI code form in the U.S. remarks.
4.8	The United States does not provide supplemental section for the METAR rather the U.S provides a Remarks Section (RMK) that contains similar information. U.S. METAR and SPECI contain Remarks that are intended for all operational decision−making. FMH−1 contains the complete description of Remarks. Wind shear is not included in the METAR/SPECI code form in the U.S remarks. Practice is to not use RE and to use beginning and ending times in the remarks section for only recent precipitation and thunderstorms. Sea−surface temperature, the state of the sea and state of the runway are not provided in the METAR/SPECI code form in the U.S. remarks.
APPENDIX 4	**Technical specifications related to aircraft observations and reports**
3.1.3	The U.S. MWOs do not disseminate special air observations and reports.
APPENDIX 5	**Technical specifications related to forecasts**
1.1	NWS TAFS are not issued in accordance with Table A5−1 due to national practices, which are described in *National Weather Service Instruction 10−813*.
1.2	Forecast visibility increments used consist of 1/4 mile from 0 (zero) to 1 mile, 1/2 mile from 1 to 2 miles, and 1 mile above 2 miles. Note: miles are statute miles. Practice defines light winds as less than or equal to 6 knots for using VRB in TAF. Practices require forecast of non−convective low−level wind shear within 2,000 feet of the ground in the Optional Group. The NWS does not use CAVOK and NSC in the TAF. NWS practices do not include TCU in the TAF.

1.3	Change groups and amendment criteria below 1/2 statute mile (800 meters) are not used. The 100−foot (30 meter) change group and amendment criterion is not used. Practice requires TAF to be amended for a 30−degree change with an accompanying wind of 12 knots or greater; for a 10 knot wind increase only when the original was 12 knots or greater; and for a 10 knot wind gust, regardless of mean wind speed. The NWS does not use the change indicator "BECMG." The period of time covered by a TEMPO group is normally kept to a minimum but could be up to four (4) hours. Practice does not amend TAFs for moderate or heavy precipitation.
1.4	The NWS does not use "PROB 40" in the TAF. "PROB 30" will not be used in the first nine (9) hours of every TAF's valid period, including amendments.

APPENDIX 6	**Technical specifications related to SIGMET and AIRMET information, aerodrome warnings and wind shear warnings and alerts**
Table A6−1A, Template for SIGMET and AIRMET messages	The US does not provide SIGMET and AIRMET information in accordance with Table A6−1A, template for SIGMET and AIRMET messages.
1.1	The content and format of U.S. SIGMETs are not in accordance with Table A6−1A due to national practices, which are described in National Weather Service Instruction 10−811. SIGMETs in the conterminous U.S. (CONUS), i.e. except Alaska and Hawaii, are often valid for more than one FIR. The SIGMET sequence number is not restricted to FIRs. U.S. practices are to issue SIGMET for mountain wave only when accompanied by severe turbulence. Within the CONUS and coastal waters, convective SIGMETs are issued in lieu of SIGMETS for thunderstorms. SIGMETs are issued by alphanumeric series, e.g., Kilo 1,2,3 etc. SIGMET messages in the CONUS use VORs in place of lat/long and do not reference FIRs. The U.S. does not use flight level (FL) when describing the altitudes in SIGMETs except for those above FL180. The U.S. does not include a specific forecast position for the end of the SIGMET and AIRMET validity time, other than TC and VA. The U.S. does not issue a SIGMET for radioactive clouds. Within the FIRs over the CONUS and coastal waters, convective SIGMETs are issued in lieu of SIGMETS for Tropical Cyclones (TC).
2.1	The content, order and format of U.S. AIRMETs are not in accordance with Table A6−1A due to national practices, which are described in National Weather Service Instruction 10−811. AIRMETs in the conterminous U.S. are often valid for more than one FIR. The AIRMET sequence number is not restricted to FIRs. AIRMETs in the U.S. are issued on a routine schedule for icing, turbulence, sustained surface winds, ceiling/visibility and mountain obscuration. The US does not issue AIRMETs for thunderstorms. AIRMET information is not restricted to FL100 and below and can be provided up to FL450 depending on the phenomena. The U.S. does not use flight level (FL) when describing the altitudes in AIRMETs except for those above FL180. The U.S. uses VORs instead of latitude and longitude to describe the area within an AIRMET.
4.2	The U.S. issues convective SIGMETs in lieu of SIGMETs for thunderstorms over the CONUS. The US does not issue AIRMETs for thunderstorms. Convective SIGMETs are issued hourly for the East, Central, and Western U.S. and thus they do not indicate the FIR. Connective SIGMETs have an outlook section.
4.2.1	U.S. practices allow for the use of term widespread (WDSPR) for more than 50 percent of the area. Convective SIGMET criteria over the CONUS are: a. A line of thunderstorms at least 60 miles long with thunderstorms affecting at least 40 percent of its length. b. An area of active thunderstorms judged to have a significant impact on the safety of aircraft operations, covering at least 40 percent of the area concerned, and exhibiting a very strong radar reflectivity intensity or a significant satellite or lightning signature. c. Embedded or severe thunderstorm(s) expected to occur for more than 30 minutes during the valid period regardless of the size of the area.
4.2.9	The U.S. criteria for heavy sandstorm and dust storm is visibility less than or equal to 1/4 SM (400 m). The U.S. criteria for moderate sandstorm and dust storm is visibility greater than 1/4 SM and less than or equal to 1/2 SM (800 m).
5.1	The U.S. issues airport warning messages similar to the ICAO format (Table A6−2, Template for aerodrome warnings) only at selected airports based on criteria per a bilateral agreement between the airport authority and the NWS Forecast Office.
6.2.1	The U.S. does not provide wind shear warnings.

ANNEX 4 − AERONAUTICAL CHARTS	
Chapter 1	**Definitions**
Air taxiway	The U.S. does not depict defined surfaces for air−taxiing of helicopters.
Final approach and take−off area (FATO)	The U.S. does not depict final approach and take−off areas (FATOs).
Prohibited area Restricted area	The U.S. will employ the terms “prohibited area” and “restricted area” substantially in accordance with the definitions established and, additionally, will use the following terms: “Alert area.” Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. “Controlled firing area.” Airspace wherein activities are conducted under conditions so controlled as to eliminate the hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground. “Warning area.” Airspace which may contain hazards to nonparticipating aircraft in international airspace. “Maneuvering area.” This term is not used by the U.S. “Military operations area (MOA).” An MOA is an airspace assignment of defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. “Movement area.” Movement area is defined by the U.S. as the runways, taxiways, and other areas of an airport which are utilized for taxiing, take−off, and landing of aircraft, exclusive of loading ramp and parking areas.
Touchdown and lift−off area (TLOF)	The U.S. does not use this term.
Chapter 1.1	**Definitions**
Aerodrome reference point	Airport Reference Point is the approximate geometric center of all usable runway surfaces.
Area Minimum Altitude	Off Route Obstruction Clearance Altitude (OROCA) used.
Air Transit Route	Term “Helicopter Route” used.
Arrival Routes	Arrival routes are also identified on Standard Terminal Arrival (STAR).
Danger Area	The term “danger area” will not be used in reference to areas within the U.S. or in any of its possessions or territories.
Flight Level	Flight level is related to a reference datum of 29.92 inches of mercury.
Glide Path	Glideslope is used instead of glide path.
Helicopter Stand	Helipad is used vice helicopter stand.
Minimum obstacle clearance altitude (MOCA)	MOCA also assures acceptable navigational signal coverage within 22 NM of a VOR.
Minimum sector altitude (MSA)	The FAA refers to Minimum Sector Altitudes as Minimum Safe Altitudes.
Missed approach point	Missed approach point based on acquiring the required visual reference.
Movement Area	Movement area also includes areas used by helicopters in taxiing. It does not include loading ramps or parking areas.
Obstacle	Obstacles may include terrain and objects of natural growth.

Obstacle clearance altitude (OCA) or Obstacle clearance height (OCH)	Decision Altitude and Decision Height used vice Obstacle Clearance Altitude and Obstacle Clearance Height.
Terminal arrival altitude (TAA)	Terminal Arrival Areas defined by the extension of the IAF legs and the intermediate segment course.
Touchdown zone	Touchdown zone is the first 3000 feet of the runway beginning at the threshold.
Visual approach procedure	Visual approach procedure is conducted on an IFR flight plan which authorizes the pilot to proceed visually and clear of clouds to the airport.
Chapter 1.2	**Applicability**
1.2.2	Charts vary in their conformance to ICAO Standards.
1.2.2.1	Charts vary in their conformance to ICAO Recommended Practices.
Chapter 2	**General Specifications**
2.1.7	Charts are True North oriented except as indicated.
2.1.8	Sheet size of charts varies dependent on chart type.
2.2.1	The marginal note layouts, in some cases, differ from those set forth in Appendices 1, 5, and 6.
2.3.1	Marginal note layouts vary by chart type
2.4	Symbols do not universally conform to Appendix 2.
2.4.1	Symbols do not universally conform to Appendix 2.
2.5.4	Linear dimensions are expressed in feet.
2.5.7	Conversion scales are not universally used.
2.6.2	Some charts have no linear scale.
2.9.2	Abbreviations used are from FAA Order JO JO 7340.2, not ICAO Doc 8400.
2.11	Color schemes differ by chart series.
2.12.2	Hypsometric tints differ by chart series.
2.14.1	Airspace depiction differs by chart.
2.15.1	Depiction of magnetic variation differs by chart series and is not always shown.
2.15.4	Each aerodrome has its own magnetic variation assigned. IACC specifications require individually assigned magnetic variation values for each airport.
2.16	Chart typography may vary in conformance to ICAO Standards.
2.18.3.1	Julian Calendar is also used. Local times are used on select charts.
Chapter 3	**Aerodrome Obstacle Chart – ICAO Type A (Operating Limitations)**
3.1	This data is available digitally and is depicted on other individual flight products to which it is pertinent.
3.2.1	Availability of chart is not dependent on provision of other charts.
3.2.2	Notification is not made when chart is not required.
Chapter 4	**Aerodrome Obstacle Chart – ICAO Type B**
4.1	This data is available digitally and is depicted on other individual flight products to which it is pertinent.
4.2.1	Availability of chart is not dependent on provision of other charts.
Chapter 5	**Aerodrome Obstacle Chart – ICAO Type C**
5.1	This data is available digitally and is depicted on other individual flight products to which it is pertinent.

Chapter 6	**Precision Approach Terrain Chart – ICAO**
6.1	This data is available digitally and is depicted on other individual flight products to which it is pertinent.
Chapter 7	**En Route Chart – ICAO**
7.1	Simplified versions are not created.
7.6.1	Charts depict only oceanic shorelines and the major lake/river systems forming the U.S./Canadian border.
7.6.2	Off Route Obstruction Clearance Altitude (OROCA) is shown.
7.7	Isogonic date not charted. Isogonic data always reflects the most recent 5 year epoch date
7.9.2	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted.
7.9.3.1.1	Coordinates are shown in degrees, minutes and hundredths of minutes. DME antenna elevation is not shown. Vertical limits of airspace are shown in tabulated data form. RNP values are not shown on routes. Coordinates of significant points are not shown. Bearings are shown to the nearest degree and distances to the nearest mile.
Chapter 8	**Area Chart – ICAO**
8.1	Area charts produced only where the amount of detail required results in congestion of information on an IFR Enroute Low Altitude chart.
8.3.1	Departure and Arrival routes are not shown.
8.6.1	Charts depict only oceanic shorelines and the major lake/river systems forming the U.S./Canadian border.
8.6.2	Obstacles are not shown.
8.7	Magnetic Variation is not shown unless an isogonic line runs through the area.
8.8.1	Bearings and tracks are not provided as True values. IACC specifications do not accommodate nor require True values.
8.8.2	Bearings and tracks are not provided as true values.
8.9.1	Only airports shown are those with hard surface runways of 3000 feet or longer and/or with an Instrument Approach Procedure.
8.9.2	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted.
8.9.3	Off Route Obstruction Clearance Altitude (OROCA) is shown.
8.9.4.1.1	Coordinates are shown in degrees, minutes and hundredths of minutes. DME antenna elevation is not shown. Vertical limits of airspace are shown in tabulated data form. Terminal routings are not shown. Coordinates of significant points are not shown. Bearings are shown to the nearest degree and distances to the nearest mile. Minimum vectoring altitudes are not shown.
Chapter 9	**Standard Departure Chart – Instrument (SID) – ICAO**
9.2	Charts are provided only when a procedure has been established.
9.3.2	Charts are not generally drawn to scale.
9.3.3	Scale bar is not shown.
9.4.2	Parallels and meridians are not shown.
9.4.3	Graduation marks are not shown.
9.5	Procedure route is identified in accordance with FAA Order 8260.46
9.6.1	Culture and topography are not shown.
9.6.2	Contour relief is not shown. Obstacles are listed textually.
9.7	Magnetic variation is not shown.
9.8.1	Bearings and tracks are not provided as True values. IACC specifications do not accommodate nor require True values.
9.8.2	Bearings and tracks are not provided as True values.
9.8.3	Bearings, tracks, and radials are not provided as True/Grid values.
9.9.1.2	Any requested secondary airport shown by symbol vs runway pattern.

9.9.2	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted when requested by procedure developer.
9.9.3	The FAA refers to Minimum Sector Altitudes as Minimum Safe Altitudes
9.9.3.2	Area minimum altitudes are not shown.
9.9.4.1.1	Coordinates for NAVAIDs and Significant Points are shown in degrees, minutes and hundredths of minutes. Bearings are shown to the nearest degree and distances to the nearest mile. DME antenna elevation is not shown. Obstacles are depicted textually with position and height, and without regard for penetration of OIS. Minimum vectoring altitudes are not shown.
Chapter 10	**Standard Arrival Chart − Instrument (STAR) − ICAO**
10.2	Charts are provided only when a procedure has been established.
10.3.2	Charts are not generally drawn to scale.
10.3.3	Scale bar is not shown.
10.4.2	Parallels and meridians are not shown.
10.4.3	Graduation marks are not shown.
10.5	Procedure route is identified in accordance with FAA Order JO 7100.9
10.6.1	Culture and topography are not shown.
10.6.2	Contour relief is not shown. Obstacles are listed textually.
10.7	Magnetic variation is not shown.
10.8.1 10.8.2	Bearings and tracks are not provided as True values.
10.8.3	Bearings, tracks, and radials are not provided as True/Grid values.
10.9.1.1	Airports are shown by symbol vice pattern.
10.9.1.2	Airports are shown by symbol vs runway pattern.
10.9.2	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted when requested by procedure developer.
10.9.3.1	Minimum Sector Altitude is not shown.
10.9.3.2	Area minimum altitudes are not shown.
10.9.4.1.1	Bearings are shown to the nearest degree and distances to the nearest mile. Coordinates for NAVAIDs and Significant Points are shown in degrees, minutes and hundredths of minutes. DME antenna elevation is not shown. Minimum vectoring altitudes are not shown.
Chapter 11	**Instrument Approach Chart − ICAO**
11.3.3	Scale is not shown.
11.3.3.1	Distance circle is not shown.
11.3.3.2	Distance between components and between last component and runway shown.
11.4	Sheet size is 8.25 inches by 5.375 inches
11.5.2	Graduation marks are not shown.
11.7.1	Culture information is not shown. Shaded hydrographic features are shown, but not labeled.
11.7.2	Terrain charting criteria does not include approach gradient steeper than optimal due to terrain.
11.7.3	Terrain is not charted if Std 11.7.2 is not met.
11.8.1	Magnetic variation is shown only in areas of compass instability and on charts North of 67 degrees of latitude.
11.9.1	Bearings, tracks, and radials are not shown as true values for RNAV segments.
11.9.2	Only magnetic north values are shown.
11.9.3	Bearings, tracks, and radials are not provided in true/grid values.
11.10.1.1	Only airports specifically requested for charting are shown.
11.10.1.2	Only airports specifically requested for charting are shown.
11.10.2.2	Obstacles that are the determining factor for an OCA/OCH are not necessarily shown.
11.10.2.4	Obstacle heights are only shown in MSL.

11.10.2.7	Absence of obstacle free zones are not shown.
11.10.3	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted when requested by procedure developer.
11.10.4.3	Geographic final approach fix coordinates are not shown.
11.10.5	Minimum Safe Altitudes vice Minimum Sector Altitudes. Terminal Arrival Areas vice Terminal Arrival Altitude.
11.10.6.1	Arrowed dotted line is used for MA track. Arrowed dashed line used for Visual track. Times required for the procedure are not shown.
11.10.6.2	Distance to airport from final approach NAVAID is not shown.
11.10.6.3	Missed approach segment is shown by arrowed, dotted line. Arrowed, dashed line is used for visual segments. Times required for the procedure are not shown. Distance between components is shown vice a distance scale.
11.10.6.4	Parentheses are not shown.
11.10.6.5	Ground profile and shaded altitude blocks are not shown.
11.10.7.1	Procedure landing minima are shown vice aerodrome operating minima.
11.10.7.2	Decision Altitude/Height (DA/H) and Minimum Descent Altitude/Height (MDA/H) are shown vice OCA/H.
11.10.8.2	Altitude/height table is not shown.
11.10.8.3	Altitude/height table is not shown.
11.10.8.4	Rate of descent table is not shown on individual plates, but a combined climb/descent table is available digitally or with printed procedure publication.
11.10.8.5	Descent gradient not shown, threshold crossing height shown in feet, vertical descent angle shown to hundredths of a degree.
11.10.8.6	Threshold crossing height shown in feet. Descent angle shown to the nearest hundredth of a degree.
11.10.8.8	Cautionary note is dependent on multiple criteria.
11.10.8.9	Simultaneous operations notes do not always contain references to runways or procedures.
Chapter 12	**Visual Approach Chart − ICAO**
12.2	Chart provided only when visual approach procedure has been established.
12.3.2	The scale can vary and also be not−to−scale.
12.3.3	Charts are shown at scale of 1:250,000, IAPs at 1:500,000 or smaller.
12.4	Sheet size is 8.25 inches by 5.375 inches.
12.5.2	Graduation marks are not shown
12.8	Magnetic variation is shown only in areas of compass instability and on charts North of 67 degrees of latitude.
12.9.2	Bearings, tracks, and radials are not shown as true/grid values.
12.9.3	Grid meridian is not shown.
12.10.1.1	Only airports specifically requested for charting are shown.
12.10.1.2	Airport elevation is not shown.
12.10.2.3	Height of obstacle above Mean Sea Level is shown.
12.10.2.3.1	Datum height not shown. Parentheses are not shown.
12.10.3	Vertical limits of areas are not shown. Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted when requested by procedure developer.
12.10.4	Control zones and Traffic zones are not shown.
12.10.5.3	VASI, MEHT, and angle of displacement are not shown.
Chapter 13	**Aerodrome/Heliport Chart − ICAO**
13.1	Helicopter movement is supported only with the location of helipads.
13.3.2	Latitude and longitude graticules are shown vice linear scale.

13.6.1	Latitude and longitude graticules are shown vice geographical coordinates. Airport elevations and runway end elevations are shown. Runway length and width are shown in feet. Clearways are not shown. Taxiways and identification only are shown. Standard taxi routes are not shown. Boundaries of air traffic service are not shown. RVR observation sites are not shown. Approach and runway lighting are not shown. VASI systems are not shown. VOR checkpoint and frequency are not shown.
13.6.2	Locations accommodating folding wings tips are not shown.
13.6.3	Helicopter pads only are shown. Touchdown and liftoff areas are not shown. Final approach and takeoff areas are not shown. Safety areas are not shown. Clearways are not shown. Only highest obstacle within parameters of chart is shown. Visual aids are not shown. Declared distances are not shown.
Chapter 14	**Aerodrome Ground Movement Chart – ICAO**
14.1	Chart is not produced.
Chapter 15	
15.1	Chart is not produced.
Chapter 16	**World Aeronautical Chart – ICAO 1:1 000 000**
16.2.1	1:1,000,000 Chart Series only produced and made available in areas NOT covered by 1:500,000 Chart Series. (Available in Caribbean area only.)
16.3.1	Linear scales are shown in the following order: nautical miles, statute miles, kilometers.
16.4.3	Charts are folded in eleven vertical panels and one horizontal fold.
16.5.1	Standard parallels are for each 8 degrees and are shown 1 degree and 20 minutes in from the Northern and Southern edges of the chart. Charts are not produced above 80 degrees latitude.
16.5.2	Distance between parallels is 1 degree. Above 56 degrees North, latitude graduation marks are shown only on every even degree of longitude. Distance between longitude meridians is 1 degree. Above 64 degrees North, meridian graduation marks are shown every 5 minutes.
16.5.3.1	Lengths of interval marks are as follow: 1 minute − .045 inches; 5 minutes − .065 inches; 10 minutes − .10 inches on both sides.
16.6	Chart numbering is indicated on Title Panel chart index.
16.7.2.2	Tunnels, if possible, are shown wherever they exist.
16.7.3.2	Roads are not shown within outlined populated areas.
16.7.9.2	Coordinates shown to the nearest minute.
16.7.10.1	Notes will read ‘Relief data incomplete’ or ‘Limits of reliable relief information.’
16.7.12.1	Wooded areas are not shown.
16.7.13	Date of topographic information is not shown.
16.8.2	Date of isogonic information is shown in the chart legend.
16.9.2.2	Other than hard surface runways are shown by symbol.
16.9.3.1	Obstacles greater than 500 feet are shown.
16.9.4	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted.
16.9.7.1	Only aeronautical ground lights that operate continuously are shown.
16.9.7.2	Only marine lights that operate year round, with a range of at least 10 NM, and are omnidirectional are shown.
Chapter 17	**Aeronautical Chart – ICAO 1:500 000**
17.3.1	Linear scales are shown in the following order: nautical miles, statute miles, kilometers.
17.4.3	Charts are folded in eleven vertical panels and one horizontal fold.
17.4.4	Relationship of chart to WAC series is not shown.
17.5.4.1	The 10 minute interval mark is .10 inches on both sides of the graticule line.
17.6.1.1	Relationship of chart to WAC series is not shown.
17.7.2.2	Tunnels, if possible, are shown wherever they exist. Prominent tunnels are shown pictorially.
17.7.3.1	Roads are shown for radar and visual value and for distinct configurations that provide visual checkpoint value.

17.7.9.2	Coordinates are shown to the nearest minute.
17.7.10.1	Notes will read ‘Relief data incomplete’ or ‘Limits of reliable relief information.’
17.7.12.1	Wooded areas are not shown.
17.7.13	Date of topographic information is not shown.
17.8.2	Date of isogonic information is shown in the chart legend.
17.9.2.2	Other than hard surface runways are shown by symbol.
17.9.3.1	Obstacles greater than 200 feet are shown, except in built up areas where only those greater than 300 feet are shown.
17.9.4	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted.
17.9.7.1	Only aeronautical ground lights that operate continuously are shown.
17.9.7.2	Only marine lights that operate year round, with a range of at least 10 NM, and are omnidirectional are shown.
Chapter 18	**Aeronautical Navigation Chart — ICAO Small Scale**
18.1	Chart is not produced.
Chapter 19	**Plotting Chart − ICAO**
19.1	Chart is not produced.
Chapter 20	**Electronic Aeronautical Chart Display — ICAO**
20.1	Charts provided digitally to operators. Digital charts mimic paper products described above and may not be modified.
Chapter 21	**ATC Surveillance Minimum Altitude Chart — ICAO**
21.1	Minimum Vectoring Altitude charts are available in electronic format only.
21.9.2	Danger Areas do not exist in the U.S. Prohibited and Restricted airspace, Military Operations Areas, Warning Areas, Alert Areas, and National Security Areas exist and are charted.
Appendix 6	**Aeronautical Data Quality Requirements**
Table 5. Bearing used for the formation of an en route and of a terminal fix	Whole degree resolution in charting of bearing used for formation of an en route and terminal fix.
Table 5. Bearing used for the formation of an instrument approach fix	Whole degree resolution in charting of bearing used for formation of an instrument approach procedure fix.
Table 6. (Length/ distance/ dimension Distance used for the formation of an en route fix	Whole NM resolution in charting of distance used for formation of an en route fix.

Table 6. (Length/ distance/ dimension Distance used for formation of an terminal and instrument approach procedure fix	Whole NM resolution in charting of distance used for formation of an Arrival or Departure fix.

DOC 10066, PANS−AIM	**Procedures for Air Navigation Services Aeronautical Information Management**
Chapter 1	**Definitions**
ASHTAM	The U.S. does not have a series of NOTAM called ASHTAM.
Danger Area	The FAA does not have Danger Area airspace within the U.S.
SNOWTAM	The U.S. does not use the SNOWTAM format.
Chapter 5	**Aeronautical Information Products and Services**
5.2.1.3.7	The FAA does not produce an AIP Supplement.
5.2.1.4	The FAA does not produce an AIP Supplement.
5.2.5	The U.S. Does not use SNOWTAM format.
5.2.5	The U.S. does not have a series of NOTAM called ASHTAM.
5.2.5	Currently, the U.S. does not utilize the ICAO format for Domestic NOTAMs. The U.S. NOTAMs that are distributed as International NOTAMs may be in ICAO format.
5.4.2	The FAA distribution system does not always match the ICAO standard for formatting, SNOWTAM, and ASHTAM.
Chapter 6	**Aeronautical Information Updates**
6.1.4	The FAA does not issue Trigger NOTAMs.
Appendix 2	**Content of the Aeronautical Information Publication (AIP)**
	PART 2 – EN (ENR)−ROUTE
ENR 5.1	U.S. does not use the term Danger Areas. The U.S. describes navigation warnings for Prohibited and Restricted airspace, Warning Areas, Military Operations Areas, Alert Areas, Controlled Firing Areas, and National Security Areas.
	PART 3 – AERODROMES (AD)
	AD 2. AERODROMES
AD 2.3	The U.S. AIP AD 2.3 specifies only the hours that the airport is attended. All other pertinent information for AD 2.3 is listed in the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.5	The U.S. AIP does not reference Passenger Facilities.
AD 2.6	The U.S. AIP 2.6 includes the Aerodrome Category for Firefighting and date of FAA certification. For availability of crash, fire, rescue equipment refer to the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.7	The U.S. AIP does not list AD 2.7 information. For airports with seasonal availability, that information will be included in the Airport Remarks of the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.8	The U.S. AIP does not list AD 2.8. The pertinent information for AD 2.8 may be found in the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**

AD 2.9	Types of runway lighting are shown with the runway or runway end they serve in the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/** In the U.S. uniformity in airport markings and signs from one airport to another enhances safety and improves efficiency. Refer to AIP Aerodromes, AD 1.1 Aerodrome Availability, paragraphs 12 through 17 for FAA uniform aerodrome lighting information, marking aids and signs.
AD 2.10	The U.S. AIP does not contain AD 2.10, Aerodrome obstacles. Obstructions are shown on U.S. airport diagrams and SIDs, STARs and Instrument Approach Procedures, available at FAA Terminal Procedures: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/search/** For FAA standards for obstruction lighting refer to AIP Aerodromes, AD 1.1, Aerodrome availability, paragraph 15.3, Obstruction Lights.
AD 2.11	The U.S. AIP does not contain AD 2.11, Meteorological information provided. Weather data sources will be listed in the Airport/Facility Directory of the Chart Supplement, and will include assigned frequencies and/or telephone numbers and hours of operation. The Chart Supplement is available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.15	The U.S. AIP does not contain AD 2.15, Other lighting and secondary power supply. Rotating beacon position is indicated on airport diagram. Rotating beacon operates sunset to sunrise unless otherwise indicated in the Airport Remarks section of the Airport/Facility Directory of the Chart Supplement. If a landing direction indicator is present its location will be indicated on the Airport Diagram. The airport's taxiway lighting is described in the Airport/Facility Directory of the Chart Supplement. The Chart Supplement is available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.16	The U.S. AIP does not list Helicopter landing areas. Public heliports with an Instrument Approach Procedure (IAP) or requested by the FAA or DoD are depicted on the IFR Enroute Low Altitude Charts. If helicopter charts are available for an airport, this will be indicated in the Charts section of the Airport/Facility Directory of the Chart Supplement. The Chart Supplement is available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/** Helicopter Instrument Approach Procedures, when available, can be found at **Terminal Procedures – Basic Search (faa.gov)**.

AD 2.17	The U.S. AIP does not contain AD 2.17, Air traffic services airspace. Information concerning Class B, C, and part−time D and E surface area airspace is published with effective time in the Airport/Facility Directory of the Chart Supplement. The chart Supplement also lists the appropriate ATC unit and frequencies to be used. The Chart Supplement is available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.20	The U.S. AIP does not contain AD 2.20, Local aerodrome regulations. This information is listed in the Airport Remarks section of the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**.
AD 2.21	The U.S. AIP does not contain AD 2.21, Noise abatement procedures. Noise Restrictions and Noise Abatement procedures are listed in the NOISE section of the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.22	The U.S. AIP does not contain AD 2.22, Flight procedures. Radar and ADS−B procedures are described in the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/** When an aerodrome has established low visibility procedures a detailed description can be found online at; **https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/cat_ils_info/media/App_SMGCS_Pub.xls**
AD 2.23	The U.S. AIP does not contain AD 2.23, Additional Information. Additional information at the aerodrome, such as an indication of bird concentrations to the extent practicable are described in the Airport Remarks section of the Airport/Facility Directory of the Chart Supplement, available on−line at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
AD 2.24	The U.S. AIP does not contain AD 2.24, Charts related to an aerodrome. U.S. charts equivalent to the recommended ICAO charts may be found online at **https://www.faa.gov/air_traffic/flight_info/aeronav/productcatalog/**

AD 2.25	The U.S. AIP does not contain AD 2.25, Visual segment surface (VSS) penetration. This information is depicted on Instrument Approach Procedures. If there are obstacles in the visual segment that could cause an aircraft to destabilize the approach between MDA and touchdown, the profile will not show a VDA (Vertical Descent Angle) and will instead show a note that states "Visual Segment−Obstacles". On RNAV approach charts, a small, shaded arrowhead shaped symbol from the end of the VDA to the runway indicates that the 34:1 Obstacle Clearance Surface (OCS) for the visual segment is clear of obstacles. The absence of the symbol indicates that the 34:1 OCS is not clear, or a Visual Segment−Obstacles note is indicated on the chart. Instrument Approach Procedures are available at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/search/**
	AD 3 HELIPORTS
	The U.S. AIP does not contain AD 3. HELIPORTS. All public and joint use heliports in the United States, Puerto Rico, Virgin Islands, and Pacific Territories are listed in the Digital Chart Supplements. The Digital Chart Supplement pages are available for viewing, searching, downloading, and printing at: **https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/**
Appendix 3	**NOTAM Format**
Entire Appendix	Currently, the U.S. does not utilize the ICAO format for Domestic NOTAMs. The U.S. NOTAMs that are distributed as International NOTAMs may be in ICAO format.
Appendix 4	**SNOWTAM Format**
Entire Appendix	The U.S. does not use the SNOWTAM format.
Appendix 5	**ASHTAM Format**
Entire Appendix	The U.S. does not have a series of NOTAM called ASHTAM.
Appendix 7	**Predetermined Distribution System for NOTAM**
Entire Appendix	The FAA distribution system does not always match the ICAO standard for formatting, SNOWTAM, and ASHTAM.

ANNEX 5 − UNITS OF MEASUREMENT TO BE USED IN AIR−GROUND COMMUNICATIONS	
Chapter 3	**Standard application of units of measurement**
3.2.2 Table 3−3 Table 3−4	Table 3−4 Ref 1.12, runway length and Ref 1.13 runway visual range, unit of measure is in feet. Table 3−4 Ref 1.16, visibility unit of measure is statute miles (SM). Table 3−4 Ref 3.2, altimeter setting, unit of measure is reported as inches of mercury. Table 3−4, Ref 3.3, atmospheric pressure, unit of measure is in inches of mercury.
Attachment B	**Guidance on the application of System of Units (SI)**
5.4.2	Specifications differ from Attachment B, Style and usage, Para 5.4 Numbers. Comma is not acceptable as a decimal marker. Comma is used to separate digits in groups of three.

ANNEX 6 − OPERATION OF AIRCRAFT	
Part I	
Chapter 3	**General**
3.3.1	The U.S. Flight Operations Quality Assurance (FOQA) program is a voluntary program.
Chapter 4	**Flight Operations**
4.2.11	US regulations allow acceptance of air operator certificates (AOC) issued by a regional safety oversight organization (RSOO) for a State of the Operator who is a member of that RSOO. The RSOO and State of the Operator legislation, as well as the methods and processes used to delegate the tasks and functions for AOC, must be reviewed and found acceptable to the FAA.
Chapter 4 Reference 4.3.2	For multiengine aeroplanes, commuter and on−demand operators are required to maintain copies of the load manifest for 30 days. Part 121 air carriers are required to keep copies of the load manifest for 90 days
Chapter 4 Reference 4.3.4.1.2	When determining the distance to a take−off alternate, the United States does not require commuter and on demand operations to calculate engine inoperative configurations. However, it is required that the alternate must be within one−hour flying time (at normal cruising speed, in still air) of the aerodrome of departure.
Chapter 4 Reference 4.3.9.2	In the event of a loss of pressurization, the U.S. requires descent within four minutes to 14,000 ft, not the 13,000 ft as required by ICAO.
Chapter 4 Reference 4.9.2	The United States allows turbo−jets that are certificated for single pilot operations.
Chapter 5	**Aeroplane performance operating limitations**
Chapter 5 Reference 5.2.8.1	The United States does not have specific regulations that require the loss of Runway length be considered due to alignment of the airplane prior to takeoff. However, the United States does within its aircraft certification regulations require aircraft performance be determined by using the point on the runway where takeoff is started when computing takeoff distance. This same criteria is used when computing runway available for accelerate/stop distance. Accounting for runway loss due to alignment is done within each air carrier's approved operations manual.
Chapter 5 Reference 5.4.1	The U.S. does not require turbine engine reliability to have a power loss rate of less than 1 per 100,000 engine hours, a radio altimeter, two attitude indicators, airborne weather radar, a certified navigation system to identify aerodromes as forced landing areas, or an engine fire warning system.
Chapter 5 Reference 5.4.2	The U.S. does not require an automatic trend monitoring system on aeroplanes certificated after 1 January 2005.
Chapter 6	**Aeroplane instruments, equipment and flight documents**
6.3.2.3.2	The current operational rules require a CVR recording duration of at least the last 2 hours of operation.
Chapter 6 Reference 6.4.1	The U.S. does not require a time piece.
Chapter 6 Reference 6.4.2	The United States does not require aeroplanes on VFR flights, when operated as controlled flights, to be equipped in accordance with the requirements for aeroplanes operated under instrument flight rules.
Chapter 6 Reference 6.5.1	Seaplanes are not required to have equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea. Seaplanes are not required to be equipped with one sea anchor (drogue).

Chapter 6 Reference 6.5.3.1	The United States defines extended over water operations for aircraft other than helicopters as an operation over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline. For 6.5.3.1.c − The United States does not require 8.8.kHz underwater locating devices to be installed on aircraft.
Chapter 6 Reference 6.12	The United States does not require equipment to measure cosmic radiation.
6.15.1	The United States requires all Part 121 turbine aircraft to be equipped with terrain avoidance equipment. However, 14 CFR Part 135 only defines that turbine aircraft with 10 or more passenger seats be equipped and is silent on the 5700 KG weight/take off mass requirement.
Chapter 6 Reference 6.15.5	The U.S. does not require ground proximity systems for piston powered airplanes.
6.17.2	The United States does not require an ELT for scheduled air carrier operations conducted by scheduled operators unless the scheduled operation is operated over water or remote areas. The United States only requires one ELT on flights over water or remote area.
6.17.3	The United States does not require an ELT for scheduled air carrier operations conducted by scheduled operators unless the scheduled operation is operated over water or remote areas. The United States only requires one ELT on flights over water or remote areas.
6.17.4	The United States does not require an ELT for scheduled air carrier operations conducted by scheduled operators unless the scheduled operation is operated over water or remote areas. The United States only requires one ELT on flights over water or remote areas.
6.17.5	The United States does not require an ELT for scheduled air carrier operations conducted by scheduled operators unless the scheduled operation is operated over water or remote areas. The United States only requires one ELT on flights over water or remote areas.
6.18.1	Existing regulations and surveillance capabilities deployed in the U.S. National Airspace System, including requirements for ADS−B Out equipment and use, provide precise, real−time position information to pilots and air traffic controllers. Additionally, FAA regulations require U.S. operators conducting international operations to comply with the rules there in force.
6.18.2	Existing regulations and surveillance capabilities deployed in the U.S. National Airspace System, including requirements for ADS−B Out equipment and use, provide precise, real−time position information to pilots and air traffic controllers. Additionally, FAA regulations require U.S. operators conducting international operations to comply with the rules there in force.
6.18.3	Existing regulations and surveillance capabilities deployed in the U.S. National Airspace System, including requirements for ADS−B Out equipment and use, provide precise, real−time position information to pilots and air traffic controllers. Additionally, FAA regulations require U.S. operators conducting international operations to comply with the rules there in force.
Chapter 6 Reference 6.20.2	The U.S. does not require pressure altitude information with a resolution of 25 feet or better.
Chapter 6 Reference 6.20.3	The U.S. does not require pressure altitude information with a resolution of 25 feet or better.
Chapter 6 Reference 6.21	The United States requires the use of boom (or mask) microphones below 18,000 ft which would be considered transition altitude. However, if the flight is conducted below 18,000 ft and is in the cruise phase of the flight, boom microphones may be removed. Certain 14 CFR part 135 operations that do not have cockpit voice recorder requirements are not required to wear boom microphones.

Chapter 6 Reference 6.23	When operations by a single pilot are authorized the U.S. requires an autopilot for IFR passenger operations, but not for VFR or cargo operations. A) The U.S. does not require a boom microphone. B) The U.S. requires charts be available and used.
Chapter 8	**Aeroplane Maintenance**
Chapter 8 Reference 8.4.2	The United States requires that records of work be retained until the work is repeated, superseded by other work or for one year after the work is performed, but does not require the records be retained after the unit has been permanently withdrawn from service.
Chapter 9	**Aeroplane flight crew**
Chapter 9 Reference 9.4.2.1	The cited regulation addresses recency and current requirements. Air operators have the discretion as to the extent the operator may qualify and keep current a cruise relief pilot above the regulatory requirement. In lieu of a pilot qualified and current as only a cruise relief pilot, a fully qualified and current SIC may serve as a cruise relief pilot.
Chapter 9 Reference 9.4.2.2	The U.S prescribes processes for variant cross training for flight crews related to variants. Air operators have the discretion as to what extent the operator may qualify and keep current a cruise relief pilot above the regulatory requirement.
Chapter 9 Reference 9.4.3.2	Operators are required to provide the information as outlined in this Standard and ensure the pilot as adequate knowledge of, and the ability to use this information.
Chapter 9 Reference 9.4.3.5	The U.S. does not restrict operators from using a pilot as a pilot−in−command on a route where the pilot has not, within the preceding 12 months, made at least one trip between the terminal points of that route as a pilot member of the flight crew, as a check pilot, or as an observer on the flight deck, except for special areas and airports. A list of U.S. Special airports may be found at the following link: https://drs.faa.gov/browse/excelExternalWindow/DRSDOCID183887239820230707194018.0001 .
Chapter 9 Reference 9.4.3.6	The U.S. does not have an area/route 12 month currency requirement for pilots in command, except for special areas and airports.
Chapter 9 Reference 9.4.4.1	For PICs, the U.S. requires 1 proficiency checks per 12 months and either proficiency check or an approved simulator training course, for SICs, the U.S. requires 1 proficiency check each 24 months and another proficiency check or an approved simulator training course every 12 months.
PART II	
Section II	**General Aviation Operations**
Chapter 2.4	Aeroplane instruments, equipment and flight documents.
2.4.8	Airplanes operated under visual flight rules at night are not required to be equipped with: c) to f) a) a turn and slip indicator; b) an attitude indicator (artificial horizon); c) a heading indicator (directional gyroscope); d) a means of indicating whether the supply of power to the gyroscopic instruments is adequate; e) a sensitive pressure altimeter; f) a means of indicating the outside air temperature; g) a timepiece with a sweep second hand; h) an airspeed indicating system with a means of preventing malfunctioning due to condensation or icing; i) a rate−of−climb and descent indicator; j) a landing light; k) illumination for flight instruments and equipment; l) lights in passenger compartments; and m) a flashlight (electric torch) for each crew member station.
Chapter 2.5	Aeroplane Communication, Navigation and Surveillance Equipment
2.5.1.1	Except when operating under controlled flight, airplanes operated at night are not required to have radio communications equipment capable of conducting two-way communications. United States requirements for radio communications equipment are based upon the type of airspace in which the operation occurs, and not on the time of the day.
2.5.1.2	When more than one radio communications equipment unit is required, the United States has no provision that each unit be independent of any other.

2.5.1.4	Except when operating under controlled flight, airplanes on extended flights over water or on flights over underdeveloped land are not required to have radio communications equipment capable of conducting two-way communications.
2.5.2.1	The United States has no provisions concerning required aircraft navigation instruments enabling a flight to proceed in accordance with a flight plan, prescribed RNP types, or the air traffic services provided. The United States does not specify a minimum distance between landmark references used by flights operating under visual flight rules.
Chapter 2.6	**Aeroplane Maintenance**
2.6.2.2.	The FAA established Title 14 Code of Federal Regulations section 43.10, which speaks to the disposition of parts, removed from type-certificated products. After April 15, 2002, each person who removes a life-limited part from a type certificated product must ensure that the part is controlled using: a record keeping system; tag or record attached to part; non-permanent marking; permanent marking; or segregation.
Chapter 2.8	Manuals, logs and records
2.8.2.1	The FAA doesn't require a journey logbook for General Aviation operations.
2.8.3	The FAA doesn't require pilots for General Aviation operations to carry a list of emergency equipment. The list of required flying equipment and operating information is available in 14 CFR § 91.503.
Appendix 2.4	**General aviation specific approvals**
2. SPECIFIC APROVAL TEMPLATE	The FAA monitors RVSM performance on a continual basis via ADS−B.
Section III	**Large and Turbojet Aeroplanes**
Chapter 3.1	**Applicability**
3.1.1	Large aircraft means aircraft of more than 12,500 pounds, maximum certificated takeoff weight. Additionally, 14 CFR part 91 requirements for non−commercial general aviation operations apply to large and turbojet airplanes with additional specific requirements established 14 CFR part 91 subparts F and G.
3.1.2	Large aircraft means aircraft of more than 12,500 pounds, maximum certificated takeoff weight. Additionally, 14 CFR part 91 requirements for non−commercial general aviation operations apply to large and turbojet airplanes with additional specific requirements established 14 CFR part 91 subparts F and G.
3.4	**Flight operations**
3.4.3.5.3	No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed— (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes. No person may operate a civil aircraft in IFR conditions unless it carries enough fuel (considering weather reports and forecasts and weather conditions) to— (1) Complete the flight to the first airport of intended landing; (2) Except as provided in paragraph (b) of this section, fly from that airport to the alternate airport; and (3) Fly after that for 45 minutes at normal cruising speed or, for helicopters, fly after that for 30 minutes at normal cruising speed.

3.4.3.5.4	No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed— (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes. No person may operate a civil aircraft in IFR conditions unless it carries enough fuel (considering weather reports and forecasts and weather conditions) to— (1) Complete the flight to the first airport of intended landing; (2) Except as provided in paragraph (b) of this section, fly from that airport to the alternate airport; and (3) Fly after that for 45 minutes at normal cruising speed or, for helicopters, fly after that for 30 minutes at normal cruising speed.
3.4.3.6.1	For general aviation operations, the pilot is the operator as noted in the definition for operator in Annex 6, Part II and is not required to develop policies or procedures.
Chapter 3.11	**Manuals, logs and records**
3.11.2.3	The FAA considers the terms Maintenance Program and Inspection Program to be different. In addition, the FAA recognizes there are significant differences between an air carrier maintenance program and an inspection program used in non−air carrier operations. The FAA requires air carriers that operate certain types of aircraft to have a maintenance program (CAMP). In general, some non air−carrier aircraft, along with aircraft operated under 14 CFR part 91, are not required to have a maintenance program. However, FAA regulations and various Advisory Circulars allow the operator/registered owner to use a maintenance program if they decide to do so. 14 CFR § 91.409 identifies the inspection programs available for selection by a registered owner. Advisory Circular 120−16 may be used as a guide to develop a maintenance program.
PART III	
Section I	**General**
Chapter 1	**Definitions**
Section II	**International Commercial Air Transport**
1.3.1	The U.S. Flight Operations Quality Assurance (FOQA) program is a voluntary program.
Chapter 2 Reference 2.2.4.2	The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.

2.2.8.3	Takeoff and landing under IFR. (a) Instrument approaches to civil airports. Unless otherwise authorized by the FAA, when it is necessary to use an instrument approach to a civil airport, each person operating an aircraft must use a standard instrument approach procedure prescribed in part 97 of this chapter for that airport. This paragraph does not apply to United States military aircraft. (b) Authorized DA/DH or MDA. For the purpose of this section, when the approach procedure being used provides for and requires the use of a DA/DH or MDA, the authorized DA/DH or MDA is the highest of the following: −−(1) The DA/DH or MDA prescribed by the approach procedure. −−(2) The DA/DH or MDA prescribed for the pilot in command. −−(3) The DA/DH or MDA appropriate for the aircraft equipment available and used during the approach. (c) Operation below DA/DH or MDA. Except as provided in § 91.176 of this chapter, where a DA/DH or MDA is applicable, no pilot may operate an aircraft, except a military aircraft of the United States, below the authorized MDA or continue an approach below the authorized DA/DH unless – −−(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of 11descent using normal maneuvers, and for operations conducted under part 121 or part 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing; −−(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach being used; and −−(3) Except for a Category II or Category III approach where any necessary visual reference requirements are specified by the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot: −−−−(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable. −−−−(ii) The threshold. The U.S. has not adopted the 2D and 3D instrument approach operation language.
2.3.3.2	The United States does not require that the operations manual describe the contents and use of the operational flight plan, but does require establishing procedures for locating each flight.
2.3.4.2.1	U.S. regulations allow for isolated aerodrome operations but do not require a point of no return (PNR) calculation.
2.3.4.2.3	U.S. regulations do not require two alternates in marginal weather conditions.
2.3.6.3	The fuel requirements for commuter and on demand operations are expressed in terms of flight time and do not include a specific altitude requirement.
Chapter 2 Reference 2.3.6.3.1	The United States does not require IFR helicopter operations to maintain a specific altitude above a destination.
Chapter 2 Reference 2.3.6.3.2	Fuel reserves for IFR helicopter operations is 30 minutes at normal cruise speed beyond the alternate heliport.
Chapter 2 Reference 2.3.6.3.3	The United States has no provisions addressing when a suitable alternate is unavailable. If the destination weather so requires, an alternate must be specified and 30−minute fuel reserves must be carried.

Chapter 2 Reference 2.3.6.4	The operations manual does not include procedures for loss of pressurization and other contingencies.
2.3.6.5	VFR: Fuel Supply No person may begin a flight operation in a helicopter under VFR unless, considering wind and forecast weather conditions, it has enough fuel to fly to the first point of intended landing and, assuming normal cruising fuel consumption, to fly after that for at least 20 minutes. IFR: Alternate airport requirements Except as provided in paragraph (b) of this section, no person may operate an aircraft in IFR conditions unless it carries enough fuel (considering weather reports or forecasts or any combination of them) to— (1) Complete the flight to the first airport of intended landing; (2) Fly from that airport to the alternate airport; and (3) Fly after that for 45 minutes at normal cruising speed or, for helicopters, fly after that for 30 minutes at normal cruising speed. (b) Paragraph (a)(2) of this section does not apply if part 97 of this chapter prescribes a standard instrument approach procedure for the first airport of intended landing and, for at least one hour before and after the estimated time of arrival, the appropriate weather reports or forecasts, or any combination of them, indicate that— (1) The ceiling will be at least 1,500 feet above the lowest circling approach MDA; or (2) If a circling instrument approach is not authorized for the airport, the ceiling will be at least 1,500 feet above the lowest published minimum or 2,000 feet above the airport elevation, whichever is higher; and (3) Visibility for that airport is forecast to be at least three miles, or two miles more than the lowest applicable visibility minimums, whichever is the greater, for the instrument approach procedure to be used at the destination airport.
Chapter 2 Reference 2.3.7.1	The operator's manual must include: Procedures for refueling aircraft, eliminating fuel contamination, protecting from fire (including electrostatic protection), and supervising and protecting passengers during refueling;
Chapter 2 Reference 2.3.7.4	The operator's manual must include: Procedures for refueling aircraft, eliminating fuel contamination, protecting from fire (including electrostatic protection), and supervising and protecting passengers during refueling; Procedures for ensuring compliance with emergency procedures, including a list of the functions assigned each category of required crewmembers in connection with an emergency and emergency evacuation duties under §135.123; AC 150/3230 requires compliance with National Fire Protection Association standards in NPA 407 which provides: Accessibility to aircraft by emergency fire equipment shall be considered in establishing aircraft fuel servicing positions.

Chapter 2 Reference 2.3.7.6	The operator's manual must include: Procedures for refueling aircraft, eliminating fuel contamination, protecting from fire (including electrostatic protection), and supervising and protecting passengers during refueling;
Chapter 2 Reference 2.3.8.1	The United States requires oxygen at all times for passengers experiencing cabin pressure altitudes above 15,000 ft, not 13,000 ft (620hPa) as per ICAO.
Chapter 2 Reference 2.3.8.2	In the event of a loss of pressurization the U.S. requires descent within four minutes to 14,000 ft, not the 13,000 ft as required by ICAO.
Chapter 2 Reference 2.4.1.3	The United States does not utilize a 1,000 ft minimum for non-precision approaches
Chapter 3 Reference 3.2.7	US does not require the helicopter weight limitations found I n3.2.7 a), c), and d).
3.2.7.2.1	The rotorcraft must be able to maintain any required flight condition and make a smooth transition from any flight condition to any other flight condition without exceptional piloting skill, alertness, or strength, and without danger of exceeding the limit load factor under any operating condition probable for the type, including— (1) Sudden failure of one engine, for multiengine rotorcraft meeting Transport Category A engine isolation requirements; (2) Sudden, complete power failure, and (3) Sudden, complete control system failures. Aircraft operational approval that does not require guaranteed engine out performance (Part 29 Category B or Part 27 Normal Category for single or multi−engine helicopters) shall be operated per the specific approved flight manual procedures that ensure a safe landing following an engine failure or all engine failure.
Chapter 4 Reference 4.2.2	Precaution Kits and First aid equipment are not required on helicopters.
Chapter 4 Reference 4.2.4.1	The US does not require marking of break-in points.
Chapter 4 Reference 4.2.4.2	The U.S. does not require marking of break-in points.
Chapter 4 Reference 4.4.2	The FAA does not specify a requirement for two landing lights.
Chapter 4 Reference 4.5.2.1	B) and C) Life−saving rafts and pyrotechnic devices are only required for extended over−water operations. That is in respect to helicopters in operations over water with a horizontal distance of more than 50 NM from the nearest shoreline and more than 50 NM from an offshore heliport structure.
Chapter 4 Reference 4.6	Helicopters operated over land areas designated as areas in which search and rescue would be especially difficult are not required to be equipped with signaling devices or life-saving equipment. The U.S. does not designate areas in which search and rescue would be especially difficult and therefore does not require additional equipment.
Chapter 5 Reference 5.1.1	Except when operating under controlled flight, helicopters are not required to have radio communications for night operations.
Chapter 5 Reference 5.2.1	The United States does not require a helicopter to be provided with navigation equipment in accordance with RNP types for navigation with the United States. However, the United States does provide information and operations specifications for IFR operating requirements when U.S. operators and aircraft conduct operations in the European Airspace Designated for Basic Area Navigation (RNP−5 and 10).
Chapter 6 Reference 6.4.2	The U.S. requires that records of work be retained until the work is repeated, superseded by other work for one year after the work is performed, but does not require the records be retained after the until has been permanently withdrawn from service.
Chapter 6 Reference 6.8.2	The U.S. requires that records of work must be retained until the work is repeated, superseded by other work, or for one year after the work is performed.

Chapter 7 Reference 7.4.2.2	US CAT helicopter pilots must demonstrate their proficiencies in the provisions of 7.4.2.2 through various means.
Chapter 9 Reference 9.5	The U.S. does not require that an operator keep a list of the emergency and survival equipment carried on board any of their helicopters engaged in international air navigation.
Chapter 11 Reference 11.1	In the United States, certificate holders regulated under Part 135 of the CFR shall prepare and keep current a manual setting forth the certificate holder's procedures and policies. Additionally, the Aircraft Operators Standard Security Program, (required by 49 CFR 1544, Subpart B) mandates crew members (both flight deck and attendants) be trained in the proper conduct of an aircraft cabin search, including likely areas of an aircraft that could conceal a weapon or improvised explosive devices and how to recognize weapons or devices.
Chapter 11 Reference 11.3	Upon receipt of a specific and credible threat, the aircraft operator must immediately notify the appropriate airport operator and the necessary ground and in−flight security operators. Additionally, upon receiving information that an act or suspected act of air piracy has been committed, the aircraft operator must notify the U.S. Transportation Security Administration. If the aircraft is outside U.S. airspace, the aircraft operator must notify the appropriate authorities of the State in which the aircraft is located. Additionally, if different, the operator must also notify the appropriate authorities in which the aircraft is to land.
Section III	**International General Aviation**
2.18	The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.
2.6.3.2	The United States allows the continuation of an approach regardless of the reported weather.
5.2.1	The U.S. has no provision that visual landmarks used in VFR be located at least every 60 NM (110km).

ANNEX 7 – AIRCRAFT NATIONALITY AND REGISTRATION MARKS	
4.3.1	The marks are not required on wing structure; only tail or fuselage.
4.3.2	14 CFR § 45.25(b)(2) allows the marks to be placed on engine pods or appurtenances if they are located between the trailing edge of the wing and the leading edge of the horizontal stabilizer and are an integral part of the fuselage side surfaces. Annex 7, §4.3.2 does not mention the ability to place markings on the engine pod or appurtenances.
5.2.2	United States regulations use inches rather than centimeters. 14 CFR § 45.29 prescribes minimum heights of marks as 12 inches generally for fixed−wing aircraft, except marks may be 2 inches in some grandfathered cases, and 3 inches on a glider and for certain experimental certificates. Marks must be at least 3 inches high for airships, spherical balloons, nonspherical balloons, powered parachutes and weight−shift−control aircraft. Marks must be at least 12 inches high for rotorcraft except certain grandfathered rotorcraft. The minimum height of marks on small (12,500 lb. or less), fixed−wing aircraft is 3 inches when none of the following exceeds 180 knots true airspeed: (1) design cruising speed; (2) maximum operating limit speed; (3) maximum structural cruising speed; and (4) if none of the foregoing speeds have been determined for the aircraft, the speed shown to be the maximum cruising speed of the aircraft.
10.1	The U.S. identification plate does not include the nationality or registration mark.
10.2	With respect to location of identification plate: for aircraft other than 14 CFR part 121, location must be either adjacent to and aft of the rear−most entrance door or on the fuselage near the tail surfaces. a) There is no explicit U.S. registration requirement for unmanned free balloons and no requirement to carry an identification plate. A centralized registry of unmanned free balloons is not maintained. Operators are required to furnish the nearest ATC facility with a prelaunch notice containing information on the date, time, and location of release, and the type of balloon. This information is not maintained for any specified period of time. b) With respect to RPA/small Unmanned Aircraft, in place of a “plate”, the FAA requires “markings” for the small UAS, which are not required to be fireproof. The FAA only allows markings on external surfaces.

ANNEX 8 − AIRWORTHINESS OF AIRCRAFT	
PART II Procedures for Certification and Continued Airworthiness	
Chapter 1	**Type Certification**
1.2.5	ICAO requires that the design of an aircraft under ICAO Annex 8, Parts IIIB, IVB, and V use alternative fire extinguishing agents to halon in the lavatories, engines, and auxiliary power units. The United States does not have a similar requirement.
PART III Large Aeroplanes	
Part IIIA	*Aeroplanes over 5 700 kg for which application for certification was submitted on or after 13 June 1960, but before 2 March 2004*
Chapter 4	**Design and Construction**
4.1.6 (b), 4.1.6 (f), 4.1.6 (g), 4.1.6 (h), 4.1.6 (i)	The FAA does not have similar requirements relative to paragraphs b) and f). The FAA published a notice to amend the U.S. regulations with the purpose of eventually meeting the intent of these provisions for new designs. However, the amendment will not be retroactive and will apply to airplanes for which application for certification is submitted after the effective dates of the future amendment. For b), the FAA does not have a specific requirement for physical separation of systems. However, physical separation is considered in the means of compliance to various regulations such as 25.1309, 25.901(c) and 25.903(d). The FAA also does not have a requirement for continued safe flight and landing after ANY event resulting in damage to the airplane structure or systems. For g), h) and i), the FAA does not have specific requirements to consider the effects of explosions or incendiary devices.
Chapter 8	**Instruments and Equipment**
8.4.1	ICAO requires that airplanes operating on the movement area of an airport shall have airplane lights of such intensity, color, fields of coverage and other characteristics to furnish personnel on the ground with as much time as possible for interpretation and for subsequent maneuver necessary to avoid a collision. The FAA has no such requirement.
8.4.2	This provision addresses the lights' effect on outside observers in reference to "harmful dazzle." The U.S. regulations do not address the effect of aircraft lights on outside observers. However, visibility to other pilots and the lights' effect on the flight crew is addressed.
Chapter 9	**Operating Limitations and Information**
9.3.5	The United States does not have similar requirements. The FAA has begun work in an effort to amend the U.S. regulations with the purpose of eventually meeting the intent of these provisions.
Chapter 11	**Security**
11.2, 11.3, 11.4	With the exception of the door required by 11.3, the United States does not have similar requirements. The FAA has begun work in an effort to amend the U.S. regulations with the purpose of eventually meeting the intent of these provisions.
Part IIIB	***Aeroplanes over 5 700 kg for which application for certification was submitted on or after 2 March 2004***
Chapter 3	**Structure**

3.8.2	14 CFR 25.571 addresses structural durability. The damage−tolerance principles were introduced at amendment 25−45 of 14 CFR 25.571 (effective 12/1/1978), and therefore all applicable products/parts certified on or after 12/1/1978 are required to be damage−tolerant (except as provided by 14 CFR 21.101). It is noted that "Likely structural repairs" is not a consideration under 14 CFR 25.571, and therefore Section 3.8.2 appears to be different in this regard. However, as a post−type certification requirement, 14 CFR part 26 requires TC holders who develop published repair data to perform a damage tolerance evaluation of any repair that affects fatigue critical structure and incorporate any required damage tolerance−based inspections into the published repair data. In addition, the provisions for repairs reside in 14 CFR part 43, not part 21. All structural repairs are required to meet the certification basis of the airplane. 14 CFR 25.571 considers sonic fatigue whereas Section 3.8.1 of Annex 8 does not have a corresponding explicit requirement for sonic fatigue considerations. It is thus observed that 14 CFR 25.571 is more stringent in this regard. Lastly, amendment 25−132 of 14 CFR 25.571 (effective 1/14/2011) introduced the requirement for a Limit of Validity on the airframe of an airplane (on top of the requirement for considering WFD), and therefore 14 CFR is more stringent in this regard.
Chapter 4	**Design and Construction**
4.1.6	On November 28, 2008, the FAA adopted new regulations that meet the intent of these provisions. However, Part IIIB applies to airplanes with a date of application of March 2, 2004 or later, but the U.S. requirements apply to airplanes with a date of application of November 28, 2008 or later.
4.2 g)4)	The United States has not modified regulations to require manufacturers to include the elements of the aeroplane design associated with cargo compartment fire protection and a summary of the demonstrated standards that were considered in the process of aeroplane certification, in the documentation made available to the operator for those aircraft certificated on or after 1 January 2025.
D.2 (g)	Paragraph D.2.g.1 of the ICAO standard requires a fire suppression system for each cargo compartment accessible to a crewmember in a passenger−carrying airplane. U.S. requirements permit manual fire fighting in an accessible cargo compartment by a crewmember or members for an all−passenger−carrying airplane or a passenger−cargo combination carrying airplane. Additionally, the FAA does not have specific requirements to consider the effects of explosions or incendiary devices.
D.2 (h)	The United States does have provisions to protect against possible instances of cabin depressurization. However, the FAA does not have specific requirements to consider the effects of explosions or incendiary devices.
F.4.1	ICAO requires that airplanes operating on the movement area of an airport shall have airplane lights of such intensity, color, fields of coverage and other characteristics to furnish personnel on the ground with as much time as possible for interpretation and for subsequent maneuver necessary to avoid a collision. The U.S. has no such requirement.
PART IV Helicopters	
Part IVA	***Helicopters for which application for certification was submitted on or after 22 March 1991 but before 13 December 2007***
Chapter 2	**Flight**
2.2.3.1, 2.2.3.1.1 − 2.2.3.1.4	These provisions address take−off performance data for all classes of helicopters and require that this performance data include the take−off distance required. However, the United States has adopted the requirements only for Category A helicopters.
Chapter 6	**Rotor and Power Transmissions Systems and Powerplant Installation**

6.7	This provision requires that there be a means for restarting a helicopter's engine at altitudes up to a declared maximum altitude. In some cases the FAA does not require demonstration of engine restart capability. Since there is a different level of certitude for transport and normal category helicopters in the United States, the engine restart capability is only required for Category A and B helicopters (14 CFR Part 29) and Category A normal helicopters (14 CFR Part 27).
Chapter 7	**Instruments and Equipment**
7.4.2	This provision addresses the need to switch off or reduce the intensity of the flashing lights. The United States has minimum acceptable intensities that are prescribed for navigation lights and anti−collision lights. No reduction below these levels is possible.
7.4.2 (b)	This provision addresses the lights' effect on outside observers in reference to "harmful dazzle." The U.S. regulations do not address the effect of aircraft lights on outside observers. However, visibility to other pilots and the lights' effect on the flight crew is addressed.
PART V Small Aeroplanes	
Part VA	***Aeroplanes over 750 kg but not exceeding 5 700 kg for which application for certification was submitted on or after 13 December 2007 but before 7 March 2021***
Chapter 8	**Crashworthiness and Cabin Safety**
8.5 (e)	The FAA provides requirements for emergency lighting systems in 14CFR 23.812. These requirements do not address the impact of the fuel spillage on emergency lighting systems. Only commuter category airplanes are required to install emergency lighting systems.

ANNEX 9 – FACILITATION	
*The list of differences include Guam, Puerto Rico, and the U.S. Virgin Islands. The status of implementation of Annex 9 in Guam with respect to public health quarantine is not covered in the list of differences.	
Chapter 2	**Entry and Departure of Aircraft**
2.3	Written crew baggage declaration is required in certain circumstances, and a special Embarkation/Disembarkation Card is required for most alien crew members.
2.4	A General Declaration for all inbound and for outbound flights with commercial cargo are required. However, the General Declaration outbound flights with commercial cargo shall not be required if the declaratory statement is made on the air cargo manifest. No declaration is required for outbound flights without commercial cargo if Customs clearance is obtained by telephone.
Remarks	19 CFR 122
2.4.1	Each crew member must be listed showing surname, given name, and middle initial.
2.4.4	The signing or stamping of the General Declaration protects the carrier by serving as proof of clearance.
2.5	The crew list is required by statute.
2.7	There is a statutory requirement for the Cargo Manifest.
2.8	In order to combat illicit drug smuggling, the U.S. requires the additional following information: the shipper's and the consignee's name and address, the type of air waybills, weight, and number of house air waybills. The manifest submitted in electronic form may become legally acceptable in the future. However, until the compliance rate for the automated manifest is acceptable, the U.S. must be able to require the written form of the manifest.
Remarks	19 CFR 122.48
2.9	Nature of goods information is required.
2.10	Stores list required in all cases but may be recorded on General Declaration in lieu of a separate list.
2.17	A cargo manifest is required except for merchandise, baggage and stores arriving from and departing for a foreign country on the same through flight. "All articles on board which must be licensed by the Secretary of State shall be listed on the cargo manifest." "Company mail shall be listed on the cargo manifest."
2.18	Traveling general declaration and manifest, crew purchases and stores list as well as a permit to proceed are required under various conditions when aircraft arrive in the U.S. from a foreign area with cargo shown on the manifest to be traveling to other airports in the U.S. or to foreign areas.
2.21	There is a statutory requirement that such changes can only be made prior to or at the time of formal entry of the aircraft.
2.25	The U.S. does not support the use of insecticides in aircraft with passengers present. Pesticides registered for such use should not be inhaled. In effect, the passenger safety issue has precluded the use of such insecticides in the presence of passengers since 1979.
2.35	Advance notice is required of the number of citizens and aliens on board (non−scheduled flights only).
2.40	A copy of the contract for remuneration or hire is required to be a part of the application in the case of non−common carrier operations.
2.41	Single inspection is accorded certain aircraft not by size of aircraft but rather by type of operation. Loads (cargo) of an agricultural nature require inspection by a plant or animal quarantine inspector.
2.41c	Fees are charged for services provided in connection with the arrival of private aircraft (nonscheduled aircraft).
Chapter 3	**Entry and Departure of Persons and Their Baggage**
3.3	Medical reports are required in some cases.

Remarks	8 CFR 212.7 and INA 234
3.4	Documents such as visas with certain security devices serve as identity documents.
3.4.1	The U.S. has not standardized the personal identification data included in all national passports to conform with the recommendation in Doc 9303.
3.5.6	U.S. passport fees exceed the cost of the operation.
3.5.7	U.S. allows separate passports for minor dependents under the age of 16 entering the U.S. with a parent or legal guardian.
3.7	The U.S. has a pilot program that allows nationals of certain countries which meet certain criteria to seek admission to the U.S. without a visa for up to 90 days as a visitor for pleasure or business.
Remarks	22 CFR 41.112(d) INA 212(d)(4), INA 238, 8 CFR 214.2(c) INA 217
	The law permits visa waivers for aliens from contiguous countries and adjacent islands or in emergency cases. Visas are also waived for admissible aliens arriving on a carrier which is signatory to an agreement assuring immediate transit of its passengers provided they have a travel document or documents establishing identity, nationality, and ability to enter some country other than the U.S.
3.8	The U.S. charges a fee for visas.
3.8.3	Duration of stay is determined at port of entry.
Remarks	INA 217
3.8.4	A visitor to the U.S. cannot enter without documentation.
Remarks	INA 212(a) (26)
3.8.5	Under U.S. law, the duration of stay is determined by the Immigration Authorities at the port of entry and thus cannot be shown on the visa at the time of issuance.
3.10	Embarkation/Disembarkation Card does not conform to Appendix 4 in some particulars.
3.10.1	The operator is responsible for passengers' presentation of completed embarkation/disembarkation cards.
Remarks	8 CFR 299.3
3.10.2	Embarkation/Disembarkation cards may be purchased from the U.S. Government, Superintendent of Documents.
Remarks	8 CFR 299.3
3.14.2	The U.S. fully supports the electronic Advance Passenger Information (API) systems. However, the WCO/IATA Guideline is too restrictive and does not conform to the advancements in the PAXLIST EDIFACT international standard.
3.15	U.S. Federal Inspection Services' officials see individuals more than once.
3.16	Written baggage declarations by crew members are required in some instances.
3.17.1	The U.S. uses a multiple channel system rather than the dual channel clearance system.
3.23, 3.23.1	Statute requires a valid visa and passport of all foreign crew members.
3.24, 3.24.1, 3.25, 3.25.1, 3.25.2, 3.25.3	Crew members, except those eligible under Visa Waiver Pilot Program guidelines, are required to have valid passports and valid visas to enter the U.S.
Remarks	INA 212(a) (26), INA 252 and 253, 8 CFR 214.1(a), 8 CFR 252.1(c)
3.26, 3.27, 3.28, 3.29	Passports and visas are required for crew and non−U.S. nationals to enter the U.S.
3.33	Does not apply to landing card.
3.35	Law requires that the alien shall be returned to the place whence he/she came. Interpretation of this provision requires that he/she be returned to the place where he/she began his/her journey and not only to the point where he/she boarded the last−used carrier.
3.35.1	Law requires that certain aliens be deported from the U.S. at the expense of the transportation line which brought them to the U.S.
3.36	Statute provides for a fine if a passenger is not in possession of proper documents.

3.39.3	NOTE: The U.S. considers security for individuals in airline custody to be the carrier's responsibility.
3.40.2	Annex 9 recommends that fines and penalties be mitigated if an alien with a document deficiency is eventually admitted to the country of destination.
3.43	Operator can be held responsible for some detention costs.
Chapter 4	**Entry and Departure of Cargo and Other Articles**
4.20	The Goods Declaration as defined by the Kyoto Convention serves as the fundamental Customs document rather than the commercial invoice.
4.40	Aircraft equipment and parts, certified for use in civil aircraft, may be entered duty−free by any nation entitled to most−favored nation tariff treatment. Security equipment and parts, unless certified for use in the aircraft, are not included.
4.41	Customs currently penalizes the exporting carrier for late filing of Shipper's Export Declarations (SEDs) and inaccuracies on bills of lading with respect to the SEDs.
4.42	Regulations require entry of such items, most of which are dutiable by law.
4.44	Certain items in this category are dutiable by law.
4.48	Carriers are required to submit new documentation to explain the circumstances under which cargo manifest is not unladen. No penalty is imposed if the carrier properly reports this condition.
4.50	The procedures for adding, deleting, or correcting manifest items require filing a separate document.
4.55	The U.S. requires a transportation in−bond entry or a special manifest bonded movement for this type of movement.
Chapter 5	**Traffic Passing Through the Territory of a Contracting State**
5.1	Such traffic must be inspected at airports where passengers are required to disembark from the aircraft and no suitable sterile area is available.
5.2	Passports and visas are waived for admissible aliens arriving on a carrier which is signatory to an agreement assuring immediate transit of its passengers provided they have a travel document or documents establishing identity, nationality, and ability to enter some country other than the U.S.
5.3	Such traffic must be inspected at airports where no suitable sterile area is available.
5.4	Passports and visas are waived for admissible aliens arriving on a carrier which is signatory to an agreement assuring immediate transit of its passengers provided they have a travel document or documents establishing identity, nationality, and ability to enter some country other than the U.S.
5.4.1	Passengers will not be required to obtain and present visas if they will be departing from the U.S. within 8 hours of arrival or on the first flight thereafter departing for their destination.
5.8	Examination of transit traffic is required by law. Transit passengers without visas are allowed one stopover between the port of arrival and their foreign destination.
5.9	Passports and visas are required generally for transit passengers who are remaining in the U.S. beyond 8 hours or beyond the first available flight to their foreign destinations.
Chapter 6	**International Airports − Facilities and Services for Traffic**
6.3.1	Procedures involving scheduling committees raise a number of anti−trust problems under U.S. law.
6.33	Sterile physical facilities shall be provided, and in−transit passengers within those areas shall be subject to immigration inspection at any time.
Remarks	OI 214.2(c)
6.34	The U.S. inspects crew and passengers in transit.
6.36	The U.S. inspects crew and passengers in transit.

6.56	Operators of aircraft are statutorily required to pay overtime charges for federal inspections conducted outside normal scheduled hours of operation. This requirement places aircraft operators in a less favorable position than operators of highway vehicles and ferries who are statutorily exempt from such charges.
Chapter 8	**Other Facilitation Provisions**
8.1	Separate bonds are required.
8.3.2	Visas are issued by the Department of State and are not issued at ports of entry.

ANNEX 10 − AERONAUTICAL TELECOMMUNICATIONS	
ANNEX 10 − VOLUME 1 − RADIO NAVIGATION AIDS	
PART I	
Chapter 3	**Specifications for Radio Navigation Aids**
3.1.3.3.2	Per FAA Order 6050.32B, in the U.S., the ILS Localizer minimum signal strength requirement is ~~−120.5−~~ −123 dBW which is equivalent to −120.0 dBW/m2. ICAO requirement is −114 dBW/m2. However, FAA−E−2970 states in paragraph 3.3.3.4, “The transmitter of any subsystem shall have sufficient power to meet the coverage requirements as defined in paragraph 3.3.2.1
3.1.4.1, 3.1.4.2	The United States does not require such aircraft ILS equipment immunity. Interference from FM broadcast signals will not adversely affect aircraft navigation and communications systems in the United States airspace.
3.3.4.2	The US minimum VOR signal strength is -120 dBW/m2. The ICAO requirement is - 107 dBW/m2.
3.3.8.1, 3.3.8.2	The United States does not require such equipage for aircraft. Interference from FM broadcast signals will not adversely affect aircraft navigation and communications systems in the United States airspace.
3.7.3.5.3.1	Currently, the service volume of GBAS in FAA Order 6050.32B is 23 NM up to 10,000 feet vs. 15 and 20 NM ICAO standard.
3.7.3.5.4.1	In the U.S., the LAAS operates on center frequencies from 112.050 to 117.950 MHz vs. ICAO’s 108.0 to117.975 MHz with the lowest assignable frequency of 112.05 MHz and the last upper assignable frequency of 117.150 MHz vs. ICAO’s 108.025 MHz and 117.900 MHz respectively.
3.7.3.5.3	Currently, the service volume of GBAS in FAA Order 6050.32B is 23 NM up to 10,000 feet.
Appendix B	**TECHNICAL SPECIFICATIONS FOR THE GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)**
3.6.7.2.3.5	A solution has been implemented in the US which does not require protection level bounding for rare anomalous ionospheric storms under extreme conditions. The solution requires denial of the approach service when anomalous ionosphere conditions could cause potentially large residual errors and allows operations when estimated residual errors would be below a threshold. The resulting errors under the threshold were found to be acceptable using specific safety assessments and criteria for this equipment.
3.6.8.2.2.5.3	In the U.S., the LAAS operates above the ILS LOC frequency band on center frequencies from 112.05 to 117.950 MHz; therefore, this standard does not apply.
3.6.8.2.2.6	Currently, the D/U standard for co−channel rejection is the same as the ICAO standard of 26 dB. However, D/U standard for the second adjacent channel rejection is 46 dB, which is 3 dB less than the ICAO standard. In addition, no third adjacent channel rejection standard exists in Order 6050.32B.
3.6.8.2.2.6.1c	In the U.S., the LAAS operates above the ILS LOC frequency band on center frequencies from 112.05 to 117.950 MHz; therefore, this standard does not apply.
3.6.8.2.2.6.2a	In the U.S., the LAAS receiver protection from an undesired LAAS signal offset by +/− 50 kHz is 46 dB vs. ICAOs 43 dB.
3.6.8.2.2.6.2c	In the U.S., the LAAS operates above the ILS LOC frequency band on center frequencies from 112.05 to 117.950 MHz.
3.6.8.2.2.6.3	In the U.S., the LAAS receiver protection from an undesired LAAS, VOR, or ILS signal offset by +/− 75 to +/− 975 kHz is not considered during the frequency assignment process.
3.6.8.2.2.6.3c	In the U.S., the LAAS operates above the ILS LOC frequency band on center frequencies from 112.05 to 117.950 MHz.
3.6.8.2.2.6.4	In the U.S., the LAAS receiver protection from an undesired LAAS, VOR, or ILS signal offset by +/− 1 MHz or more is not considered during the frequency assignment process.
Attachment C	**INFORMATION AND MATERIAL FOR GUIDANCE IN THE APPLICATION OF THE STANDARDS AND RECOMMENDED PRACTICES FOR ILS, VOR, PAR, 75 MHz MARKER BEACONS (EN−ROUTE), NDB AND DME**

2.6.2.1.1 and 2.6.2.1.2	The US frequency protections for ILS localizers are 3 dB more stringent than the ICAO protections (i.e. 23 dB vs. 20 dB for co−channel, −4 dB vs. −7 dB for interim 1st adjacent channels, −31 dB vs.−34 dB for final 1st adjacent channels, −43 dB vs. −46 dB for 2nd adjacent channels, and −47 dB vs. −50 dB for 3rd adjacent channels).
2.6.2.2.1	The US frequency protections for ILS localizers are 3 dB more stringent than the ICAO protections (i.e. 23 dB vs. 20 dB for co−channel, −4 dB vs. −7 dB for interim 1st adjacent channels, −31 dB vs. −34 dB for final 1st adjacent channels, −43 dB vs. −46 dB for 2nd adjacent channels, and −47 dB vs. −50 dB for 3rd adjacent channels).
3.4.6.1 a),b),c) 3.4.6.2 a),b),c)	The US frequency protections for co−channel, 1st and 2nd adjacent channels for VOR are 3 dB more stringent than the ICAO protections (i.e. 23 dB vs. 20 dB for co−channel, −4 dB vs. −7 dB for interim 1st adjacent channels, −31 dB vs. −34 dB for final 1st adjacent channels, −43 dB vs. −46 dB for 2nd adjacent channels).
3.4.6.1 d) 3.4.6.2 d)	The US does not provide any VOR frequency protection for 3rd adjacent channels. The ICAO protection provides −50 dB for 3rd adjacent channels.
7.1.8.1 7.1.8.2 Table C−6	The US frequency protections for co−channel and 1st adjacent channels for DME are 3 dB more stringent than the ICAO protections (i.e. 11 dB vs. 8 dB for co−channel, −39 dB vs. −42 dB for 1st adjacent channels). The US frequency protection for 2nd adjacent channels for DME is 28 dB more stringent than the ICAO protection (i.e. − 47 dB vs. − 75 dB).
Attachment D	**INFORMATION AND MATERIAL FOR GUIDANCE IN THE APPLICATION OF THE GNSS STANDARDS AND RECOMMENDED PRACTICES**
7.2.1.5 and Table D−4	In the U.S., the LAAS/LAAS co−channel geographical separation is 159 nm at 10,000 and 20,000 ft. ICAO separation is 195 nm at 10,000 ft. The first adjacent channel in the U.S. is equivalent to the ICAO second adjacent channel or +/− 50 kHz. The ICAO separation requirement for GBAS/GBAS second adjacent channel separation is 24 NM. In the U.S., geographical separations are not required between LAAS facilities, which differ in frequency by more than 25 kHz.
7.2.1.6 and Table D−5	Distances shown in ICAO Table D−5 are different from the distances in FAA Order 6050.32B figures 203 and 204 since in the U.S. the separation distances are calculated using the same method as for VOR described in FAA Order 6050.32B.
ANNEX 10 − VOLUME II − COMMUNICATION PROCEDURES INCLUDING THOSE WITH PANS STATUS	
Chapter 3	**General Procedures for the International Aeronautical Telecommunication Service**
3.2.2, 3.2.3	US regulations do not have any specific procedures for closing down international aeronautical stations. All international aeronautical stations in the U.S. operate continuously (24 hours a day and seven days a week)
Chapter 5	**Aeronautical Mobile Service − Voice Communications**
5.1.5	US regulations do not require pilots to wait 10 seconds before making a second call. US regulations only require “a few seconds” instead of “10 seconds.”
5.2.1.4.1.1	The United States directs that, for air carriers and other civil aircraft having FAA authorized call signs, the call sign should be followed by the flight number in group form; and for air carriers of foreign registry, the flight number should be stated in group form, or using separate digits if that is the format used by the pilot.
5.2.1.4.1.1	The United States issues surface wind using the word “wind” followed by the separate digits of the indicated wind direction to the nearest 10−degree multiple, the word “at” and the separate digits of the indicated velocity in knots, to include any gusts.
5.2.1.4.1.3	The United States issues the separate digits of a frequency, inserting the word “point” where the decimal point occurs.

5.2.2.7.1.2	US regulations do not specifically require pilots to send a message twice preceded with the phrase "TRANSMITTING BLIND". US regulations provides general procedures which allow pilots to make blind transmissions in case of emergency.
5.2.2.7.1.3.1	US regulations do not specifically require pilots to make a blind transmission preceded by "TRANSMITTING BLIND DUE TO RECEIVER FAILURE" with respect to the continuation of the flight of the aircraft. US regulations provide general procedures which allow pilots to make appropriate blind transmissions.
5.2.2.7.3.1	US regulations do not specifically require pilots to make a blind transmission preceded by "TRANSMITTING BLIND DUE TO RECEIVER FAILURE". US regulations provide general procedures which allow pilots to make appropriate blind transmissions.
5.3.1.2	The initial communication, and if considered necessary, any subsequent transmissions by an aircraft in distress "should" begin with the signal MAYDAY…
ANNEX 10 − VOLUME III − COMMUNICATION SYSTEMS	
PART I − DIGITAL DATA COMMUNICATION SYSTEMS	
Chapter 7	**Aeronautical Mobile Airport Communications System (AeroMACS)**
7.4.5.1 (d)	In the U.S., the power spectral density of any frequency removed from the assigned frequency above 150% of the authorized frequency is 50 dB or 55 + log (P) dB, whichever is the lesser attenuation. ICAO requires 50 dB.
PART II − VOICE COMMUNICATION SYSTEMS	
Chapter 2	**Aeronautical Mobile Service**
2.2.1.2	ICAO recommends a signal−in−space field strength of 75 uv/m (−109dBW/m^2), which translates to –82.5 dBm at the input of the receiver assuming 0 dB system losses. In the U.S., per RTCA DO−186a MOPS, the input power to the aircraft receiver should be −87 dBm.
2.3.3.1 2.3.3.2 2.3.3.3 2.3.3.4	The US does not require aircraft flying within the US airspace to meet the interference immunity performance of paragraphs 2.3.3.1, 2.3.3.2, and 2.3.3.3 and the recommendation of paragraph 2.3.3.4 of Annex 10, Vol 3, Part 2, Chapter 2. The FAA, based on the recommendations of the. Aviation Rulemaking Advisory Committee, made a decision, in 1996, not to adopt the FM interference immunity performance standards in the U.S. The U.S. continues to use its own FM immunity standards to avoid FM interference in aircraft.
2.3.3.4	The U.S. does not require airborne VHF communications receiving systems to meet the FM broadcast immunity performance standards recommended by ICAO.
ANNEX 10 − VOLUME IV − SURVEILLANCE AND COLLISION AVOIDANCE SYSTEMS	
Chapter 3	**Surveillance Systems**
3.1.1.7.13	SPI required to be transmitted for 18 +/− 1 second.
Chapter 4	**Airborne Collision Avoidance System**
4.2.3.3.4	The TSO−C118 (RTCA DO−197) implements this requirement. However, the requirement of limiting Mode S power to the level of Mode A/C (paragraph 4.2.3.4) is not implemented.
4.3.1.1.1	Specifies a nominal cycle of 1 second
4.3.2.1.2	The US specifies a false track probability of less than 1.2% for Mode A/C and less than 0.1% for Mode S.
4.3.5.3.1	Software versions 6.04A, version 7.0 and version 7.1 are all approved for operations in U.S. airspace.

4.3.5.3.2	No changes planned to the current U.S. guidance. Per Advisory Circular (AC) 120−55C, Change 1, Section 11 (MAINTENANCE), para c., TCAS Software Updates: "when necessary, operators should ensure that appropriate TCAS software updates are incorporated. The latest version of software for TCAS II is version 7.1. To ensure compatibility with international standards, the FAA encourages the installation of this software as practical. Software version 6.04A, version 7.0 and version 7.1 are all approved for operations in U.S. airspace."
4.3.5.3.3	No changes planned to the current U.S. guidance. Per Advisory Circular (AC) 120−55C, Change 1, Section 11 (MAINTENANCE), para c., TCAS Software Updates: "when necessary, operators should ensure that appropriate TCAS software updates are incorporated. The latest version of software for TCAS II is version 7.1. To ensure compatibility with international standards, the FAA encourages the installation of this software as practical. Software version 6.04A, version 7.0 and version 7.1 are all approved for operations in U.S. airspace."
ANNEX 10 − VOLUME V − AERONAUTICAL RADIO FREQUENCY SPECTRUM UTILIZATION	
Chapter 2	**Distress frequencies**
2.1.1	All emergency locator transmitters installed on or after 1 January 2002 and carried in compliance with Standards of Annex 6, Parts I, II and III may operate on both 406 MHz and 121.500 MHz or on 121.5 MHz.
Chapter 4	**Utilization of frequencies above 30 MHz**
4.1.2.4	FAA has not issued a mandatory carriage of VDL Mode 3 and VDL Mode 4. Participation in CPDLC (VDL Mode 2) "is at the discretion of the flight crew and/or operator" (NAS Data Communications Guide, version 11 dated May 26, 2021).
4.1.2.4.1	FAA has not issued a mandatory carriage of VDL Mode 3 and VDL Mode 4. Participation in CPDLC (VDL Mode 2) "is at the discretion of the flight crew and/or operator" (NAS Data Communications Guide, version 11 dated May 26, 2021).
4.1.4.1	The US does not provide the 20 dB desired−to−undesired signal protection for VHF frequency assignments. The US provides 14 dB.
4.1.4.2	The US does not require aircraft flying within the US airspace to meet one of the characteristics dealing with the FM interference immunity performance. The U.S. Aviation Rulemaking Committee made a decision not to adopt the FM interference immunity performance standards in the U.S. The U.S. continues to use its own FM immunity standards to avoid FM interference in aircraft.
4.1.6.1.2	Assignable frequencies in 25 KHz steps in the US are 121.550 − 123.075 MHz instead of 121.550 – 123.050 MHz, and 123.125 – 136.975 MHz instead of 123.150 – 136.475 MHz.
4.2.3	The US does not follow the VOR assignment priority as defined in Section 4.2.3. Due to severe frequency congestion in the U.S., the ICAO frequency assignment priority order would result in inefficient use of the radio spectrum.

ANNEX 11 – AIR TRAFFIC SERVICES	
Chapter 1	**Definitions**
Accepting Unit	The term “receiving facility” is used.
Advisory Airspace	Advisory service is provided in terminal radar service areas and the outer area associated with class C airspace areas as well as Class E airspace.
Advisory Route	Advisory service is provided in terminal radar service areas and the outer area associated with class C airspace areas as well as Class E airspace.
ACAS–Airborne Collision Avoidance System	Traffic Alert and Collision Avoidance System (TCAS) – An airborne collision avoidance system based on radar beacon signals which operates independent of ground−based equipment. 14 CFR 1.1 further defines and breaks down TCAS into TCAS 1 – provides traffic advisories 2 – provides traffic advisories and resolution advisories in the vertical plane and 3 – provides traffic advisories and resolution advisories in the vertical and horizontal planes.
AIRMET	FAA Pilot Controller Glossary defines (in part) AIRMET as “A concise description of an occurrence or expected occurrence of specified en route weather phenomena that may affect the safety of aircraft operations, but at intensities lower than those that require the issuance of a SIGMET.” The ICAO definition of AIRMET narrows the purpose of the advisory to “low-level aircraft operations”, where the FAA has a more broad definition to encompass “all aircraft and…aircraft having limited capability…” Also, ICAO uses the term “forecast…for the flight information region” where the FAA uses “area forecast”. Difference in character (terminology) for area forecast. FAA uses AIRMETS for broader purpose.
Air taxiing	The U.S. does not limit this definition to apply only to above the surface of an aerodrome.
Air traffic control service	The U.S. uses “Air Traffic Control” with a definition of “A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.”
Air traffic flow management (ATFM)	The U.S. does not define air traffic flow management.
Air traffic control unit	The U.S. uses the term “air traffic control facility”. (i.e., En Route, Terminal, or Flight Service)
Air traffic services reporting office	FAA Pilot Control Glossary defines (in part) Flight Service Stations (FSS) as “air traffic facilities which provide pilot briefing, en route communications and VFR search and rescue services, assist lost aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR flight plans....” FSSs are available to receive any reports concerning air traffic services as well as accept and file flight plans.
Air traffic services unit	The U.S. uses “Air Route Traffic Control Center”.
Airway	A Class E airspace area established in the form of a corridor, the centerline of which is defined by radio navigational aids.
Alert Phase	Alert – a notification to a position that there is an aircraft−to−aircraft or aircraft−to−airspace conflict as detected by automated problem detection.
Altitude	Height above ground level (AGL), mean sea level (MSL) or indicate altitude.
Approach Control Service	The U.S. not only includes arriving and departing controlled flights but also includes en route controlled flights. Additionally, as opposed to Annex 2 Amdt 47, the U.S. specifies the control facility that provides the service.
Approach Control Unit	The U.S. uses “Approach Control Facility” and also includes the possibility of providing ATS to en route aircraft.
Appropriate ATS Authority	The U.S. does not define “Appropriate ATS Authority.” The P/CG does contain a definition annotated as [ICAO] that adds “In the United States, the “appropriate ATS authority” is the Program Director for Air Traffic Planning and Procedures, ATP−1.”

Apron	The U.S. adds reference to seaplane operations to the definition.
Apron Management Service	Ground control or ramp control provide the same service. There is no formal definition in the Pilot Controller Glossary.
Area Control Centre	The U.S. uses the terms "Traffic Control Center", "Radar Approach Control Facility", and "Tower" to define a facility that provides air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft.
Area Control Service	Air Traffic Control − A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.
Controlled flight	The US uses the term "IFR Clearance".
Control Zone	The US uses the term "Surface Area". Surface area is airspace contained by the lateral boundary of the Class B, C, D, or E airspace designated for an airport that begins at the surface and extends upward.
Cruising Level	Cruising Altitude – an altitude or flight level maintained during en route level flight. This is a constant altitude and should not be confused with a cruise clearance.
Data Quality	The U.S. does not define data quality in its ATS operational documents.
Datum	The U.S. does not define datum in its ATS operational documents.
Declared capacity	The U.S. does not define declared capacity in its ATS operational documents.
DETRESFA	The U.S. does not define DETRESFA, although the P/CG does contain DETRESFA [ICAO].
Distress phase	The U.S. does not define distress phase, although the P/CG does contain the Annex 11 Amdt 52 verbiage in the definition of DETRESFA [ICAO].
Downstream Clearance	Same as air traffic control clearance. Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.
Duty	While "duty" is frequently used in ATS documents and Title 14 of the U.S. Code of Federal Regulations, the U.S. does not define duty in its ATS operational documents.
Duty period	While "duty period" is used in ATS documents and Title 14 of the U.S. Code of Federal Regulations, the U.S. does not define duty period in its ATS operational documents.
Emergency phase	The U.S. defines 'emergency' but only uses some of the language from the Annex 11 Amdt 52 definition of "emergency phase".
Final Approach	The U.S. defines the aspects of "Final Approach" separately.
Flight Information Centre	In the US, flight information service and alerting service are often provided by flight service stations.
Flight level	The U.S. uses the measurement of a level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury instead of 1 013.2 hectopascals (hPa).
Geodetic Datum	The U.S. does not define Geodetic datum in aeronautical publications.
Height	The U.S defines Height as the height above ground level (or AGL) expressed in meters or feet.
INCERFA	The U.S. does not define INCERFA.
Level	The term "altitude" is used.

Maneuvering Area	Any locality either on land, water, or structures, including airports/heliports and intermediate landing fields, which is used, or intended to be used, for the landing and takeoff of aircraft whether or not facilities are provided for the shelter, servicing, or for receiving or discharging passengers or cargo.
Meteorological office	No PCG definition. However FSSs perform this duty.
Movement Area	The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.
Non−duty period	The U.S. uses the term “rest period.”
Obstacle	The U.S. limits its definition of obstacle to an existing object, object of natural growth, or terrain at a fixed geographical location.
Pilot−in−command	The person who has final authority for the operation and safety of the flight has been designated as pilot in command before or during the flight and hold the appropriate category, class and type rating for the flight.
Prohibited area	The U.S. allows flight into prohibited areas with proper permissions. Special use area.
Radio navigation service	The U.S. describes its radio navigation services in AIP GEN 3.4 but does not define it.
Radiotelephony only	The U.S. does not explicitly define radiotelephony.
Traffic avoidance advice	US uses the term “Safety Alert”
Traffic information	US uses the term “Traffic Advisory”
Transferring unit	The U.S. uses the term “TRANSFERRING CONTROLLER.”
Uncertainty phase	The U.S. does not define uncertainty phase.
Waypoint	A predetermined geographical position used for route/instrument approach definition, progress reports, published VFR routes, visual reporting points or points for transitioning and/or circumnavigating controlled and/or special use airspace, that is defined relative to a VORTAC station or in terms of latitude/longitude coordinates.
Chapter 2	**General**
2.3.2	Annex 11, paragraph 2.3.2 directs the flight information service to accomplish objective d) of para 2.2, “to provide advice and information for the safe and efficient conduct of flight.” Details on procedures to accomplish this objective are contained in FAA Order JO 7210.3, Part 4, Flight Service Stations. Specific procedures for accomplishing this objective are contained in FAA Order JO 7110.10, Flight Services. Also, the FAA Pilot Controller Glossary defines a Flight Service Station (FSS) as an air traffic facility which provides pilot briefings, flight plan processing, en route flight advisories, search and rescue services, and assistance to lost aircraft and aircraft in emergency situations. FSSs also relay ATC clearances, process Notices to Airmen, and broadcast aviation weather and aeronautical information. In Alaska, FSSs provide Airport Advisory Services.
2.5.2.2.1	FAA uses the generic term “controlled airspace” and “surface areas”
2.5.2.2.1.1	FAA also provides this service in Class E.

2.5.2.2.2	Annex 11, paragraph 2.3.2 directs the flight information service to accomplish objective d) of para 2.2, "to provide advice and information for the safe and efficient conduct of flight." Details on procedures to accomplish this objective are contained in FAA Order 7210.3, Part 4, Flight Service Stations. Specific procedures for accomplishing this objective are contained in FAA Order 7110.10, Flight Services. Also, the FAA Pilot Controller Glossary defines Flight Service Stations as "air traffic facilities which provide pilot briefing, en route communications and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR flight plans, and monitor NAVAIDs. In addition, at selected locations, FSSs provide En Route Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of trans−border flights."
2.6.1	The U.S. has chosen not to use Class F airspace.
2.11.3.2.2	Class E−5 700/1200−foot airspace areas are used for transitioning aircraft to/from the terminal or en route environment.
2.11.3.3	En Route Domestic Airspace Areas consist of Class E airspace that extends upward from a specified altitude to provide controlled airspace in those areas where there is a requirement to provide IFR en route ATC services but the Federal airway structure is inadequate. En Route Domestic Airspace Areas may be designated to serve en route operations when there is a requirement to provide ATC service but the desired routing does not qualify for airway designation. Offshore/ Control Airspace Areas are locations designated in international airspace (between the U.S. 12−mile territorial limit and the CTA/FIR boundary, and within areas of domestic radio navigational signal or ATC radar coverage) wherein domestic ATC procedures may be used for separation purposes.
2.11.5.1	A Class D airspace area shall be of sufficient size to: 1. Allow for safe and efficient handling of operations. 2. Contain IFR arrival operations while between the surface and 1,000 feet above the surface, and IFR departure operations while between the surface and the base of adjacent controlled airspace. Size and shape may vary to provide for 1 and 2. The emphasis is that a Class D area shall be sized to contain the intended operations.
2.11.5.3	Refer to Surface Areas. The U.S. uses the term "Surface Area". Surface area is airspace contained by the lateral boundary of the Class B, C, D, or E airspace designated for an airport that begins at the surface and extends upward.
2.26.5	No time is issued prior to taxi for take−off. Time checks are given to the nearest quarter minute.
2.29	Process is described in the FAA Safety Management System Manual and the FAA Order 1100.161.
Chapter 3	**Air Traffic Control Service**
3.2	Air Route Traffic Control Facilities (ARTCC) are used instead of Area Control Service, and Terminal Control Facilities instead of Approach Control Service.
3.6.2.4	The U.S does not specify notification of 2−way communication. The accepting unit shall not alter the clearance of an aircraft that has not yet reached the transfer of control point without the prior approval of the transferring unit.

3.7.3.1	Air crews are not required to read back clearances, only to acknowledge receipt of clearances. Certain air traffic controller safety−related parts of ATC clearances and instructions which are transmitted by voice and which must be read back according to US requirements. “Ensure pilots acknowledge all Air Traffic Clearances and ATC Instructions. When a pilot reads back an Air Traffic Clearance or ATC Instruction: Ensure that items read back are correct. Ensure the read back of hold short instructions, whether a part of taxi instructions or a LAHSO clearance. Ensure pilots use call signs and/or registration numbers in any read back acknowledging an Air Traffic Clearance or ATC Instruction.”
3.7.3.1.1	Air crews are not required to read back clearances, only to acknowledge receipt of clearances.
3.7.3.3	The U.S. only requires a read back for operations regarding hold short instructions. Controllers may request a read back whenever they feel a read back is necessary.
3.7.4.3	4−3−8. COORDINATION WITH RECEIVING FACILITY Coordinate with the receiving facility before the departure of an aircraft if the departure point is less than 15 minutes flying time from the transferring facility’s boundary unless an automatic transfer of data between automated systems will occur, in which case the flying time requirement may be reduced to 5 minutes or replaced with a mileage from the boundary parameter when mutually agreeable to both facilities.
3.7.4.4	4−4−5. CLASS G AIRSPACE Include routes through Class G airspace only when requested by the pilot. NOTE−1. Flight plans filed for random RNAV routes through Class G airspace are considered a request by the pilot. 2. Flight plans containing MTR segments in/through Class G airspace are considered a request by the pilot. Air Traffic Control Clearance means an authorization by air traffic control within controlled airspace.
Chapter 4	**Flight Information Service**
4.2.2	No Class F airspace. Collision Hazard information is provided between known traffic to aircraft in Class G airspace.
Chapter 6	**Air Traffic Services Requirements for Communications**
6.1.1.4 6.2.2.3.8	The US uses a 45 day retention period.
6.2.3.6	The US has a 45 day or longer retention period, with some exceptions. US en route facilities using system analysis recording tapes as their radar retention media shall retain radar data for 15 days. Facilities using a teletype emulator or console printout must be retained for 30 days unless they are related to an accident or incident. A facility using a console typewriter printout take−up device may retain the printout on the spool for 15 days after the last date on the spool. If a request is received to retain data information following an accident or incident, the printout of the relative data will suffice and the tape/disc may then be returned to service through the normal established rotational program.
6.3.1.3	The US has a 45 day or longer retention period except that those facilities utilizing an analog voice recorder system shall retain voice recordings for 15 days.
6.4.1.2	The US retains surveillance data recordings for 45 days or longer when they are pertinent to an accident or incident investigation, except that en route facilities using system analysis recording tapes as their radar retention media (regardless of the type of voice recorder system being used) shall retain voice recordings for 15 days and those facilities using an analog voice recorder system shall retain voice recordings for 15 days. FAA’s Air Traffic Control System Command Center shall retain voice recordings for 15 days.
Chapter 7	**Air Traffic Services Requirements for Information**
7.1.5	The term “communication station” is not used but the flight information is passed.

7.6	Temporary Flight Restrictions (TFRs) are the mechanism that would be implemented in such cases.
Appendix 2	**Principles Governing the Establishment and Identification of Significant Points**
3.1	In US, per FAA Order 8260.19D, there are some points not to be named. Fixes used for navigation not to be named include Visual Descent Points (VDPs), radar fixes used on ASR and/or PAR procedures, RNAV missed approach point at threshold, and an ATD fix located between the MAP and the landing area marking the visual segment descent point on COPTER RNAV PinS approach annotated "PROCEED VISUALLY." Additionally, there are some non-pronounceable points allowed. Order 8260.19 states "Except as noted below, each name must consist of a 5-letter pronounceable word. These non-pronounceable exceptions include; Stepdown fixes between FAF and MAP, Missed Approach Points (MAP), Computer Navigation Fixes (CNFs), and VFR Waypoints.
Appendix 4	**ATS Airspace Classifications**
	Speed restrictions of 250 knots do not apply to aircraft operating beyond 12 NM from the coast line within the U.S. Flight Information Region, in offshore Class E airspace below 10,000 feet MSL. Paragraph (a) of § 91.117 of Title 14 of the Code of Federal Regulations (CFR) provides that "Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots." Within domestic airspace, a pilot operating at or above 10,000 MSL on an assigned speed adjustment greater than 250 knots is expected to comply with § 91.117(a) when cleared below 10,000 feet MSL without notifying Air Traffic Control (ATC). The Federal Aviation Administration has proceeded from an operational perspective that the speed restrictions of § 91.117(a) do not apply to U.S.-registered aircraft, via § 91.703(a)(3), when operating outside the United States (and not within another country's territorial airspace).
Appendix 6	**Fatigue Risk Management System (FRMS) Requirements**
1.2 f)	Breaks ("relief periods") required to be "of reasonable duration" (Section 2−5−4c) and "administered in an equitable manner" (2−6−6a)y. Minimum duration not defined except for a meal break (30 minutes).
1.2 Note	Variation from prescriptive schedule rules must be entered into the Daily Record of Facility Operation at the time of the deviation.
3 b)	FAA does not have *specific* processes for deviations or variations from prescriptive fatigue management regulations.

ANNEX 12 − SEARCH AND RESCUE
There are no reportable differences between U.S. regulations and the Standards and Recommended Practices contained in this Annex.

ANNEX 13 − AIRCRAFT ACCIDENT INVESTIGATION	
Chapter 5	**Investigation**
5.1.2	The U.S. is unable to investigate all serious incidents. A decision on whether to investigate a serious incident will consider factors such as the potential consequences of the incident, an assessment of available staff and resources, and the potential benefit to future safety.
5.12	The laws of the United States require the determination and public reporting of the facts, circumstances, and cause(s) or probable cause(s) of every civil aircraft accident. These laws, including the U.S. Freedom of Information Act, do not confine the disclosure of such information to an accident investigation or report. Accordingly, factual information such as statements, records of communications between persons, and air traffic recordings and transcripts are generally made public. United States law prohibits the public disclosure of cockpit voice recordings and visual recordings and limits the public disclosure of cockpit voice recording transcripts or written depictions of visual information to that information which is deemed relevant by the investigative authority. However, U.S. Courts can order the disclosure of the foregoing information for other than accident investigation purposes. Regarding issues related to the competent authority, the U.S. approach is consistent with Annex 13 and ICAO Document 10053 in recognizing limits in a State's ability to protect investigation records that may be sought for other public purposes, including freedom of information laws. This approach is fully consistent with the balancing test that has been broadly applied in the U.S. in determining whether applicable laws and regulations require the public disclosure of these records or permit their withholding from the public.
5.12.2	The laws of the United States require the determination and public reporting of the facts, circumstances, and cause(s) or probable cause(s) of every civil aircraft accident. These laws, including the U.S. Freedom of Information Act, do not confine the disclosure of such information to an accident investigation or report. United States law prohibits the public disclosure of cockpit voice recordings and visual recordings and limits the public disclosure of cockpit voice recording transcripts or written depictions of visual information to that information which is deemed relevant by the investigative authority. However, U.S. Courts can order the disclosure of the foregoing information for other than accident investigation purposes.
5.12.3	The laws of the United States require the determination and public reporting of the facts, circumstances, and cause(s) or probable cause(s) of every civil aircraft accident. These laws, including the U.S. Freedom of Information Act, do not confine the disclosure of such information to an accident investigation or report. United States law may afford protection of the names of persons involved in accidents or incidents in some cases, though not all cases. U.S. Courts can order the disclosure of the foregoing information. In addition, while it is U. S. practice not to identify names of such persons in accident and incident reports, those names may be revealed in background material made available to the public as required by U.S. law.
5.12.6	The United States supports the principle of not circulating, publishing, or providing access to a draft Report or any part thereof, or any documents obtained during the investigation, unless such a report or document has already been published or released by the State that conducted the investigation. However, the laws of the United States facilitate the public disclosure of information held by government agencies and commercial businesses. The U.S. government may not be able to restrict public access to a draft Report or any part thereof on behalf of the State conducting the investigation. However, regarding "Foreign Investigations", neither the Board, nor any agency receiving information from the Board, shall release records pertaining to an investigation until the State conducting the investigation issues its Final Report or 2 years following the date of the accident, whichever occurs first. The standard for determining public access to information requested from a U.S. government agency or a commercial business does not consider or require the express consent of the State conducting an investigation.

5.19	The United States may find it necessary to accept a limited number of advisors appointed to assist the accredited representative and will exercise discretion in determining whether the skills and expertise of the advisor(s) are appropriate for the conduct of the aircraft accident or incident investigation.
5.20	The United States may find it necessary to accept a limited number of advisors appointed to assist the accredited representative and will exercise discretion in determining whether the skills and expertise of the advisor(s) are appropriate for the conduct of the aircraft accident or incident investigation.
5.25	Concerning 5.25(h), investigative procedures observed by the United States allow full participation in all progress and investigation planning meetings; however, deliberations related to analysis, findings, probable causes, and safety recommendations are restricted to the investigative authority and its staff. However, contributions to these areas are permitted through timely written submissions, as specified in paragraph 5.25(i).
5.25 h)	Investigative procedures observed by the U.S. allow full participation in all progress and investigation planning meetings; however, deliberations related to analysis, findings, probable causes, and safety recommendations are restricted to the investigative authority and its staff. However, participation in these areas is extended through timely written submissions, as specified in paragraph 5.25 i).
5.26	Concerning 5.26(b): The United States supports, in principle, the privacy of the State conducting the investigation regarding the progress and the findings of that investigation. However, the laws of the United States facilitate the public disclosure of information held by U.S. government agencies and U.S. commercial businesses. Notwithstanding any other provision of law, regarding “Foreign Investigations”, neither the Board, nor any agency receiving information from the Board, shall release records pertaining to an investigation until the State conducting the investigation issues its Final Report or 2 years following the date of the accident, whichever occurs first. The standard for determining public access to information requested from a U.S. government agency or a commercial business does not consider or require the express consent of the State conducting the investigation.
5.26 b)	The U.S. supports, in principle, the privacy of the State conducting the investigation regarding the progress and the findings of that investigation. However, the laws of the U.S. facilitate the public disclosure of information held by U.S. government agencies and U.S. commercial business. The standard for determining public access to information requested from a U.S. government agency or a commercial business does not consider or require the expressed consent of the State conducting the investigation.
Chapter 6	**Reporting**
6.2	The United States supports the principle of not circulating, publishing, or providing access to a draft Report or any part thereof, or any documents obtained during the investigation, unless such a report or document has already been published or released by the State that conducted the investigation. However, the laws of the United States facilitate the public disclosure of information held by government agencies and commercial businesses. The U.S. government may not be able to restrict public access to a draft Report or any part thereof on behalf of the State conducting the investigation. However, regarding “Foreign Investigations”, neither the Board, nor any agency receiving information from the Board, shall release records pertaining to an investigation until the State conducting the investigation issues its Final Report or 2 years following the date of the accident, whichever occurs first. The standard for determining public access to information requested from a U.S. government agency or a commercial business does not consider or require the express consent of the State conducting an investigation.

6.3	The United States requires that comments on draft final reports be received within 30 days of transmittal unless an extension is provided.
6.13	The U.S. supports the principle of not circulating, publishing, or providing access to a draft report or any part thereof unless such a report or document has already been published or released by the State which conducted the investigation. However, the laws of the U.S. facilitate the public disclosure of information held by government agencies and commercial business. The U.S. government may not be able to restrict public access to a draft report or any part thereof on behalf of the State conducting the investigation. The standard for determining public access to information requested from a U.S. government agency or a commercial business does not consider or require the expressed consent of the State conducting an investigation.

ANNEX 14 − AERODROMES	
VOLUME 1 − AERODROME DESIGN AND OPERATIONS	
Chapter 1	**General**
1.2.1	Airports in the U.S. are for the most part owned and operated by local governments and quasi−government organizations formed to operate transportation facilities. The Federal Government provides air traffic control, operates and maintains NAVAIDs, provides financial assistance for airport development, certificates major airports, and issues standards and guidance for airport planning, design, and operational safety. There is general conformance with the Standards and Recommended Practices of Annex 14, Volume I. At airports with scheduled passenger service using aircraft having more than nine seats, compliance with standards is enforced through regulation and certification. At other airports, compliance is achieved through the agreements with individual airports under which Federal development funds were granted; or, through voluntary actions.
1.3.1 1.3.2 1.3.3 1.3.4	In the U.S., the Airport Reference Code is a two−component indicator relating the standards used in the airport's design to a combination of dimensional and operating characteristics of the largest aircraft expected to use the airport. The first element, Aircraft Approach Category, corresponds to the ICAO PANS−OPS approach speed groupings. The second, Airplane Design Group, corresponds to the wingspan groupings of code element 2 of the Annex 14, Aerodrome Reference Code. See below:

TBL GEN 1.7−1

Airport Reference Code (ARC)

Aircraft Approach Category	Approximate Annex 14 Code Number
A	1
B	2
C	3
D	4
E	−
Airplane Design Group	**Corresponding Annex 14 Code Letter**
I	A
II	B
III	C
IV	D
V	E
VI	F (proposed)

EXAMPLE: AIRPORT DESIGNED FOR B747−400 ARC D−V.

Chapter 2	Aerodrome Data
2.2.1	The airport reference point is recomputed when the ultimate planned development of the airport is changed.
2.9.6 2.9.7	Minimum friction values have not been established to indicate that runways are "slippery when wet." However, U.S. guidance recommends that pavements be maintained to the same levels indicated in the ICAO Airport Services Manual.
2.11.3	If inoperative fire fighting apparatus cannot be replaced immediately, a NOTAM must be issued. If the apparatus is not restored to service within 48 hours, operations shall be limited to those compatible with the lower index corresponding to operative apparatus.
2.12 e)	Where the original VASI is still installed, the threshold crossing height is reported as the center of the on−course signal, not the top of the red signal from the downwind bar.

Chapter 3	Physical Characteristics
3.1.2*	The crosswind component is based on the ARC: 10.5 kt for AI and BI; 13 kt for AII and BII; 16 kt for AIII, BIII and CI through DIII; 20 kts for AIV through DVI.
3.1.9*	Runway widths (in meters) used in design are shown in the table below:

Width of Runway in Meters

Aircraft Approach Category	Airplane Design Group					
	I	II	III	IV	V	VI
A	18[1]	23[1]	—	––	45	60
B	18[1]	23[1]	—	––	45	60
C	30	30	30[2]	45	45	60
D	30	30	30[2]	45	45	60

[1]The width of a precision (lower than $^3/_4$ statute mile approach visibility minimums) runway is 23 meters for a runway which is to accommodate only small (less than 5,700 kg) airplanes and 30 meters for runways accommodating larger airplanes.

[2]For airplanes with a maximum certificated take−off mass greater than 68,000 kg, the standard runway width is 45 meters.

3.1.12	FAA allows dual and triple simultaneous independent approaches when runway centerlines are at least 3100 feet apart.
3.1.14*	Longitudinal runway slopes of up to 1.5 percent are permitted for aircraft approach categories C and D except for the first and last quarter of the runway where the maximum slope is 0.8 percent.
3.1.19*	Minimum and maximum transverse runway slopes are based on aircraft approach categories as follows: For categories A and B: 1.0 – 2.0 percent C and D: 1.0 – 1.5 percent
3.2.2	The U.S. does not require that the minimum combined runway and shoulder widths equal 60 meters. The widths of shoulders are determined independently.
3.2.3*	The transverse slope on the innermost portion of the shoulder can be as high as 5 percent.
3.3.3 3.3.4* 3.3.5*	A strip width of 120 meters is used for code 3 and 4 runways for precision, nonprecision, and non−instrumented operations. For code 1 and 2 precision runways, the width is 120 meters. For non−precision/visual runways, widths vary from 37.5 meters up to 120 meters.
3.3.9*	Airports used exclusively by small aircraft (U.S. Airplane Design Group I) may be graded to distances as little as 18 meters from the runway centerline.
3.3.14*	The maximum transverse slope of the graded portion of the strip can be 3 percent for aircraft approach categories C and D and 5 percent for aircraft approach categories A and B.
3.3.15*	The U.S. does not have standards for the maximum transverse grade on portions of the runway strip falling beyond the area that is normally graded.
3.3.17*	Runways designed for use by smaller aircraft under non−instrument conditions may be graded to distances as little as 18 meters from the runway centerline (U.S. Airplane Design Groups I and II).
3.4.2*	For certain code 1 runways, the runway end safety areas may be only 72 meters.
3.7.1* 3.7.2*	The U.S. does not provide Standards or Recommended Practices for radio altimeter operating areas.
3.8.3*	The U.S. specifies a 6 meter clearance for Design Group VI airplanes.
3.8.4*	The taxiway width for Design Group VI airplanes is 30 meters.
3.8.5*	The U.S. also permits designing taxiway turns and intersections using the judgmental oversteering method.

3.8.7*	Minimum separations between runway and taxiway centerlines, and minimum separations between taxiways and taxilanes and between taxiway/taxilanes and fixed/moveable objects are shown in the tables that follow. Generally, U.S. separations are larger for non−instrumented runways, and smaller for instrumented runways, than the Annex. Values are also provided for aircraft with wingspans up to 80 meters.

Minimum Separations Between Runway Centerline and Parallel Taxiway/Taxilane Centerline

Operation	Aircraft Approach Category	Airplane Design Group						
		I[1]	I	II	III	IV	V	VI
Visual runways and runways with not lower than 3/4‑statute mile (1,200 meters) approach visibility minimums	A and B	150 feet 45 meters	225 feet 67.5 meters	240 feet 72 meters	300 feet 90 meters	400 feet 120 meters	––	––
Runways with lower than 3/4‑statute mile (1,200 meters) approach visibility minimums	A and B	200 feet 60 meters	250 feet 75 meters	300 feet 90 meters	350 feet 105 meters	400 feet 120 meters	––	––
Visual runways and runways with not lower than 3/4‑statute mile (1,200 meters) approach visibility minimums	C and D	––	300 feet 90 meters	300 feet 90 meters	400 feet 120 meters	400 feet 120 meters	400[2] feet 120[2] meters	600 feet 180 meters
Runways with lower than 3/4‑statute mile (1,200 meters) approach visibility minimums	C and D	––	400 feet 120 meters	400 feet 120 meters	400 feet 120 meters	400 feet 120 meters	400[2] feet 120[2] meters	600 feet 180 meters

[1]These dimensional standards pertain to facilities for small airplanes exclusively.

[2]Corrections are made for altitude: 120 meters separation for airports at or below 410 meters; 135 meters for altitudes between 410 meters and 2,000 meters; and, 150 meters for altitudes above 2,000 meters.

Minimum Taxiway and Taxilane Separations:

	Airplane Design Group					
	I	II	III	IV	V	VI
Taxiway centerline to parallel taxiway/ taxilane centerline	69 feet 21 meters	105 feet 32 meters	152 feet 46.5 meters	215 feet 65.5 meters	267 feet 81 meters	324 feet 99 meters
Fixed or movable object	44.5 feet 13.5 meters	65.5 feet 20 meters	93 feet 28.5 meters	129.5 feet 39.5 meters	160 feet 48 meters	193 feet 59 meters
Taxilane centerline to parallel taxilane centerline	64 feet 19.5 meters	97 feet 29.5 meters	140 feet 42.5 meters	198 feet 60 meters	245 feet 74.5 meters	298 feet 91 meters
Fixed or movable object	39.5 feet 12 meters	57.5 feet 17.5 meters	81 feet 24.5 meters	112.5 feet 34 meters	138 feet 42 meters	167 feet 51 meters

3.8.10*	Line−of−sight standards for taxiways are not provided in U.S. practice, but there is a requirement that the sight distance along a runway from an intersecting taxiway must be sufficient to allow a taxiing aircraft to safely enter or cross the runway.
3.8.11*	Transverse slopes of taxiways are based on aircraft approach categories. For categories C and D, slopes are 1.0−1.5 percent; for A and B, 1.0−2.0 percent.
3.11.5	The runway centerline to taxi−holding position separation for code 1 is 38 meters for non−precision operations and 53 meters for precision. Code 3 and 4 precision operations require a separation of 75 meters, except for “wide bodies,” which require 85 meters.

Dimensions and Slopes for Protective Areas and Surfaces

	Precision Approach	Non−precision Instrument Approach			Visual Runway	
	All runways	All runways[a]	Runways other than utility[b]	Utility runways[d]	Runways other than utility	Utility runways
Width of inner edge	305 meters	305 meters	152 meters	152 meters	152 meters	76 meters[c]
Divergency (each side)	15 percent	15 percent	15 percent	15 percent	10 percent	10 percent
Final width	4,877 meters	1,219 meters	1,067 meters[c]	610 meters	475 meters[c]	381 meters[c]
Length	15,240 meters	3,048 meters[c]	3,048 meters[c]	1,524 meters[c]	1,524 meters[c]	1,524 meters[c]
Slope: inner 3,049 meters	2 percent	2.94 percent[c]	2.94 percent[c]	5 percent[c]	5 percent[c]	5 percent[c]
Slope: beyond 3,048 meters	2.5 percent[c]					

[a]With visibility minimum as low as 1.2 km; [b]with visibility minimum greater than 1.2 km; [c]criteria less demanding than Annex 14 Table 4−1 dimensions and slopes. [d]Utility runways are intended to serve propeller−driven aircraft having a maximum take−off mass of 5,570 kg.

Chapter 4	**Obstacle Restriction and Removal**
4.1	Obstacle limitation surfaces similar to those described in 4.1−4.20 are found in 14 CFR Part 77.
4.1.21	A balked landing surface is not used.
4.1.25	The U.S. does not establish take−off climb obstacle limitation areas and surface, *per se*, but does specify protective surfaces for each end of the runway based on the type of approach procedures available or planned. The dimensions and slopes for these surfaces and areas are listed in the table above.
4.2	The dimensions and slopes of U.S. approach areas and surfaces are set forth in the above table. Aviation regulations do not prohibit construction of fixed objects above the surfaces described in these sections.
4.2.1	Primary surface is also used as a civil airport imaginary surface. Primary surface is a surface longitudinally centered on a runway. U.S. uses the width of the primary surface of a runway as prescribed in 14 CFR Part 77.25 for the most precise approach existing or planned for either end of that runway.
4.2.8	The slope and dimensions of the approach surface applied to each end of a runway are determined by the most precise approach existing or planned for that runway end.
4.2.9	Approach surfaces are applied to each end of each runway based upon the type of approach available or planned for that runway end.
4.2.10, 4.2.11	Any proposed construction of or alteration to an existing structure is normally considered to be physically shielded by one or more existing permanent structure(s), natural terrain, or topographic feature(s) of equal or greater height if the structure under consideration is located within the lateral dimensions of any runway approach surface but would not exceed an overall height above the established airport elevation greater than that of the outer extremity of the approach surface, and located within, but would not penetrate, the shadow plane(s) of the shielding structure(s).
4.2.12	The basic principle in applying shielding guidelines is whether the location and height of the structures are such that aircraft, when operating with due regard for the shielding structure, would not collide with that structure.
4.2.16	The size of each imaginary surface is based on the category of each runway according to the type of approach available or planned for that runway. The slope and dimensions of the approach surface applied to each end of a runway are determined by the most precise approach existing or planned for that runway end.
4.2.17	Approach surfaces are applied to each end of each runway based upon the type of approach available or planned for that runway end.

Chapter 5	Visual Aids for Navigation
5.2.1.7*	The U.S. does not require unpaved taxiways to be marked.
5.2.2.2*	The U.S. does not require a runway designator marking for unpaved runways.
5.2.2.4	Zeros are not used to precede single−digit runway markings. An optional configuration of the numeral 1 is available to designate a runway 1 and to prevent confusion with the runway centerline.
5.2.4.2* 5.2.4.3*	Threshold markings are not required, but sometimes provided, for non−instrument runways that do not serve international operations.
5.2.4.5	The current U.S. standard for threshold designation is eight stripes, except that more than eight stripes may be used on runways wider than 45 meters. After 1 January 2008, the U.S. standard will comply with Annex 14.
5.2.4.6	The width and spacing of threshold stripes will comply with Annex 14 after 1 January 2008.
5.2.4.10	When a threshold is temporarily displaced, there is no requirement that runway or taxiway edge markings, prior to the displaced threshold, be obscured. These markings are removed only if the area is unsuitable for the movement of aircraft.
5.2.5.2 5.2.5.3*	Aiming point markings are required on precision instrument runways and code 3 and 4 runways used by jet aircraft.
5.2.5.4	The aiming point marking commences 306 meters from the threshold at all runways.
5.2.6.3	The U.S. pattern for touchdown zone markings, when installed on both runway ends, is only applicable to runways longer than 4,990 feet. On shorter runways, the three pair of markings closest to the runway midpoint are eliminated.
5.2.6.4	The U.S. standard places the aiming point marking 306 meters from the threshold where it replaces one of the pair of three stripe threshold markings. The 306 meters location is used regardless of runway length.
5.2.6.5*	Touchdown zone markings are not required at a non−precision approach runway, though they may be provided.
5.2.7.4*	Runway side stripe markings on a non−instrument runway may have an over−all width of 0.3 meter.
5.2.8.3	Taxiway centerline markings are never installed longitudinally on a runway even if the runway is part of a standard taxi route.
5.2.9.5*	The term "ILS" is used instead of CAT I, CAT II, CAT III.
5.2.11.4 5.2.11.5* 5.2.11.6*	Check−point markings are provided, but the circle is 3 meters in diameter, and the directional line may be of varying width and length. The color is the yellow used for taxiway markings.
5.2.12	Standards for aircraft stand markings are not provided.
5.2.13.1*	Apron safety lines are not required although many airports have installed them.
5.2.14.1	The U.S. does not have standards for holding position markings on roadways that cross runways. Local traffic control practices are used.
5.3.1.1 5.3.1.2*	The U.S. does not have regulations to prevent the establishment of non−aviation ground lights that might interfere with airport operations.
5.3.1.3 5.3.1.4	New approach lighting installations will meet the frangibility requirements. Some existing non−frangible systems may not be replaced before 1 January 2005.
5.3.2.1* 5.3.2.2* 5.3.2.3*	There is no requirement for an airport to have emergency runway lighting available if it does not have a secondary power source. Some airports do have these systems, and there is an FAA specification for these lights.
5.3.3.1 5.3.3.3	Only airports served by aircraft having more than 30 seats are required to have a beacon, though they are available at many others.
5.3.3.6	Although the present U.S. standard for beacons calls for 24−30 flashes per minute, some older beacons may have flash rates as low as 12 flashes per minute.
5.3.3.8	Coded identification beacons are not required and are not commonly installed. Typically, airport beacons conforming to 5.3.3.6 are installed at locations served by aircraft having more than 30 seats.

5.3.4.1	While the U.S. has installed an approach light system conforming to the specifications in 5.3.4.10 through 5.3.4.19, it also provides for a lower cost system consisting of medium intensity approach lighting and sequenced flashing lights (MALSF) at some locations.
5.3.4.2	In addition to the system described in 5.3.4.1, a system consisting of omnidirectional strobe lights (ODALS) located at 90 meters intervals extending out to 450 meters from the runway threshold is used at some locations.
5.3.4.10 through 5.3.4.19	The U.S. standard for a precision approach category I lighting system is a medium intensity approach lighting system with runway alignment indicator lights (MALSR). This system consists of 3 meters barrettes at 60 meters intervals out to 420 meters from the threshold and sequenced flashing lights at 60 meters intervals from 480 meters to 900 meters. A crossbar 20 meters in length is provided 300 meters from the threshold. The total length of this system is dependent upon the ILS glide path angle. For angles 2.75° and higher, the length is 720 meters.
5.3.4.16 5.3.4.31	The capacitor discharge lights can be switched on or off when the steady−burning lights of the approach lighting system are operating. However, they cannot be operated when the other lights are not in operation.
5.3.4.20	The U.S. standard for a precision approach category II and III lighting system has a total length dependent upon the ILS glide path angle. For angles 2.75° and higher, the length is 720 meters.
5.3.5.1 5.3.5.3 5.3.5.4	Visual approach slope indicator systems are not required for all runways used by turbojets except runways involved with land and hold short operations that do not have an electronic glideslope system.
5.3.5.2	In addition to PAPI and APAPI systems, VASI and AVASI type systems remain in service at U.S. airports with commercial service. Smaller general aviation airports may have various other approach slope indicators including tri−color and pulsating visual approach slope indicators.
5.3.5.27	The U.S. standard for PAPI allows for the distance between the edge of the runway and the first light unit to be reduced to 9 meters for code 1 runways used by nonjet aircraft.
5.3.5.42	The PAPI obstacle protection surface used is as follows: The surface begins 90 meters in front of the PAPI system (toward the threshold) and proceeds outward into the approach zone at an angle 1 degree less than the aiming angle of the third light unit from the runway. The surface flares 10 degrees on either side of the extended runway centerline and extends 4 statute miles from its point of origin.
5.3.8.4	The U.S. permits the use of omnidirectional runway threshold identification lights.
5.3.13.2	The U.S. does not require the lateral spacing of touchdown zone lights to be equal to that of touchdown zone marking when runways are less that 45 meters wide. The lateral distance between the markings is 22 meters when installed on runways with a width of 45 meters or greater. The distance is proportionately smaller for narrower runways. The lateral distance between touchdown zone lights is nominally 22 meters but may be reduced to 20 meters to avoid construction problems.
5.3.14	The U.S. has no provision for stopway lights.
5.3.15.1 5.3.15.2*	Taxiway centerline lights are required only below 183 meters RVR on designated taxi routes. However, they are generally recommended whenever a taxiing problem exists.
5.3.15.3 8.2.3	Taxiway centerline lights are not provided on runways forming part of a standard taxi route even for low visibility operations. Under these conditions, the taxi path is coincident with the runway centerline, and the runway lights are illuminated.
5.3.15.5	Taxiway centerline lights on exit taxiways presently are green. However, the new U.S. standard which is scheduled to be published by 1 January 98 will comply with the alternating green/yellow standard of Annex 14.
5.3.15.7*	The U.S. permits an offset of up to 60 cm.
5.3.16.2 8.2.3	Taxiway edge lights are not provided on runways forming part of a standard taxi route.

5.3.17.1 5.3.17.2* 5.3.17.3 5.3.17.4* 5.3.17.5*	Stop bars are required only for runway visual range conditions less than a value of 183 meters at taxiway/runway intersections where the taxiway is lighted during low visibility operations. Once installed, controlled stop bars are operated at RVR conditions less than a value of 350 meters.
5.3.17.6	Elevated stop bar lights are normally installed longitudinally in line with taxiway edge lights. Where edge lights are not installed, the stop bar lights are installed not more than 3 meters from the taxiway edge.
5.3.17.9	The beamspread of elevated stop bar lights differs from the inpavement lights. The inner isocandela curve for the elevated lights is ± 7 horizontal and ± 4 vertical.
5.3.17.12	The U.S. standard for stop bars, which are switchable in groups, does not require the taxiway centerline lights beyond the stop bars to be extinguished when the stop bars are illuminated. The taxiway centerline lights which extend beyond selectively switchable stop bars are grouped into two segments of approximately 45 meters each. A sensor at the end of the first segment re−illuminates the stop bar and extinguishes the first segment of centerline lights. A sensor at the end of the second segment extinguishes that segment of centerline lights.
5.3.18.1*	Taxiway intersection lights are also used at other hold locations on taxiways such as low visibility holding points.
5.3.18.2	Taxiway intersection lights are collocated with the taxiway intersection marking. The marking is located at the following distances from the centerline of the intersecting taxiway: Airplane Design Group — Distance I — 13.5 meters II — 20 meters III — 28.5 meters IV — 39 meters V — 48.5 meters VI — 59 meters
5.3.19.1 5.3.19.2*	Runway guard lights are required only for runway visual range conditions less than a value of 350 meters.
5.3.19.4 5.3.19.5	Runway guard lights are placed at the same distance from the runway centerline as the aircraft holding distance, or within a few feet of this location.
5.3.19.12	The new U.S. standard for in−pavement runway guard lights complies with Annex 14. However, there may be some existing systems that do not flash alternately.
5.3.20.4*	The U.S. does not set aviation standards for flood lighting aprons.
5.3.21	The U.S. does not provide standards for visual docking guidance systems. U.S. manufacturers of these devices generally adhere to ICAO SARPS.
5.3.23.1	The U.S. does not have a requirement for providing roadholding position lights during RVR conditions less than a value of 350 meters.
5.4.1.2	Signs are often installed a few centimeters taller than specified in Annex 14, Volume 1, Table 5−4.
5.4.1.5	Sign inscriptions are slightly larger, and margins around the sign slightly smaller, than indicated in Annex 14, Volume 1, Appendix 4.
5.4.1.6	The sign luminance requirements are not as high as specified in Appendix 4. The U.S. does not specify a nighttime color requirement in terms of chromaticity.
5.4.2.2 5.4.2.4 5.4.2.9 5.4.2.14 5.4.2.16	All signs used to denote precision approach holding positions have the legend "ILS."
5.4.2.6	U.S. practice uses the NO ENTRY sign to prohibit entry by aircraft only.
5.4.2.8 5.4.2.10	The second mandatory instruction sign is usually not installed unless added guidance is necessary.

5.4.2.15	Signs for holding aircraft and vehicles from entering areas where they would infringe on obstacle limitation surfaces or interfere with NAVAIDs are inscribed with the ***designator of the approach***, followed by the letters "*APCH*"; *for example, "15−APCH."*
5.4.3.13 5.4.3.15	U.S. practice is to install signs about 3 to 5 meters closer to the taxiway/runway (See Annex 14, Table 5−4).
5.4.3.16	The U.S. does not have standards for the location of runway exit signs.
5.4.3.24	A yellow border is used on all location signs, regardless of whether they are stand−alone or collocated with other signs.
5.4.3.26	U.S. practice is to use Pattern A on runway vacated signs, except that Pattern B is used to indicate that an ILS critical area has been cleared.
5.4.3.30*	The U.S. does not have standards for signs used to indicate a series of taxi−holding positions on the same taxiway.
5.4.4.4*	The inscription, "VOR Check Course," is placed on the sign in addition to the VOR and DME data.
5.4.5.1*	The U.S. does not have requirements for airport identification signs, though they are usually installed.
5.4.6.1*	Standards are not provided for signs used to identify aircraft stands.
5.4.7.2	The distance from the edge of road to the road−holding position sign conforms to local highway practice.
5.5.2.2* 5.5.7.1*	Boundary markers may be used to denote the edges of an unpaved runway.
5.5.3	There is no provision for stopway edge markers.
Chapter 6	**Visual Aids for Denoting Obstacles**
6.1	Recommended practices for marking and lighting obstacles are found in FAA Advisory Circular 70/7460−1J, Obstruction Marking and Lighting.
6.1.3	Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet (61m) above ground level or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted.
6.2.1	This chapter provides recommended guidelines to make certain structures conspicuous to pilots during daylight hours. One way of achieving this conspicuity is by painting and/or marking these structures. Recommendations on marking structures can vary depending on terrain features, weather patterns, geographic location, and in the case of wind turbines, number of structures and overall layout of design.
6.2.3*	The maximum dimension of the rectangles in a checkered pattern is 6 meters on a side.
6.2.7	Markers should be displayed in conspicuous positions on or adjacent to the structure so as to retain the general definition of the structure. They should be recognizable in clear air from a distance of at least 4,000 feet (1219m) and in all directions from which aircraft are likely to approach. Markers should be distinctively shaped, i.e., spherical or cylindrical, so they are not mistaken for items that are used to convey other information. They should be replaced when faded or otherwise deteriorated.
6.2.11	Flag markers should be displayed around, on top, or along the highest edge of the obstruction. When flags are used to mark extensive or closely grouped obstructions, they should be displayed approximately 50 feet (15m) apart. The flag stakes should be of such strength and height that they will support the flags above all surrounding ground, structures, and/or objects of natural growth.
6.2.12	Each side of the flag marker should be at least 2 feet (0.6m) in length. Standard does not specifically address mobile objects.
6.2.14	Color patterns. Flags should be colored as follows: solid, orange and white, and checkerboard. Standard does not specifically address mobile objects.

6.3.1	Obstruction lighting may be displayed on structures as follows: aviation red obstruction lights; medium intensity flashing white obstruction lights, high intensity flashing white obstruction lights, dual lighting, obstruction lights during construction, obstruction lights in urban areas, and temporary construction equipment lighting.
6.3.11	The height of the structure AGL determines the number of light levels. Recommendations on marking structures can vary depending on terrain features, weather patterns, geographic location, and in the case of wind turbines, number of structures and overall layout of design.
6.3.13	When a structure lighted by a high intensity flashing light system is topped with an antenna or similar appurtenance exceeding 40 feet (12m) in height, a medium intensity flashing white light (L−865) should be placed within 40 feet (12m) from the tip of the appurtenance. This light should operate 24 hours a day and flash simultaneously with the rest of the lighting system.
6.3.14	The number of light units recommended depends on the diameter of the structure at the top.
6.3.16	Lights should be installed on the highest point at each end. At intermediate levels, lights should be displayed for each 150 feet (46m) or fraction thereof. The vertical position of these lights should be equidistant between the top lights and the ground level as the shape and type of obstruction will permit. One such light should be displayed at each outside corner on each level with the remaining lights evenly spaced between the corner lights.
6.3.17	Lights should be installed on the highest point at each end. At intermediate levels, lights should be displayed for each 150 feet (46m) or fraction thereof. The vertical position of these lights should be equidistant between the top lights and the ground level as the shape and type of obstruction will permit. One such light should be displayed at each outside corner on each level with the remaining lights evenly spaced between the corner lights.
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6.3.19, 6.3.20	One or more light units is needed to obtain the desired horizontal coverage. The number of light units recommended per level (except for the supporting structures of catenary wires and buildings) depends upon the average outside diameter of the specific structure, and the horizontal beam width of the light fixture. The light units should be installed in a manner to ensure an unobstructed view of the system by a pilot approaching from any direction. The number of lights recommended is the minimum. The U.S. does not utilize Type A or Type B obstacle lights. Recommendations on marking structures can vary depending on terrain features, weather patterns, geographic location, and in the case of wind turbines, number of structures and overall layout of design.
6.3.21* 6.3.22*	The effective intensity, for daylight−luminance background, of Type A high−intensity obstacle lights is 270,000 cd ± 25 percent. The effective intensity, for daylight−luminance background, of Type B high−intensity obstacle lights is 140,000 cd ± 25 percent.
6.3.22	The height of the structure AGL determines the number of light levels. The light levels may be adjusted slightly, but not to exceed 10 feet (3m) when necessary to accommodate guy wires and personnel who replace or repair light fixtures. If an adjacent object shields any light, horizontal placement of the lights should be adjusted or additional lights should be mounted on that object to retain or contribute to the definition of the obstruction. Recommendations on marking structures can vary depending on terrain features, weather patterns, geographic location, and in the case of wind turbines, number of structures and overall layout of design.

6.3.23, 6.3.24, 6.3.27, 6.3.29	Red obstruction lights are used to increase conspicuity during nighttime. The red obstruction lighting system is composed of flashing omnidirectional beacons (L−864) and/or steady burning (L−810) lights. When one or more levels is comprised of flashing beacon lighting, the lights should flash simultaneously. The U.S. does not utilize Type A, B, C, or D obstacle lights. Recommendations on marking structures can vary depending on terrain features, weather patterns, geographic location, and in
6.3.28	When objects within a group of obstructions are approximately the same overall height above the surface and are located a maximum of 150 feet (46m) apart, the group of obstructions may be considered an extensive obstruction. Install light units on the same horizontal plane at the highest portion or edge of prominent obstructions. Light units should be placed to ensure that the light is visible to a pilot approaching from any direction.
6.3.30, 6.3.31, 6.3.32	The medium intensity flashing white light system is normally composed of flashing omni−directional lights. Medium intensity flashing white obstruction lights may be used during daytime and twilight with automatically selected reduced intensity for nighttime operation. The U.S. does not utilize Type A, B, or C obstacle lights. Medium intensity flashing white (L−865) obstruction lights may provide conspicuity both day and night. Recommendations on marking structures can vary depending on terrain features, weather patterns, geographic location, and in the case of structures and overall layout of design.
6.3.35	Use high intensity flashing white obstruction lights during daytime with automatically selected reduced intensities for twilight and nighttime operations. When high intensity white lights are operated 24 hours a day, other methods of marking and lighting may be omitted. The U.S. does not utilize Type A obstacle lights. Lighting with high intensity (L−856) flashing white obstruction lights provides the highest degree of conspicuity both day and night. Recommendations on marking structures can vary depending on terrain features, weather patterns, geographic location, and in the case of wind turbines, number of structures and overall layout of design.
Chapter 7	**Visual Aids for Denoting Restricted Use Areas**
7.1.2*	A “closed” marking is not used with partially closed runways. See 5.2.4.10, above.
7.1.4	Crosses with shapes similar to figure 7.1, illustration b) are used to indicate closed runways and taxiways. The cross for denoting a closed runway is yellow.
7.1.5	In the U.S. when a runway is permanently closed, only the threshold marking, runway designation marking, and touchdown zone marking need be obliterated. Permanently closed taxiways need not have the markings obliterated.
7.1.7	The U.S. does not require unserviceability lights across the entrance to a closed runway or taxiway when it is intersected by a night−use runway or taxiway.
7.4.4	Flashing yellow lights are used as unserviceability lights. The intensity is such as to be adequate to delineate a hazardous area.
Chapter 8	**Equipment and Installations**
8.1.5* 8.1.6* 8.1.7 8.1.8	A secondary power supply for non−precision instrument and non−instrument approach runways is not required, nor is it required for all precision approach runways. The U.S. does not provide secondary power specifically for take−off operations below 550 meters RVR.
8.2.1	There is no requirement in the U.S. to interleave lights as described in the Aerodrome Design Manual, Part 5.
8.2.3	See 5.3.15.3 and 5.3.16.2
8.7.2* 8.7.3 8.7.4*	Glide slope facilities and certain other installations located within the runway strip, or which penetrate obstacle limitation surfaces, may not be frangibly mounted.

8.9.7*	A surface movement surveillance system is recommended for operations from 350 meters RVR down to 183 meters. Below 183 meters RVR, a surface movement radar or alternative technology is generally required.
Chapter 9	**Emergency and Other Services**
9.1.1	Emergency plans such as those specified in this section are required only at airports serving scheduled air carriers using aircraft having more than 30 seats. These airports are certificated under 14 CFR Part 139. In practice, other airports also prepare emergency plans.
9.1.12	Full−scale airport emergency exercises are conducted at intervals, not to exceed three years, at airports with scheduled passenger service using aircraft with more than 30 seats.
9.2.1	Rescue and fire fighting equipment and services such as those specified in this section are required only at airports serving scheduled air carriers in aircraft having more than 30 seats. Such airports generally equate to ICAO categories 4 through 9. Other airports have varying degrees of services and equipment.
9.2.3*	There is no plan to eliminate, after 1 January 2005, the current practice of permitting a reduction of one category in the index when the largest aircraft has fewer than an average of five scheduled departures a day.
9.2.4 9.2.5	The level of protection at U.S. airports is derived from the length of the largest aircraft serving the airport similar to the Annex's procedure, except that maximum fuselage width is not used. U.S. indices A−E are close equivalents of the Annex's categories 5−9. The U.S. does not have an equivalent to category 10.

Fire Extinguishing Agents and Equipment

Index	Aircraft length		Total minimum quantities of extinguishing agents			
	More than	Not more than	Dry chemical	Water for protein foam	Minimum trucks	Discharge rate[1]
A		27 meters	225 kg	0	1	See below
B	27 meters	38 meters	225 kg	5,700 L	1	See below
C	38 meters	48 meters	225 kg	5,700 L	2	See below
D	48 meters	60 meters	225 kg	5,700 L	3	See below
E	60 meters		225 kg	11,400 L	3	See below

[1]Truck size	Discharge rate
1,900 L but less than 7,600	at least 1,900 L per minute but not more than 3,800 L per minute
7,600 L or greater	at least 2,280 L per minute but not more than 4,560 L per minute

9.2.10	The required firefighting equipment and agents by index are shown in the table above. The substitution equivalencies between complementary agents and foam meeting performance level A are also used for protein and fluoroprotein foam. Equivalencies for foam meeting performance level B are used only for aqueous film forming foams.
9.2.18*	There is no specific requirement to provide rescue equipment as distinguished from firefighting equipment.
9.2.19*	At least one apparatus must arrive and apply foam within 3 minutes with all other required vehicles arriving within 4 minutes. Response time is measured from the alarm at the equipment's customary assigned post to the commencement of the application of foam at the mid−point of the farthest runway.
9.2.29*	For ICAO category 6 (U.S. index B), the U.S. allows one vehicle.

9.4.4	At the present time, there is no requirement to perform tests using a continuous friction measuring device with self−wetting features. Some U.S. airports own these devices, while others use less formal methods to monitor build−up of rubber deposits and the deterioration of friction characteristics.
9.4.15	The standard grade for temporary ramps is 15 feet longitudinal per 1 inch of height (0.56 percent slope) maximum, regardless of overlay depth.
9.4.19	There is no U.S. standard for declaring a light unserviceable if it is out of alignment or if its intensity is less than 50 percent of its specified value.

*Indicates ICAO Recommended Practice

ANNEX 14 − AERODROMES	
VOLUME II − HELIPORTS	
Chapter 1	**Definitions**
Declared distances	The U.S. does not use declared distances (take−off distance available, rejected take−off distance available, or landing distance available) in designing heliports.
Final approach and take−off area (FATO)	The U.S. ''take−off and landing area'' is comparable to the ICAO FATO, and the U.S. ''FATO'' is more comparable to the ICAO TLOF. The U.S. definition for the FATO stops with ''the take−off manoeuvre is commenced.'' This difference in definition reflects a variation in concept. The rejected take−off distance is an operational computation and is not required as part of the design.
Helicopter stand	The U.S. does not use the term "helicopter stand." Instead, the U.S. considers paved or unpaved aprons, helipads, and helidecks, all as helicopter parking areas; i.e., helicopter stands.
Safety area	The U.S. considers the safety area to be part of the take−off and landing area which surrounds the FATO and does not call for or define a separate safety area.
Touchdown and lift−off area (TLOF)	The U.S. differs in the definition by considering helipads and helidecks to be FATO. The U.S. does not define the load bearing area on which the helicopter may touch down or lift−off as a TLOF.
Chapter 2	**Heliport Data**
2.1 d)	The U.S. does not measure or report a safety area as a separate feature of a heliport.
2.2	The U.S. does not ''declare'' distances for heliports.
Chapter 3	**Physical Characteristics**
3.1.2	The U.S. does not distinguish between single−engine and multi−engine helicopters for the purposes of heliport design standards. Neither does the U.S. design or classify heliports on the basis of helicopter performance. The U.S. FATO dimensions are at least equal to the rotor diameter of the design single rotor helicopter and the area must be capable of providing ground effect. The U.S. does not have alternative design standards for water FATOs, elevated heliports, or helidecks.
3.1.3	The U.S. has a single gradient standard; i.e., 5 percent, except in fueling areas where the limit is 2 percent, which is applicable for all portions of heliports.
3.1.6 3.1.7* 3.1.8*	The U.S. does not require or provide criteria for clearways in its design standards. It does encourage ownership and clearing of the land underlying the innermost portion of the approach out to where the approach surface is 10.5 meters above the level of the take−off surface.
3.1.14 to 3.1.21	Safety areas are considered part of the take−off and landing area (or primary surface) in U.S. heliport design. The take−off and landing area of the U.S. design criteria, based on 2 rotor diameters, provides for the ICAO safety area; however, the surface does not have to be continuous with the FATO or be load bearing.
3.1.22	Taxiway widths are twice the undercarriage width of the design helicopter.
3.1.23	The U.S. requires 1.25 rotor diameters plus 2 meters of separation between helicopter ground taxiways.
3.1.24	The U.S. gradient standard for taxiways is a maximum of 5 percent.
3.1.32*	The U.S. sets no gradient standards for air taxiways.
3.1.33	The U.S. requires 1.5 rotor diameters of separation between hover or air taxiways.
3.1.34	The U.S. standards for air taxiways and air transit routes are combined as the standards for hover taxiways noted in paragraphs 3.1.23, 3.1.24 and 3.1.33.
3.1.35	The U.S. sets no maximum turning angle or minimum radius of turn on hover taxiways.
3.1.36	The U.S. gradient standard for aprons is a maximum of 5 percent except in fueling areas where it is 2 percent.
3.1.37	The U.S. criterion for object clearances is 1/3 rotor diameter or 3 meters, whichever is greater.
3.1.38	The U.S. standard for helipads (comparable to helicopter stands) is 1.5 times the undercarriage length or width, whichever is greater.

3.1.39	The U.S. standard for separation between FATO center and the centerline of the runway is 120 meters.
3.2.2	The U.S. does not apply either a performance related or an alternative design standard for elevated heliport facilities.
3.2.5 to 3.2.10	The U.S. does not use safety areas in its heliport design.
3.3 3.4	In the U.S., shipboard and relocatable off−shore helicopter "helideck" facilities are under the purview of the U.S. Coast Guard and utilize the International Maritime Organization (IMO) code. Fixed off−shore helideck facilities are under the purview of the Department of Interior based on their document 351DM2. Coastal water helideck facilities are under the purview of the individual affected States.
Chapter 4	**Obstacle Restriction and Removal**
4.1.1	The U.S. approach surface starts at the edge of the take−off and landing area.
4.1.2 a)	The U.S. approach surface width adjacent to the heliport take−off and landing area is a minimum of 2 rotor diameters.
4.1.2 b) 2)	The U.S. precision instrument approach surface flares from a width of 2 rotor diameters to a width of 1,800 meters at the 7,500 meters outer end. The U.S. does not use a note similar to the one that follows 4.1.4, as it does not differentiate between helicopter requirements on the basis of operational performance.
4.1.5	The outer limit of the U.S. transitional surfaces adjacent to the take−off and landing area is 76 meters from the centerline of the VFR approach/departure surfaces. The transitional surface width decreases to zero at a point 1,220 meters from the take−off and landing area. It does not terminate at an inner horizontal surface or at a predetermined height.
4.1.6	The U.S. transitional surfaces have a fixed width, 76 meters less the width of the take−off and landing area, from the approach centerline for visual operations and an outwardly flaring width to 450 meters for precision instrument operations. The U.S. does not use an inner horizontal surface nor terminate the transitional surfaces at a fixed/predetermined height.
4.1.7 b)	Since the U.S. includes the safety area in the take−off and landing area, the comparable elevation is at the elevation of the FATO.
4.1.9 through 4.1.20	The U.S. does not use the inner horizontal surface, the conical surface, or take−off climb surface described in these paragraphs or the note following paragraph 4.1.20 for heliport design.
4.1.21 through 4.1.25	The U.S. does not have alternative criteria for floating or fixed−in−place helidecks.
4.2	The U.S. has no requirement for a note similar to the one following the heading "Obstacle limitation requirements."
4.2.1	The U.S. criteria does not require a take−off climb surface or a conical obstacle limitation surface to establish a precision instrument approach procedure.
4.2.2	The U.S. criteria does not require a take−off climb surface or a conical obstacle limitation surface to establish a non−precision instrument approach procedure.
4.2.3	The U.S. criteria does not require a take−off climb obstacle limitation surface to establish a non−instrument approach procedure.
4.2.4*	The U.S. has no requirement for protective surfaces such as an inner horizontal surface or a conical surface.
4.2.5	The U.S. does not have tables for heliport design comparable to the ICAO Tables 4−1 to 4−4.
4.2.6	The U.S. subscribes to the intent of this paragraph to limit object heights in the heliport protective surfaces but uses fewer surfaces with different dimensions for those surfaces.
4.2.7*	The U.S. subscribes to the intent of this paragraph but uses different dimensional surfaces.
4.2.8	The U.S. criterion requires that a heliport have at least one approach and departure route and encourages multiple approaches separated by arcs of 90 to 180 degrees.
4.2.9*	The U.S. has no requirement that a heliport's approach surfaces provide 95 percent usability.

4.2.10	Since the U.S. does not differentiate between surface level and elevated heliports, the comments to paragraphs 4.2.1 through 4.2.5 above apply.
4.2.11	The U.S. has no requirement for a take−off climb surface. It does require at least one approach/departure surface and encourages that there be as many approaches as is practical separated by arcs of 90 to 180 degrees.
4.2.12 through 4.2.22	Since the U.S. does not have alternative design criteria for helidecks or shipboard heliports, there are no comparable U.S. protective surface requirements.
Tables 4−1, 4−2, 4−3, 4−4	The U.S. does not have tables comparable to the ICAO Tables 4−1 to 4−4.
Chapter 5	**Visual Aids**
5.2.1	The U.S. does not have criteria for markings to be used in defining winching areas.
5.2.3.3	The U.S. maximum mass markings are specified in 1,000 pound units rather than tonnes or kilograms.
5.2.4.3	The U.S. criterion requires FATO markers but is not specific on the number or spacing between markers.
5.2.4.4	The U.S. criteria for FATO markers is not dimensionally specific.
5.2.6	The U.S. does not require, or have criteria for, marking an aiming point.
5.2.7.1	The U.S. does not require specific criteria for marking floating or off−shore fixed−in−place helicopter or helideck facilities.
5.2.8	The U.S. does not require marking the touchdown area.
5.2.9	The U.S. does not have criteria for heliport name markings.
5.2.10	The U.S. does not have a requirement to mark helideck obstacle−free sectors.
5.2.12.2	The U.S. criterion places the air taxiway markers along the edges of the routes rather than on the centerline.
5.2.12.3	The U.S. criterion for air taxiway markers does not specify the viewing area or height to width ratio.
5.3.2.3	The U.S. heliport beacon flashes white−green−yellow colors rather than a series of timed flashes.
5.3.2.5*	The U.S. criteria is not specific on the light intensity of the flash.
5.3.3.3	The U.S. criterion specifies a 300 meters approach light system configuration. The light bars are spaced at 30 meters intervals. The first two bars of the configuration are single lights, the next two bars are two lights, then two bars with three lights, then two bars with four lights, and finally two bars with five lights.
5.3.3.4	The U.S. approach light system uses aimed PAR−56 lights.
5.3.3.6	The U.S. heliport approach light system does not contain flashing lights.
5.3.5.2 a)	The U.S. requires an odd number of lights, but not less than three lights per side.
5.3.5.2 b)	The U.S. requires a minimum of eight lights for a circular FATO and does not specify the distance between lights.
5.3.5.4*	The U.S. criteria does not specify light distribution.
5.3.6	The U.S. does not have specific criteria for aiming point lights.
5.3.8	The U.S. does not have standards for winching area lighting.
Chapter 6	**Heliport Services**
6.1*	The U.S. requirements for rescue and fire fighting services at certificated heliports are found in 14 CFR Part 139. Criteria for other heliports are established by the National Fire Protection Association (NFPA) pamphlets 403 or 418, or in regulations of local fire departments.

*Indicates ICAO Recommended Practice

ANNEX 15 − AERONAUTICAL INFORMATION SERVICES	
Chapter 1	**General**
ASHTAM	The U.S. doesn't have a series of NOTAM called ASHTAM.
Danger area	Danger Areas do not exist in the U.S. Equivalent/similar areas are defined, designated & charted as Prohibited, Warning, Alert, and Restricted Areas."
Pre−flight Information Bulletin (PIB)	The US does not use the term PIB.
Prohibited Area	Additional terminology used by the US.
Restricted Area	Additional terminology used by the US.
SNOWTAM	The US presents the information via a NOTAM.
1.1.20	The US does not use the term ASHTAM.
1.2.2.2	The U.S. utilizes Geoid−03 which is a component of the North American Vertical Datum of 1988 (NAVD 88).
Chapter 5	**Aeronautical Information Products and Services**
5.2.1	Currently, the U.S. does not utilize the ICAO format for domestic NOTAMs. The US NOTAMs that are distributed as International NOTAMs are in ICAO format (excluding the L/L).
5.2.5.1. f)	The US does not produce an Aircraft Parking / Docking Chart.
5.2.6	The U.S. does not use the term SNOWTAM and ASHTAM.
5.3.3.4.1	The United States does not publish the horizontal extent of obstacles.
Chapter 6	**Aeronautical Information Updates**
6.3.2.1	The U.S. does not routinely publish "trigger" NOTAMs when an AIP amendment is issued.
6.3.2.3	The U.S. does not provide a NOTAM for accidental release of radioactive material, toxic chemicals, pyrotechnic demonstrations, sky lanterns, rocket debris, or volcanic ash deposition.

ANNEX 16 − ENVIRONMENTAL PROTECTION	
VOLUME I − AIRCRAFT NOISE	
Reference: Part 36 of Title 14 of the United States Code of Federal Regulations	
Chapter 1	
1.7	Each person who applies for a type certificate for an airplane covered by 14 CFR Part 36, irrespective of the date of application for the type certificate, must show compliance with Part 36.
Chapter 2	
2.1.1	For type design change applications made after 14 August 1989, if an airplane is a Stage 3 airplane prior to a change in type design, it must remain a Stage 3 airplane after the change in type design regardless of whether Stage 3 compliance was required before the change in type design.
2.3.1 a)	Sideline noise is measured along a line 450 meters from and parallel to the extended runway centerline for two− and three−engine aircraft; for four−engine aircraft, the sideline distance is 0.35 NM.
2.4.2	Noise level limits for Stage 2 derivative aircraft depend upon whether the engine by−pass ratio is less than two. If it is, the Stage 2 limits apply. Otherwise, the limits are the Stage 3 limits plus 3 dB or the Stage 2 value, whichever is lower.
2.4.2.2 b)	Take−off noise limits for three−engine, Stage 2 derivative airplanes with a by−pass ratio equal to or greater than 2 are 107 EPNdB for maximum weights of 385,000 kg (850,000 lb) or more, reduced by 4 dB per halving of the weight down to 92 EPNdB for maximum weights of 28,700 kg (63,177 lb) or less. Aircraft with a by−pass ratio less than 2 only need meet the Stage 2 limits.
2.5.1	Trade−off sum of excesses not greater than 3 EPNdB and no excess greater than 2 EPNdB.
2.6.1.1	For airplanes that do not have turbo−jet engines with a by−pass ratio of 2 or more, the following apply: a) four−engine airplanes − 214 meters (700 feet); b) all other airplanes − 305 meters (1,000 feet). For all airplanes that have turbo−jet engines with a by−pass ratio of 2 or more, the following apply: a) four−engine airplanes − 210 meters (689 feet); b) three−engine airplanes − 260 meters (853 feet); c) airplanes with fewer than three engines − 305 meters (1,000 feet). The power may not be reduced below that which will provide level flight for an engine inoperative or that will maintain a climb gradient of at least 4 percent, whichever is greater.
Chapter 3	
3.1.1	For type design change applications made after 14 August 1989, if an airplane is a Stage 3 airplane prior to a change in type design, it must remain a Stage 3 airplane after the change in type design regardless of whether Stage 3 compliance was required before the change in type design.
3.3.1 a) 2)	The U.S. has no equivalent provision in 14 CFR Part 36.
3.3.2.2	A minimum of two microphones symmetrically positioned about the test flight track must be used to define the maximum sideline noise. This maximum noise may be assumed to occur where the aircraft reaches 305 meters (1,000 feet). 14 CFR Part 36 does not require symmetrical measurements to be made at each and every point for propeller−driven airplane sideline noise determination.
3.6.2.1 c)	Under 14 CFR Part 36, during each test take−off, simultaneous measurements should be made at the sideline noise measuring stations on each side of the runway and also at the take−off noise measuring station. If test site conditions make it impractical to simultaneously measure take−off and sideline noise, and if each of the other sideline measurement requirements is met, independent measurements may be made of the sideline noise under simulated flight path techniques. If the reference flight path includes a power cutback before the maximum possible sideline noise level is developed, the reduced sideline noise level, which is the maximum value developed by the simulated flight path technique, must be the certificated sideline noise value.

3.6.2.1 d)	14 CFR Part 36 specifies the day speeds and the acoustic reference speed to be the minimum approved value of V_2 +10 kt, or the all−engines operating speed at 35 feet (for turbine−engine powered airplanes) or 50 feet (for reciprocating−engine powered airplanes), whichever speed is greater as determined under the regulations constituting the type certification basis of the airplane. The test must be conducted at the test day speeds ±3 kt.
3.7.4	If a take−off test series is conducted at weights other than the maximum take−off weight for which noise certification is requested: a) at least one take−off test must be at or above that maximum weight; b) each take−off test weight must be within +5 or −10 percent of the maximum weight. If an approach test series is conducted at weights other than the maximum landing weight for which certification is requested: a) at least one approach test must be conducted at or above that maximum weight; b) each test weight must exceed 90 percent of the maximum landing weight. Total EPNL adjustment for variations in approach flight path from the reference flight path and for any difference between test engine thrust or power and reference engine thrust or power must not exceed 2 EPNdB.
Chapter 5	
5.1.1	Applies to all large transport category aircraft (as they do to all subsonic turbo−jet aircraft regardless of category). Commuter category aircraft, propeller−driven airplanes below 8,640 kg (19,000 lb) are subject to 14 CFR Part 36, Appendix F or to Appendix G, depending upon the date of completion of the noise certification tests.
Chapter 6	
6.1.1	Applies to new, all propeller−driven airplane types below 19,000 lb (8,640 kg.) in the normal, commuter, utility, acrobatic, transport, or restricted categories for which the noise certification tests are completed before 22 December 1988.
Chapter 8	
General	14 CFR Part 36 (Section 36.1 (h)) defines Stage 1 and Stage 2 noise levels and Stage 1 and Stage 2 helicopters. These definitions parallel those used in 14 CFR Part 36 for turbo−jets and are used primarily to simplify the acoustical change provisions in Section 36.11. 14 CFR Part 36 (Section 36.805(c)) provides for certain derived versions of helicopters for which there are no civil prototypes to be certificated above the noise level limits.
8.1.1 a)	Applicable to new helicopter types for which application for an original type certificate was made on or after 6 March 1988.
8.1.1 b)	Applicable only to "acoustical changes" for which application for an amended or supplemental type certificate was made on or after 6 March 1988.
8.4	14 CFR Part 36 Appendix H specifies a slightly different rate of allowable maximum noise levels as a function of helicopter mass. The difference can lead to a difference in the calculated maximum noise limits of 0.1 EPNdB under certain roundoff condition.
8.6.3.1 b)	Does not include the V_{NE} speeds.
8.7	14 CFR Part 36 Appendix H does not permit certain negative corrections. Annex 16 has no equivalent provision.
8.7.4	EPNL correction must be less than 2.0 EPNdB for any combination of lateral deviation, height, approach angle and, in the case of flyover, thrust or power. Corrections to the measured data are required if the tests were conducted below the reference weight. Corrections to the measured data are required if the tests were conducted at other than reference engine power.
8.7.5	The rotor speed must be maintained within one percent of the normal operating RPM during the take−off procedure.
8.7.8	The helicopter shall fly within ±10° from the zenith for approach and take−off, but within ±5° from the zenith for horizontal flyover.

Chapter 10	
General	Exception from acoustical change rule given for aircraft with flight time prior to 1 January 1955 and land configured aircraft reconfigured with floats or skis.
10.1.1	Applies to new, amended, or supplemental type certificates for propeller−driven airplanes not exceeding 8,640 kg (19,000 lb) for which noise certification tests have not been completed before 22 December 1988.
10.4	The maximum noise level is a constant 73 dBA up to 600 kg (1,320 lb). Above that weight, the limit increases at the rate of 1 dBA/75kg (1 dBA/165 lb) up to 85 dBA at 1,500 kg (3,300 lb) after which it is constant up to and including 8,640 kg (19,000 lb).
10.5.2, second phase, d)	For variable−pitch propellers, the definition of engine power is different in the second segment of the reference path. Maximum continuous installed power instead of maximum power is used.
Chapter 11	
11.1	14 CFR Part 36 Appendix J was effective 11 September 1992 and applies to those helicopters for which application for a type certificate was made on or after 6 March 1986.
11.4	14 CFR Part 36 Appendix J specifies a slightly different rate of allowable maximum noise levels as a function of helicopter mass. The difference can lead to a difference in the calculated maximum noise limits of 0.1 EPNdB under certain roundoff condition.
11.6	14 CFR Part 36 Appendix J prescribes a ±15 meter limitation on the allowed vertical deviation about the reference flight path. Annex 16 has no equivalent provision.
PART V	
General	No comparable provision exists in U.S. Federal Regulations. Any local airport proprietor may propose noise abatement operating procedures to the FAA which reviews them for safety and appropriateness.
Appendix 1	
General	Sections 3, 8, and 9 of Appendix 1 which contain the technical specifications for equipment, measurement and analysis and data correction for Chapter 2 aircraft and their derivatives differ in many important aspects from the corresponding requirements in Appendix 2 which has been updated several times. 14 CFR Part 36 updates have generally paralleled those of Appendix 2 of Annex 16. These updated requirements are applicable in the U.S. to both Stage 2 and Stage 3 aircraft and their derivatives.
2.2.1	A minimum of two microphones symmetrically positioned about the test flight track must be used to define the maximum sideline noise. This maximum noise may be assumed to occur where the aircraft reaches 305 meters (1,000 feet), except for four−engine, Stage 2 aircraft for which 439 meters (1,440 feet) may be used.
2.2.2	No obstructions in the cone defined by the axis normal to the ground and the half−angle 80° from the axis.
2.2.3 c)	Relative humidity and ambient temperature over the sound path between the aircraft and 10 meters above the ground at the noise measuring site is such that the sound attenuation in the 8 kHz one−third octave band is not greater than 12 dB/100 meters and the relative humidity is between 20 and 95 percent. However, if the dew point and dry bulb temperature used for obtaining relative humidity are measured with a device which is accurate to within one−half a degree Celsius, the sound attenuation rate shall not exceed 14 dB/100 meters in the 8 kHz one−third octave band.
2.2.3 d)	Test site average wind not above 12 kt and average cross−wind component not above 7 kt.
2.3.4	The aircraft position along the flight path is related to the recorded noise 10 dB downpoints.
2.3.5	At least one take−off test must be a maximum take−off weight and the test weight must be within +5 or −10 percent of maximum certificated take−off weight.
Appendix 2	
2.2.1	A minimum of two symmetrically placed microphones must be used to define the maximum sideline noise at the point where the aircraft reaches 305 meters.

2.2.2	When a multiple layering calculation is required, the atmosphere between the airplane and the ground shall be divided into layers. These layers are not required to be of equal depth, and the maximum layer depth must be 100 meters.
2.2.2 b)	14 CFR Part 36 specifies that the lower limit of the temperature test window is 36 degrees Fahrenheit (2.2 degrees Celsius). Annex 16 provides 10 degrees Celsius as the lower limit for the temperature test window. 14 CFR Part 36 does not specify that the airport facility used to obtain meteorological condition measurements be within 2,000 meters of the measurement site.
2.2.2 c)	14 CFR Part 36 imposes a limit of 14 dB/100 meters in the 8 kHz one−third octave band when the temperature and dew point are measured with a device which is accurate to within one−half a degree Celsius.
2.2.3	14 CFR Part 36 requires that the limitations on the temperature and relative humidity test window must apply over the whole noise propagation path between a point 10 meters above the ground and the helicopter. Annex 16 specifies that the limitations on the temperature and relative humidity test window apply only at a point 10 meters above the ground. 14 CFR Part 36 requires that corrections for sound attenuation must be based on the average of temperature and relative humidity readings at 10 meters and the helicopter. Annex 16 implies that the corrections for sound absorption are based on the temperature and relative humidity measured at 10 meters only.
3.2.6	No equivalent requirement.
3.4.5	For each detector/integrator the response to a sudden onset or interruption of a constant sinusoidal signal at the respective one−third octave band center frequency must be measured at sampling times 0.5, 1.0, 1.5, and 2.0 seconds after the onset or interruption. The rising responses must be the following amounts before the steady−state level: 0.5 seconds: 4.0 ± 1.0 dB 1.0 seconds: 1.75 ± 0.75 dB 1.5 seconds: 1.0 ± 0.5 dB 2.0 seconds: 0.6 ± 0.5 dB
3.4.5 (Note 1)	No equivalent provision in 14 CFR Part 36.
3.5.2	No equivalent requirement.
5.4	14 CFR Part 36 requires that the difference between airspeed and groundspeed shall not exceed 10 kt between the 10 dB down time period.
8.4.2	14 CFR Part 36 specifies a value of −10 in the adjustment for duration correction. Annex 16 specifies a value of −7.5.
9.1.2, 9.1.3	14 CFR Part 36 always requires use of the integrated procedure if the corrected take−off or approach noise level is within 1.0 dB of the applicable noise limit.
Appendix 6	
4.4.1	The microphone performance, not its dimensions, is specified. The microphone must be mounted 1.2 meters (4 feet) above ground level. A windscreen must be employed when the wind speed is in excess of 9 km/h (5 kt).
5.2.2 a)	Reference conditions are different. Noise data outside the applicable range must be corrected to 77 degrees F and 70 percent humidity.
5.2.2 c)	There is no equivalent provision in 14 CFR Part 36. Fixed−pitch propeller−driven airplanes have a special provision. If the propeller is fixed−pitch and the test power is not within 5 percent of reference power, a helical tip Mach number correction is required.

ANNEX 16 − ENVIRONMENTAL PROTECTION	
VOLUME II − AIRCRAFT ENGINE EMISSIONS	
Chapter 1	
	The U.S. currently has regulations prohibiting intentional fuel venting from turbojet, turbofan and turboprop aircraft, but we do not now have a regulation preventing the intentional fuel venting from helicopter engines.

ANNEX 17 − SECURITY − SAFEGUARDING INTERNATIONAL CIVIL AVIATION AGAINST ACTS OF UNLAWFUL INTERFERENCE
There are no reportable differences between U.S. regulations and the Standards and Recommended Practices contained in this Annex.

ANNEX 18 − THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR
There are no reportable differences between U.S. regulations and the Standards and Recommended Practices contained in this Annex.

ANNEX 19 − SAFETY MANAGEMENT	
Chapter 3	**State Safety Management Responsibilities**
3.3.2.1	U.S. does not currently require the implementation of SMS for: − approved training organizations that are exposed to safety risks related to aircraft operations during the provision of their services; − approved maintenance organizations providing services to operators of aeroplanes or helicopters engaged in international commercial air transport. U.S. does require the implementation of SMS for: − organizations responsible for type design that hold a production certificate for the same product; − operators of certain aerodromes that do not satisfy criteria in 14 CFR § 139.401.
3.3.2.3	The U.S. has not established criteria for international general aviation operators of large or turbojet aeroplanes to implement an SMS.

PANS − OPS − 8168/611	
VOLUME I − Flight Procedures	
PART III	
Table III−1−1 and Table III−1−2	Max speeds for visual maneuvering (Circling)" must not be applied to circling procedures in the U.S. Comply with the airspeeds and circling restrictions in ENR 1.5, paragraphs 11.1 and 11.6, in order to remain within obstacle protection areas.
PART IV	
1.2.1	The airspeeds contained in ENR 1.5 shall be used in U.S. **CONTROLLED AIRSPACE**.
VOLUME II − Construction of Visual and Instrument Flight Procedures	
In toto	The United States does not construct Visual nor Instrument Flight Procedures per Volume II. The U.S. constructs Visual and Instrument Flight Procedures following the cited FAA Orders 8260.3, 8260.19, 8260.46, 8260.58, and 8260.61.
In toto	See ENR 1.5−6 Approach Clearance. Feeder routes may connect an instrument approach to the en route structure.
PART I	
Section 2 − General Principles	
Chapter 1	
1.1.4d	See ENR 1.5−3.1 Standard Terminal Arrival (STAR) Procedures and 1.5−35 Departure Control. The United States has En Route Transitions promulgated on SIDs and STARs that facilitate transitions between en route and instrument flight procedures.
Section 4 − Arrival and Approach Procedures	
Chapter 5	
5.4.1.5	See ENR 1.5−11 Approach and Landing Minimums. The United States publishes landing minima on instrument approach charts.
5.4.6.1	See ENR 1.5−12.9. Obstacles may penetrate the visual segment surface.
Chapter 7	
7.3	See ENR 1.5−11 Approach and Landing Minimums. The United States uses a minimum obstacle clearance of 300' instead of 394' for CAT C and D circling minima.
Appendix (to Chapter 7)	See ENR 1.5−26 Charted Visual Flight Procedures (CVFPs). The United States publishes CVFPs instead of Visual Maneuvering using Prescribed Track and provides no minimum obstacle clearance assurance.
Chapter 10	
10.1.1	See ENR 1.5−10 Side−step Maneuver. The United States may authorize a side−step maneuver to transition from the final approach course aligned to one runway to land on a parallel runway.
Part III	
Section 5 − Publication	
Chapter 1	

1.4.2.3	See ENR 1.5−9.2 for RNP AR APCH, 12.13 for RNP APCH. The United States naming convention for RNP APCH approaches is "RNAV (GPS) RWY ##". The naming convention for RNP AR APCH approaches is "RNAV (RNP) RWY ##".
Part IV	
In toto	See ENR 1.5−12.8 Visual Descent Point (VDP). The United States may publish a VDP on a nonprecision approach where a pilot can make a stabilized descent from the MDA. Volume II, Part IV does not contain an equivalent provision.
VOLUME III − Aircraft Operating Procedures	
Section 3 − Simultaneous operations on parallel or near−parallel instrument runways	
1.5c3	The United States does not require the final vector to final to enable the aircraft to be established on the final approach course track, in level flight for at least 3.7 km (2.0NM) prior to intercepting the glide path or vertical path for the selected instrument approach procedure. FAA Order JO 7110.65 requires that when conducting dual or triple simultaneous independent approaches the aircraft is cleared to descend to the appropriate glideslope/glidepath intercept altitude soon enough to provide a period of level flight to dissipate excess speed. Also, the aircraft must be provided at least 1 mile of straight flight prior to the final approach course intercept.
Section 10 − Flight Tracking	
1.2.1	The United States has notified differences to the distress tracking standards in Annex 6, Part I, 6.18. Consistent with those differences, the United States does not require U.S. operators to establish training programs and procedures specific to autonomous distress tracking and will not perform surveillance of implementation by U.S. operators.
1.2.2	FAA Order JO 7210.632, Air Traffic Organization Occurrence Reporting, establishes mandatory occurrence reporting (MOR) requirements and format for FAA employees, including reports sourced from operators and missed position reporting. The MOR Report form includes most, but not all, of the template in the Appendix to Ch. 1.
1.2.3	The United States has notified differences to the distress tracking standards in Annex 6, Part I, 6.18. Consistent with those differences, the United States does not require U.S. operators to maintain contact details in the ICAO OPS CTRL.

PAN − ABC − DOC 8400
Differences between abbreviations used in U.S. AIP, International NOTAMs Class I and Class II, and Notices to Airmen Publication and ICAO PANS − ABC are listed in GEN 2.2**.** For other U.S. listings of abbreviations (contractions) for general use, air traffic control, and National Weather Service (NWS), which differ in some respects, see U.S. publication Contractions Handbook (FAA Order JO 7340.2). In addition, various U.S. publications contain abbreviations of terms used therein, particularly those unique to that publication.

GEN 2.7 Sunrise/Sunset Tables

The U.S. does not publish sunrise/sunset tables, but sunrise/sunset information can be found online at **https://www.timeanddate.com/astronomy/usa**

6. Pre−Flight Information Service at Aerodromes Available to International Flights

6.1 Pre−Flight Information Units in the U.S. are Flight Service Stations (FSS) operated by either FAA (in Alaska) or by federal contract facilities (elsewhere in the U.S.).

6.2 FSSs are air traffic facilities that provide pilot briefings, flight plan processing, en route flight advisories, search and rescue services, and assistance to lost aircraft and aircraft in emergency situations. FSSs also relay ATC clearances, process Notices to Airmen, and broadcast aviation weather and aeronautical information. In Alaska, designated FSSs also take weather observations, and provide Airport Advisory Services (AAS).

6.3 FSS locations, services, and telephone information are available in the Chart Supplement U.S., Chart Supplement Alaska, and Chart Supplement Pacific.

6.4 Flight Service Stations have telecommunications access to all of the weather and NOTAM information available for a preflight briefing to international locations with which the U.S. International NOTAM office exchanges information.

GEN 3.2 Aeronautical Charts

1. General

1.1 Civil aeronautical charts for the U.S. and its territories, and possessions are produced by Aeronautical Information Services (AIS), https://www.faa.gov/air_traffic/flight_info/aeronav/safety_alerts/, which is part of FAA's Air Traffic Organization, Mission Support Services.

2. Obtaining Aeronautical Charts

2.1 Public sales of charts and publications are available through a network of FAA approved print providers. A listing of products, dates of latest editions, and print providers is available on the AIS website at: https://www.faa.gov/air_traffic/flight_info/aeronav/safety_alerts/.

3. Safety Alerts, Charting Notices and Data Product Notices

3.1 Safety Alerts (SAs) are published to notify users of an error that was reported or discovered in one of our digital products. The specific product and effective date(s) are provided.

3.2 Charting Notices (CNs) are published to notify users of a planned chart/publication enhancement and the effective date on which the enhancement will be implemented.

3.3 Data Product Notices (DPNs) are published to notify users of a system outage. DPNs may also be used to notify users of a developmental upgrade to one of our digital products and the effective date on which the upgrade will be implemented.

3.4 A listing of SAs/CNs/DPNs may be found on the AIS website at: https://www.faa.gov/air_traffic/flight_info/aeronav/safety_alerts/.

4. Selected Charts and Products Available

VFR Navigation Charts
IFR Navigation Charts
Planning Charts
Supplementary Charts and Publications
Digital Products

5. General Description of Each Chart Series

5.1 VFR Navigation Charts

5.1.1 Sectional Aeronautical Charts. Sectional Charts are designed for visual navigation of slow to medium speed aircraft. The topographic information consists of contour lines, shaded relief, drainage patterns, and an extensive selection of visual checkpoints and landmarks used for flight under VFR. Cultural features include cities and towns, roads, railroads, and other distinct landmarks. The aeronautical information includes visual and radio aids to navigation, airports, controlled airspace, special−use airspace, obstructions, and related data. Scale 1 inch = 6.86nm/1:500,000. 60 x 20 inches folded to 5 x 10 inches. Revised every 56 days. (See FIG GEN 3.2−1 and FIG GEN 3.2−2.)

5.1.2 VFR Terminal Area Charts (TAC). TACs depict the airspace designated as Class B airspace. While similar to sectional charts, TACs have more detail because the scale is larger. The TAC should be used by pilots intending to operate to or from airfields within or near Class B or Class C airspace. Areas with TAC coverage are indicated by a • on the Sectional Chart indexes. VFR Transition Routes may also be depicted and/or described on this chart. Scale 1 inch = 3.43nm/1:250,000. Revised every 56 days. (See FIG GEN 3.2−1 and FIG GEN 3.2−2.)

5.1.3 U.S. Gulf Coast VFR Aeronautical Chart. The Gulf Coast Chart is designed primarily for helicopter operation in the Gulf of America area. Information depicted includes offshore mineral leasing areas and blocks, oil drilling platforms, and high density helicopter activity areas. Scale 1 inch = 13.7nm/1:1,000,000. 55 x 27 inches folded to 5 x 10 inches. Revised every 56 days.

5.1.4 Grand Canyon VFR Aeronautical Chart. Covers the Grand Canyon National Park area and is designed to promote aviation safety, flight free zones, and facilitate VFR navigation in this popular area. The chart contains aeronautical information for general aviation VFR pilots on one side and commercial VFR air tour operators on the other side. Revised every 56 days.

FIG GEN 3.2−1

Sectional and VFR Terminal Area Charts for the Conterminous U.S., Hawaii, Puerto Rico, and Virgin Islands

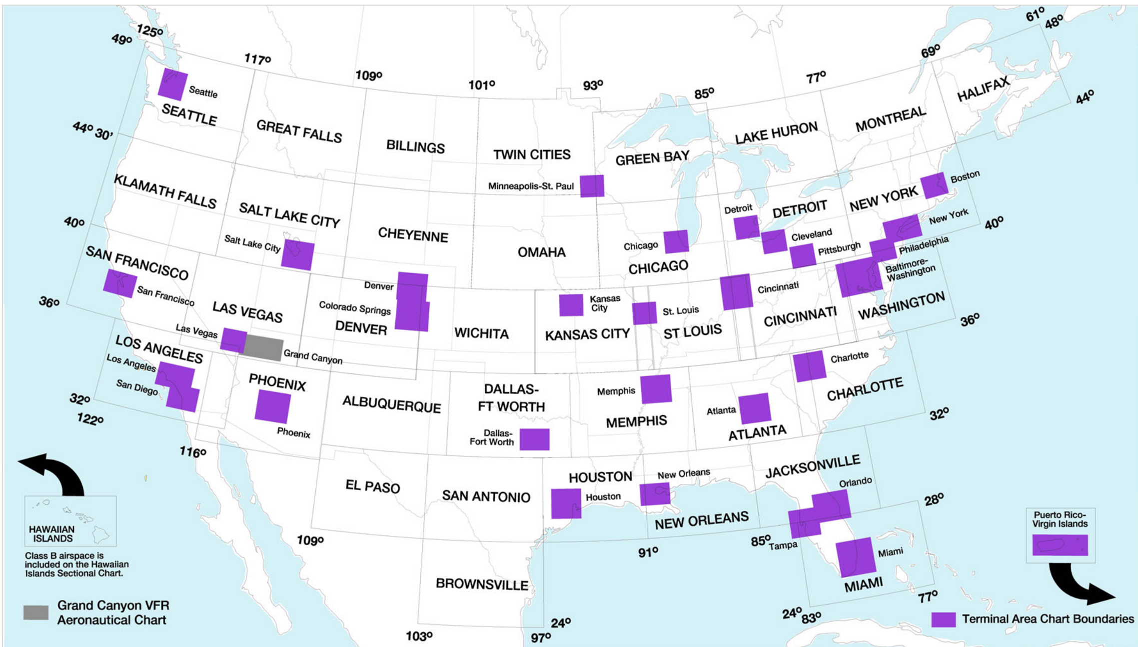
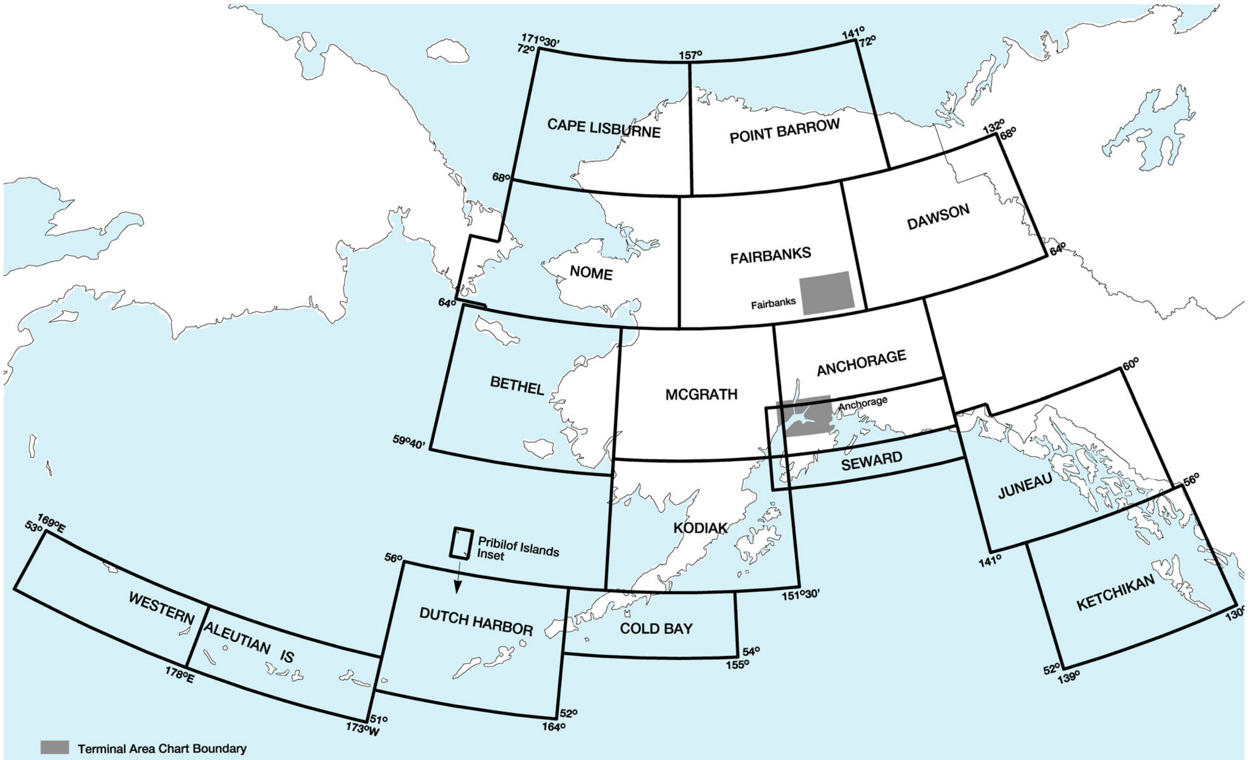


FIG GEN 3.2−2

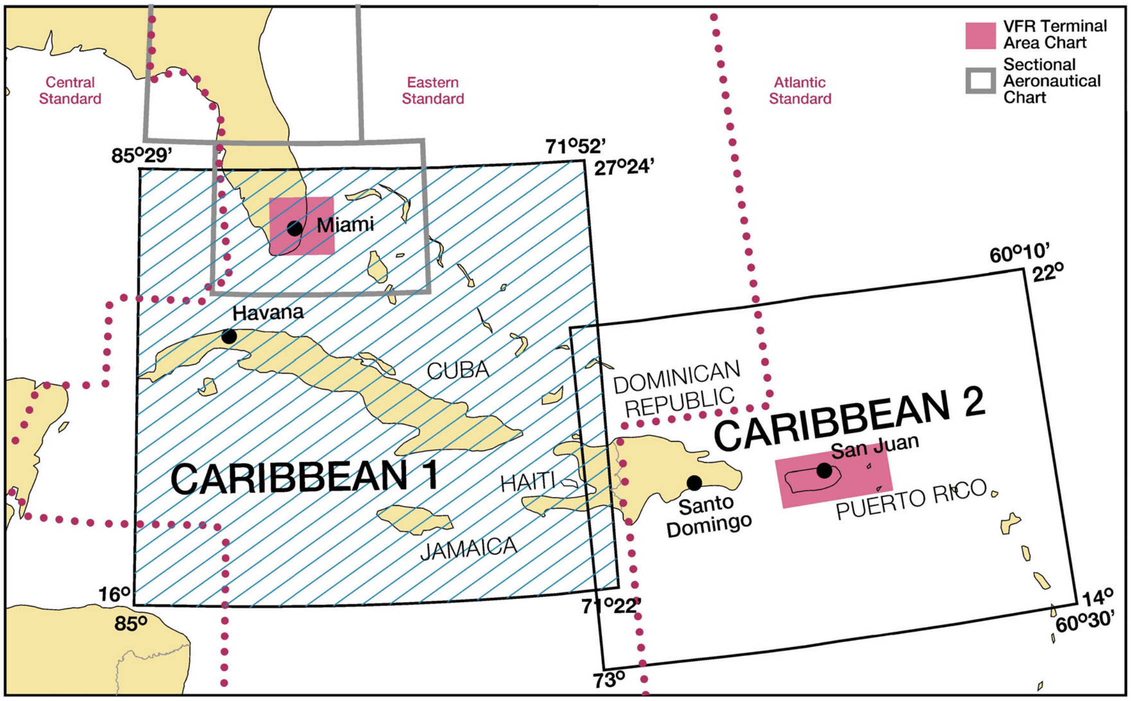
Sectional and VFR Terminal Area Charts for Alaska



5.1.5 Caribbean VFR Aeronautical Charts. Caribbean 1 and 2 (CAC−1 and CAC−2) are designed for visual navigation to assist familiarization of foreign aeronautical and topographic information. The aeronautical information includes visual and radio aids to navigation, airports, controlled airspace, special−use airspace, obstructions, and related data. The topographic information consists of contour lines, shaded relief, drainage patterns, and a selection of landmarks used for flight under VFR. Cultural features include cities and towns, roads, railroads, and other distinct landmarks. Scale 1 inch = 13.7nm/1:1,000,000. CAC−1 consists of two sides measuring 30” x 60” each. CAC−2 consists of two sides measuring 20” x 60” each. Revised every 56 days. (See FIG GEN 3.2−3.)

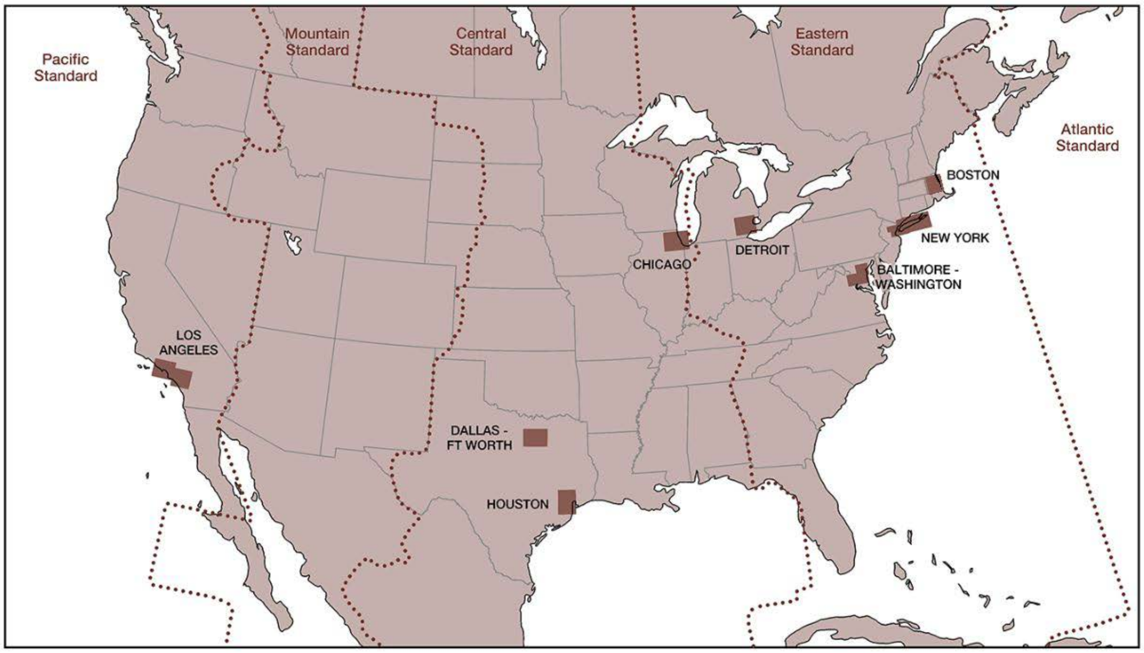
FIG GEN 3.2−3

Caribbean VFR Aeronautical Charts



5.1.6 Helicopter Route Charts. A three−color chart series which shows current aeronautical information useful to helicopter pilots navigating in areas with high concentrations of helicopter activity. Information depicted includes helicopter routes, four classes of heliports with associated frequency and lighting capabilities, NAVAIDs, and obstructions. In addition, pictorial symbols, roads, and easily identified geographical features are portrayed. Scale 1 inch = 1.71nm/1:125,000. 34 x 30 inches folded to 5 x 10 inches. Revised every 56 days. (See FIG GEN 3.2−4)

FIG GEN 3.2−4
Helicopter Route Charts



5.2 IFR Navigation Charts

5.2.1 IFR En Route Low Altitude Charts (Conterminous U.S. and Alaska). En route low altitude charts provide aeronautical information for navigation under IFR conditions below 18,000 feet MSL. This four−color chart series includes airways; limits of controlled airspace; VHF NAVAIDs with frequency, identification, channel, geographic coordinates; airports with terminal air/ground communications; minimum en route and obstruction clearance altitudes; airway distances; reporting points; special use airspace; and military training routes. Scales vary from 1 inch = 5nm to 1 inch = 20nm. 50 x 20 inches folded to 5 x 10 inches. Charts revised every 56 days. *Area charts* show congested terminal areas at a large scale. They are included with subscriptions to any conterminous U.S. Set Low (Full set, East or West sets). (See FIG GEN 3.2−5 and FIG GEN 3.2−6.)

FIG GEN 3.2−5

En Route Low Altitude Instrument Charts for the Conterminous U.S. (Includes Area Charts)

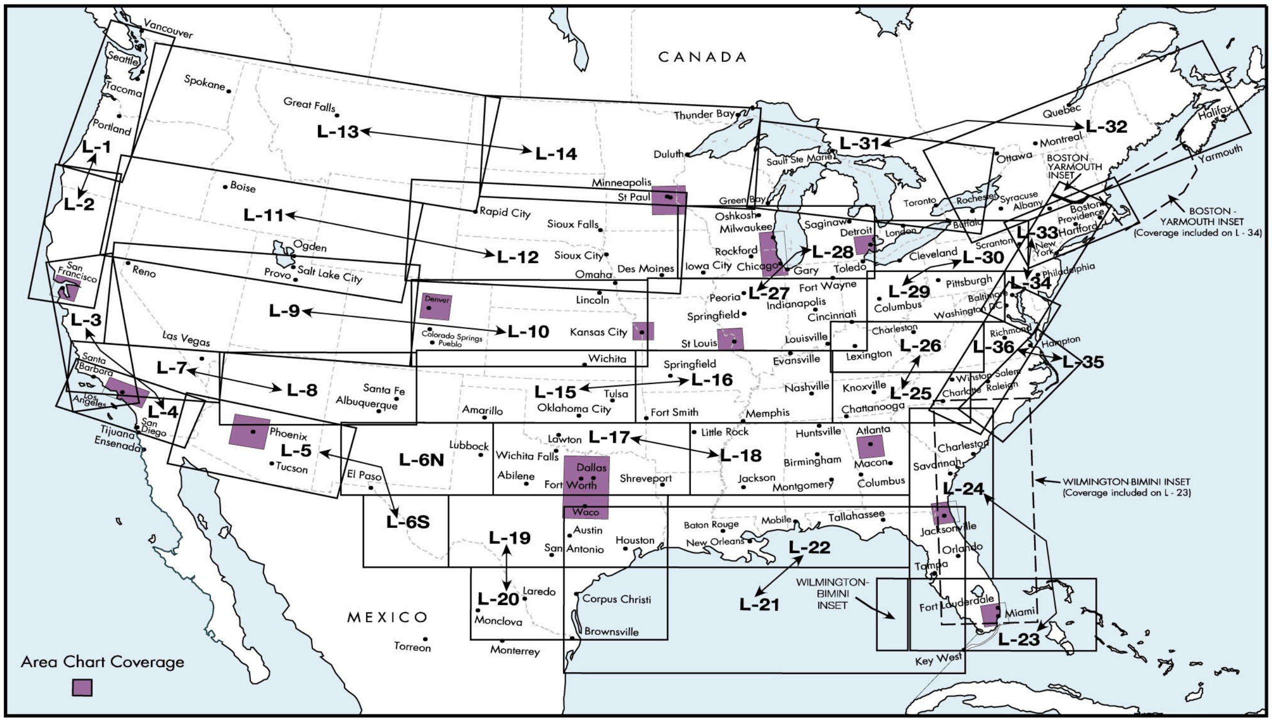
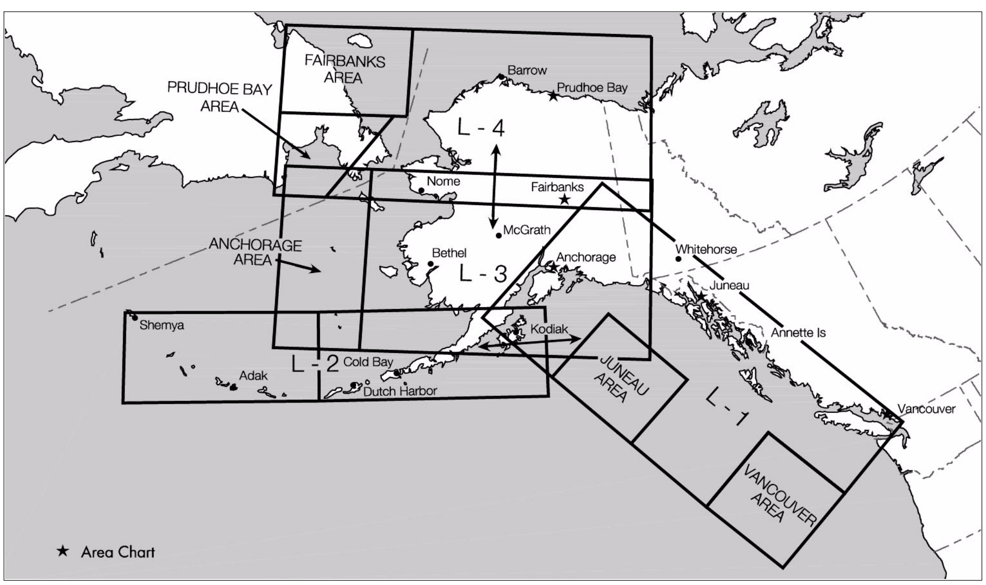


FIG GEN 3.2−6

Alaska En Route Low Altitude Chart



5.2.2 IFR En Route High Altitude Charts (Conterminous U.S. and Alaska). En route high altitude charts are designed for navigation at or above 18,000 feet MSL. This four−color chart series includes the jet route structure; VHF NAVAIDs with frequency, identification, channel, geographic coordinates; selected airports; reporting points. Scales vary from 1 inch = 45nm to 1 inch = 18nm. 55 x 20 inches folded to 5 x 10 inches. Revised every 56 days. (See FIG GEN 3.2−7 and FIG GEN 3.2−8.)

FIG GEN 3.2−7
En Route High Altitude Charts for the Conterminous U.S.

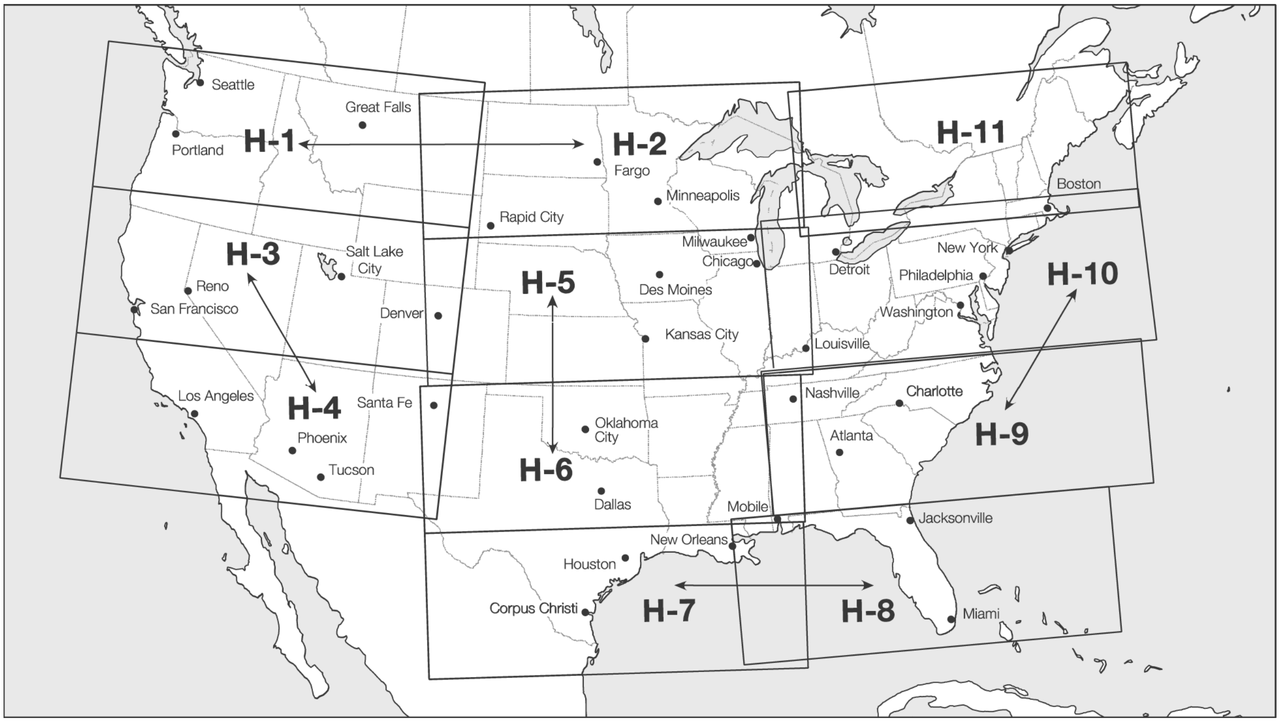
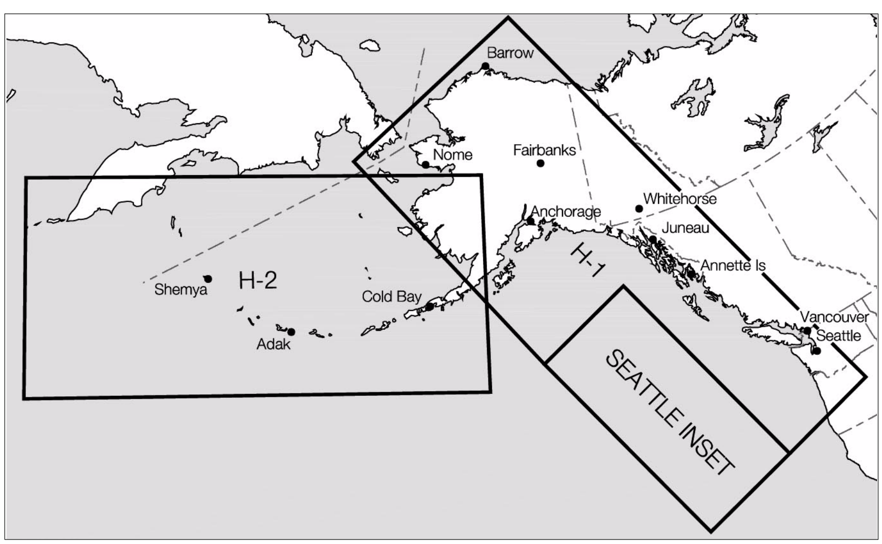


FIG GEN 3.2−8
Alaskan En Route High Altitude Chart



5.2.3 U.S. Terminal Procedures Publication (TPP). TPPs are published in 24 loose−leaf or perfect bound volumes covering the conterminous U.S., Puerto Rico and the Virgin Islands. A Change Notice is published at the midpoint between revisions in bound volume format and is available on the internet for free download at the AIS website. (See FIG GEN 3.2−15.) The TPPs include:

5.2.3.1 Instrument Approach Procedure (IAP) Charts. IAP charts portray the aeronautical data that is required to execute instrument approaches to airports. Each chart depicts the IAP, all related navigation data, communications information, and an airport sketch. Each procedure is designated for use with a specific electronic navigational aid, such as ILS, VOR, NDB, RNAV, etc.

5.2.3.2 Instrument Departure Procedure (DP) Charts. DP charts are designed to expedite clearance delivery and to facilitate transition between takeoff and en route operations. They furnish pilots' departure routing clearance information in graphic and textual form.

5.2.3.3 Standard Terminal Arrival (STAR) Charts. STAR charts are designed to expedite ATC arrival procedures and to facilitate transition between en route and instrument approach operations. They depict preplanned IFR ATC arrival procedures in graphic and textual form. Each STAR procedure is presented as a separate chart and may serve either a single airport or more than one airport in a given geographic area.

5.2.3.4 Airport Diagrams. Full page airport diagrams are designed to assist in the movement of ground traffic at locations with complex runway/taxiway configurations and provide information for updating geodetic position navigational systems aboard aircraft. Airport diagrams are available for free download at the AIS website.

5.2.4 Alaska Terminal Procedures Publication. This publication contains all terminal flight procedures for civil and military aviation in Alaska. Included are IAP charts, DP charts, STAR charts, airport diagrams, radar minimums, and supplementary support data such as IFR alternate minimums, take−off minimums, rate of descent tables, rate of climb tables and inoperative components tables. Volume is 5−3/8 x 8−1/4 inch top bound. Publication revised every 56 days with provisions for a Terminal Change Notice, as required.

5.3 Planning Charts

5.3.1 U.S. IFR/VFR Low Altitude Planning Chart. This chart is designed for prefight and en route flight planning for IFR/VFR flights. Depiction includes low altitude airways and mileage, NAVAIDs, airports, special use airspace, cities, times zones, major drainage, a directory of airports with their airspace classification, and a mileage table showing great circle distances between major airports. Scale 1 inch = 47nm/ 1:3,400,000. Chart revised annually, and is available either folded or unfolded for wall mounting. (See FIG GEN 3.2−10.)

5.3.2 Gulf of America and Caribbean Planning Chart. This is a VFR planning chart on the reverse side of the *Puerto Rico − Virgin Islands VFR Terminal Area Chart.* Information shown includes mileage between airports of entry, a selection of special use airspace and a directory of airports with their available services. Scale 1 inch = 85nm/1:6,192,178. 60 x 20 inches folded to 5 x 10 inches. Revised every 56 days. (See FIG GEN 3.2−10.)

5.3.3 Alaska VFR Wall Planning Chart. This chart is designed for VFR preflight planning and chart selection. It includes aeronautical and topographic information of the state of Alaska. The aeronautical information includes public and military airports; radio aids to navigation; and Class B, Class C, TRSA and special−use airspace. The topographic information includes city tint, populated places, principal roads, and shaded relief. Scale 1 inch = 27.4nm/1:2,000,000. The one sided chart is 58.5 x 40.75 inches and is designed for wall mounting. Revised annually. (See FIG GEN 3.2−9.)

FIG GEN 3.2−9
Alaska VFR Wall Planning Chart

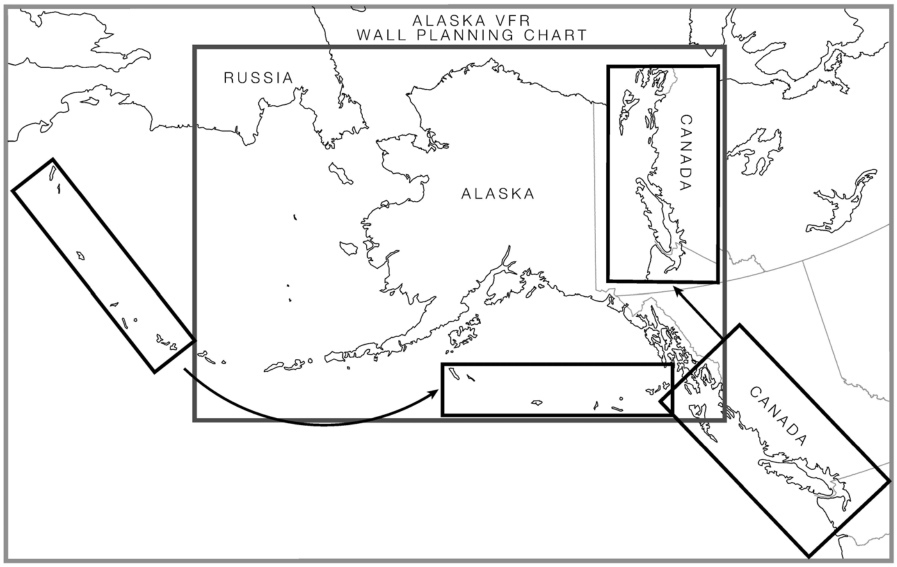
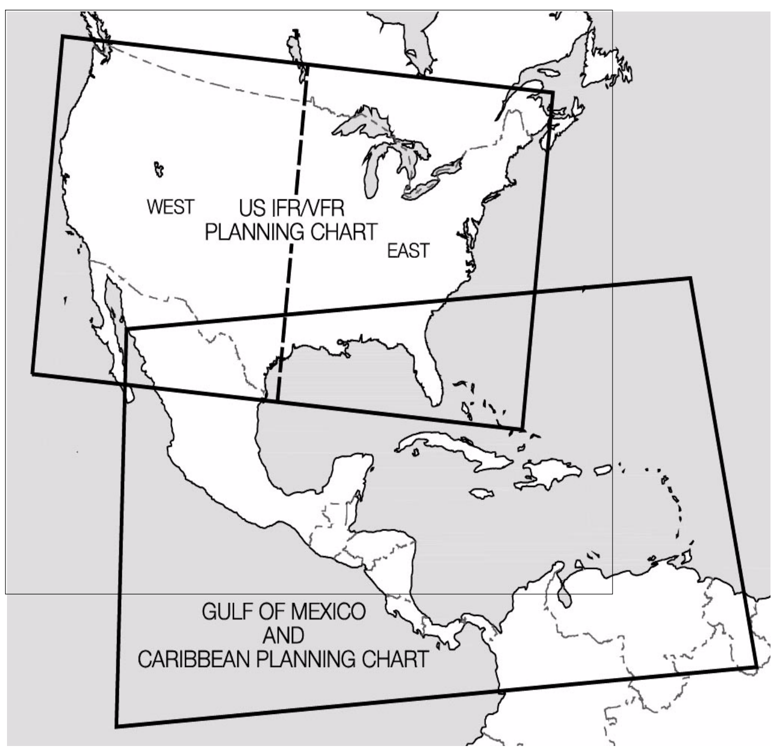
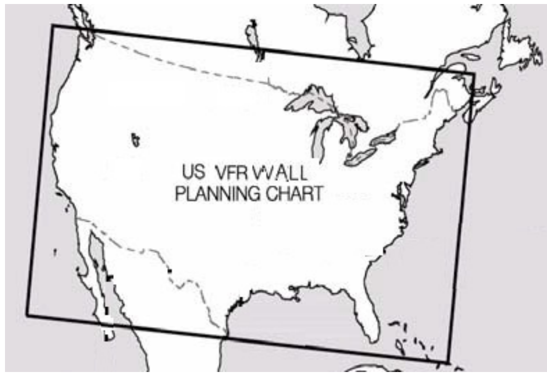


FIG GEN 3.2−10
Planning Charts



5.3.4 U.S. VFR Wall Planning Chart. This chart is designed for VFR preflight planning and chart selection. It includes aeronautical and topographic information of the conterminous U.S. The aeronautical information includes airports, radio aids to navigation, Class B airspace and special use airspace. The topographic information includes city tint, populated places, principal roads, drainage patterns, and shaded relief. Scale 1 inch = 43 nm/ 1:3,100,000. The one−sided chart is 59 x 36 inches and ships unfolded for wall mounting. Revised annually. (See FIG GEN 3.2−11)

FIG GEN 3.2−11
U.S. VFR Wall Planning Chart



5.3.5 VFR Flyway Planning Charts. This chart is printed on the reverse side of selected TAC charts. The coverage is the same as the associated TAC. Flyway planning charts depict flight paths and altitudes recommended for use to bypass high traffic areas. Ground references are provided as a guide for visual orientation. Flyway planning charts are designed for use in conjunction with TACs and sectional charts and are not to be used for navigation. VFR Transition Routes may also be depicted and/or described on this chart. Chart scale 1 inch = 3.43nm/1:250,000.

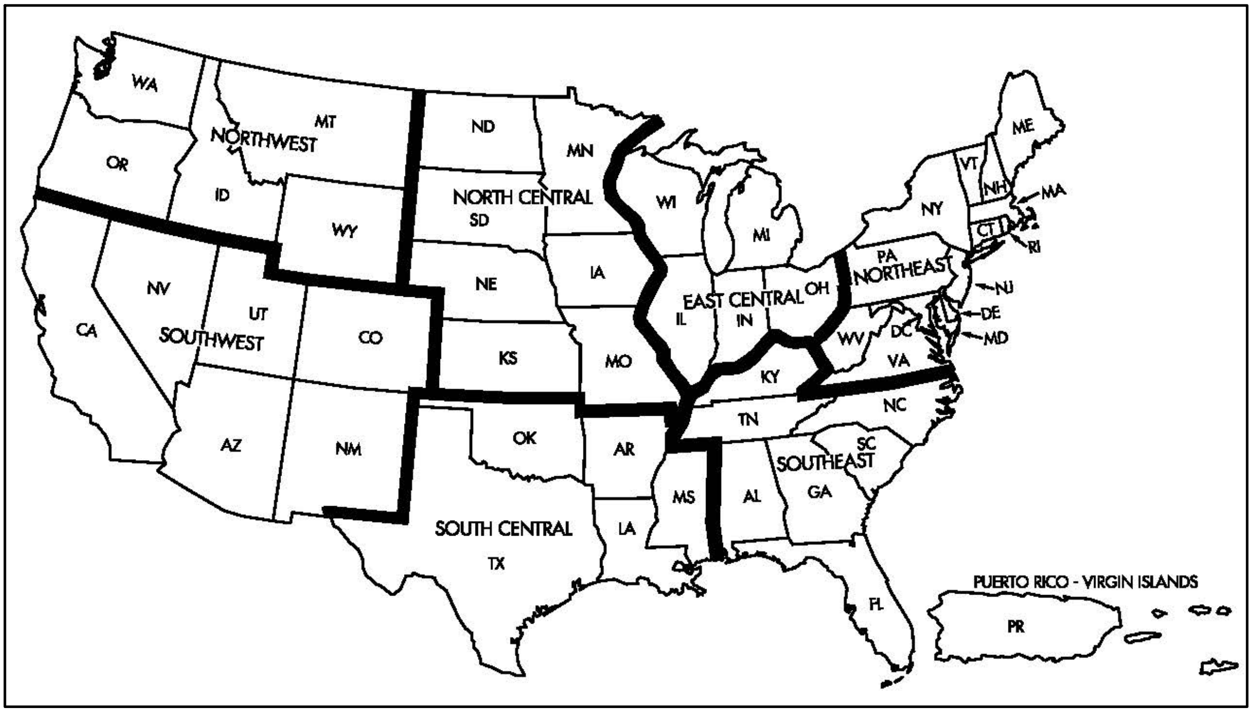
5.4 Supplementary Charts and Publications

5.4.1 Chart Supplement refers to a series of civil/military flight information publications issued by the FAA every 56 days consisting of the Chart Supplement U.S., Chart Supplement Alaska, and Chart Supplement Pacific.

5.4.2 Chart Supplement U.S. This is a civil/military flight information publication. This 7-volume book series is designed for use with appropriate IFR or VFR charts and contains data including, but not limited to, airports, NAVAIDs, communications data, weather data sources, special notices, non-regulatory operational procedures, and airport diagrams. Coverage includes the conterminous U.S., Puerto Rico, and the Virgin Islands. The Chart Supplement U.S. shows data that cannot be readily depicted in graphic form; for example, airport hours of operations, types of fuel available, runway widths, lighting codes, etc. (See FIG GEN 3.2−12.)

FIG GEN 3.2−12

Chart Supplement U.S. Geographic Areas

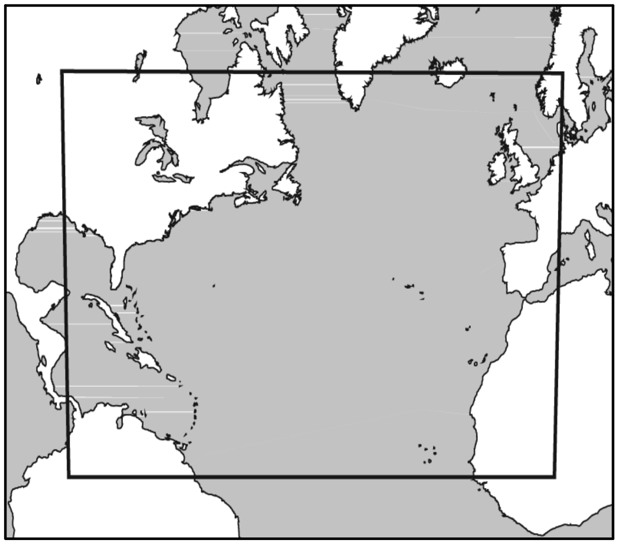


5.4.3 Chart Supplement Alaska. This is a civil/military flight information publication. This single-volume book is designed for use with appropriate IFR or VFR charts. The Chart Supplement Alaska contains data including, but not limited to, airports, NAVAIDs, communications data, weather data sources, special notices, non-regulatory operational procedures, and airport diagrams. The publication also includes uniquely geographical operational requirements such as area notices and emergency procedures.

5.4.4 Chart Supplement Pacific. This is a civil/military flight information publication. This single volume book is designed for use with appropriate IFR or VFR charts. The Chart Supplement Pacific contains data including, but not limited to, airports, NAVAIDs, communications data, weather data sources, special notices, non−regulatory operational procedures, and airport diagrams. The publication also includes airspace, navigational facilities, non−regulatory Pacific area procedures, Instrument Approach Procedures (IAP), Departure Procedures (DP), Standard Terminal Arrival (STAR) charts, radar minimums, supporting data for the Hawaiian and Pacific Islands, and uniquely geographical operational requirements such as area notices and emergency procedures.

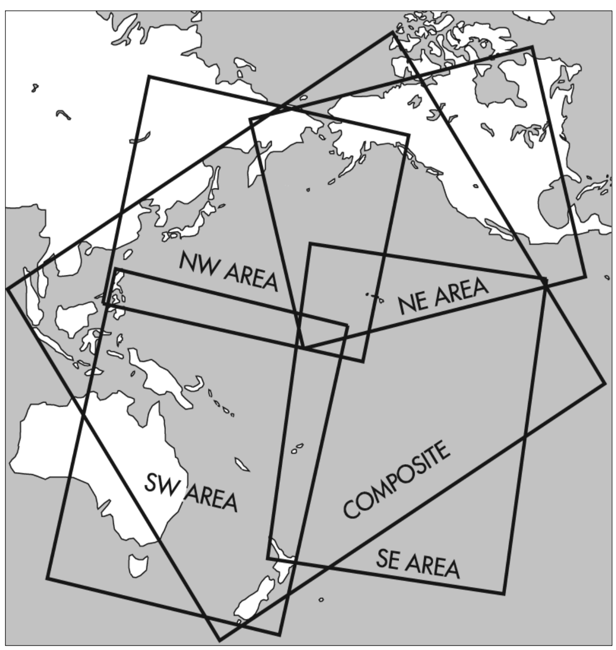
5.4.5 North Atlantic Route Chart. Designed for FAA controllers to monitor transatlantic flights, this 5−color chart shows oceanic control areas, coastal navigation aids, oceanic reporting points, and NAVAID geographic coordinates. Full Size Chart: scale 1 inch = 113.1nm/1:8,250,000. Chart is shipped flat only. Half Size Chart: scale 1 inch = 150.8nm/1:11,000,000. Chart is 29−3/4 x 20−1/2 inches, shipped folded to 5 x 10 inches only. Chart are revised every 56 days. (See FIG GEN 3.2−13.)

FIG GEN 3.2−13
North Atlantic Route Charts



5.4.6 North Pacific Route Charts. These charts are designed for FAA controllers to monitor transoceanic flights. They show established intercontinental air routes, including reporting points with geographic positions. Composite Chart: scale 1 inch = 164NM/1:12,000,000. 48 x 41−1/2 inches. Area Charts: scale 1 inch = 95.9nm/1:7,000,000. 52 x 40−1/2 inches. All charts are shipped unfolded. Charts are revised every 56 days. (See FIG GEN 3.2−14.)

FIG GEN 3.2−14
North Pacific Oceanic Route Charts



5.4.7 Airport Obstruction Charts (OC). The OC is a 1:12,000 scale graphic depicting 14 CFR Part 77, *Objects Affecting Navigable Airspace* surfaces, a representation of objects that penetrate these surfaces, aircraft movement and apron areas, navigational aids, prominent airport buildings, and a selection of roads and other planimetric detail in the airport vicinity. Also included are tabulations of runway and other operational data.

5.4.8 FAA Aeronautical Chart User's Guide. A booklet designed to be used as a teaching aid and reference document. It describes the substantial amount of information provided on FAA's aeronautical charts and publications. It includes explanations and illustrations of chart terms and symbols organized by chart type. The users guide is available for free download at the AIS website.

5.5 Digital Products

5.5.1 The Digital Aeronautical Information CD (DAICD). The DAICD is a combination of the NAVAID Digital Data File, the Digital Chart Supplement, and the Digital Obstacle File on one Compact Disk. These three digital products are no longer sold separately. The files are updated every 56 days and are available by subscription only.

5.5.1.1 The NAVAID Digital Data File. This file contains a current listing of NAVAIDs that are compatible with the National Airspace System. This file contains all NAVAIDs including ILS and its components, in the U.S., Puerto Rico, and the Virgin Islands plus bordering facilities in Canada, Mexico, and the Atlantic and Pacific areas.

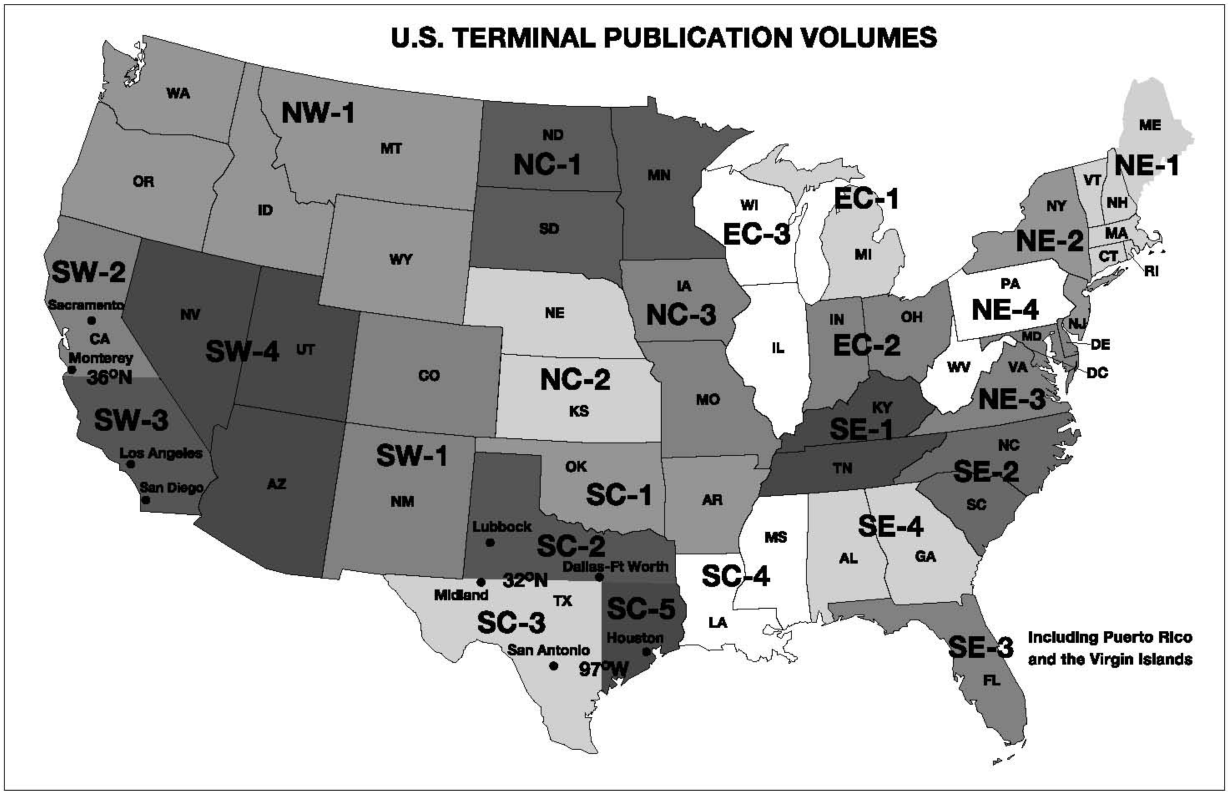
5.5.1.2 The Digital Obstacle File. This file describes all obstacles of interest to aviation users in the U.S., with limited coverage of the Pacific, Caribbean, Canada, and Mexico. The obstacles are assigned unique numerical identifiers, accuracy codes, and listed in order of ascending latitude within each state or area.

5.5.2 The Coded Instrument Flight Procedures (CIFP) (ARINC 424 [Ver 13 & 15]). The CIFP is a basic digital dataset, modeled to an international standard, which can be used as a basis to support GPS navigation. Initial data elements included are: Airport and Helicopter Records, VHF and NDB Navigation aids, en route waypoints and airways. Additional data elements will be added in subsequent releases to include: departure procedures, standard terminal arrivals, and GPS/RNAV instrument approach procedures. The database is updated every 28 days. The data is available for free download at the AIS website.

5.5.3 digital−Visual Charts (d−VC). These digital VFR charts are geo−referenced images of FAA Sectional Aeronautical, TAC, and Helicopter Route charts. Additional digital data may easily be overlaid on the raster image using commonly available Geographic Information System software. Data such as weather, temporary flight restrictions, obstacles, or other geospatial data can be combined with d−VC data to support a variety of needs. The file resolution is 300 dots per inch and the data is 8−bit color. The data is provided as a GeoTIFF and distributed for free on the AIS website. The root mean square error of the transformation will not exceed two pixels.

FIG GEN 3.2−15

U.S. Terminal Publication Volumes



6. National Geospatial−Intelligence Agency (NGA) Products

6.1 National Geospatial−Intelligence Agency (NGA) Products. For the latest information regarding publication availability, visit the NGA website:
https://www.nga.mil/ProductsServices/Aeronautical/Pages/default.aspx.

6.1.1 Flight Information Publication (FLIP) Planning Documents

General Planning (GP)
Area Planning
Area Planning − Special Use Airspace −
Planning Charts

6.1.2 FLIP En Route Charts and Chart Supplements

Pacific, Australasia, and Antarctica
United States − IFR and VFR Supplements
Flight Information Handbook
Caribbean and South America − Low Altitude
Caribbean and South America − High Altitude
Europe, North Africa, and Middle East −
Low Altitude
Europe, North Africa, and Middle East −
High Altitude
Africa
Eastern Europe and Asia
Area Arrival Charts

6.1.3 FLIP Instrument Approach Procedures (IAPs)

Africa
Canada and North Atlantic
Caribbean and South America
Eastern Europe and Asia
Europe, North Africa, and Middle East
Pacific, Australasia, and Antarctica
VFR Arrival/Departure Routes − Europe and Korea
United States

6.1.4 Miscellaneous DOD Charts and Products

Aeronautical Chart Updating Manual (CHUM)
DOD Weather Plotting Charts (WPC)
Tactical Pilotage Charts (TPC)
Operational Navigation Charts (ONC)
Global Navigation and Planning Charts (GNC)
Jet Navigation Charts (JNC) and Universal Jet Navigation Charts (JNU)
Jet Navigation Charts (JNCA)
Aerospace Planning Charts (ASC)
Oceanic Planning Charts (OPC)
Joint Operations Graphics − Air (JOG−A)
Standard Index Charts (SIC)
Universal Plotting Sheet (VP−OS)
Sight Reduction Tables for Air Navigation (PUB249)
Plotting Sheets (VP−30)
Dial−Up Electronic CHUM

GEN 3.3 Air Traffic Services

1. Responsible Authority

1.1 The authority responsible for the overall administration of air traffic services provided for civil aviation in the U.S. and its territories, possessions and international airspace under its jurisdiction is the Chief Operating Officer of the Air Traffic Organization, acting under the authority of the Federal Aviation Administration (FAA).

2. Area of Responsibility

2.1 Air traffic services as indicated in the following paragraphs are provided for the entire territory of the conterminous U.S., Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands, as well as the international airspace in oceanic areas under the jurisdiction of the U.S. which lies within the ICAO Caribbean (CAR), North Atlantic (NAT), North American (NAM), and Pacific (PAC) regions.

3. Air Traffic Services

3.1 With the exception of terminal control services at certain civil aerodromes and military aerodromes, air traffic service in the U.S. is provided by the Air Traffic Organization, FAA, Department of Transportation (DOT), U.S. Government.

3.2 Air Traffic control is exercised within the area of responsibility of the U.S.:

3.2.1 On all airways.

3.2.2 In Class B, C, D, and E Airspace; and

3.2.3 Within the Class A airspace whose vertical extent is from 18,000 feet to and including FL 600 throughout most of the conterminous U.S. and, in Alaska, from 18,000 feet to and including FL 600 but not including the airspace less than 1,500 feet above the surface of the earth and the Alaskan Peninsula west of longitude 160° 00″ West. (A complete description of Class A airspace is contained in the Code of Federal Regulations (CFR), Title 14, Part 71.)

3.3 Air traffic control and alerting services are provided by various air traffic control (ATC) units and are described in ENR 1.1.

3.4 Radar service is an integral part of the air traffic system. A description of radar services and procedures is provided in ENR 1.1.

3.5 The description of airspace designated for air traffic services is found in ENR 1.4.

3.6 Procedural data and descriptions are found in ENR 1.5.

3.7 Numerous restricted and prohibited areas are established within U.S. territory. These areas, none of which interfere with normal air traffic, are explained in ENR 1.5. Activation of areas subject to intermittent activity is notified in advance by a Notice to Airmen (NOTAM), giving reference to the area by its identification.

3.8 In general, the air traffic rules and procedures in force and the organization of the air traffic services are in conformity with ICAO Standards, Recommended Practices and Procedures. Differences between the national and international rules and procedures are given in GEN 1.7. The regional supplementary procedures and altimeter setting procedures are reproduced in full with an indication wherein there is a difference.

3.9 Coordination between the operator and air traffic services is effected in accordance with 2.11 of Annex II, and 2.1.1.4 and 2.1.2.5 of Part VIII of the PANS−ATM (Doc 4444).

3.10 Minimum flight altitudes on the ATS routes as listed in ENR 1.4 have been determined so as to ensure at least 1,000 feet vertical clearance above the highest obstacle within 4 nautical miles (NM) on each side of the centerline of the route. However, where the regular divergence (4.5 degrees) of the navigational aid signal in combination with the distance between the navigational aids could result in the aircraft being more than 4 NM on either side of the centerline, the 4 NM protection limit is increased by the extent to which the divergence is more than 4 NM from the centerline.

3.11 Pilot Visits to Air Traffic Facilities. Pilots are encouraged to participate in local pilot/air traffic control outreach activities. However, due to security and workload concerns, requests for air traffic facility visits may not always be approved. Therefore, visit requests should be submitted through the air traffic facility as early as possible. Pilots should contact the facility and advise them of the number of persons in the group, the time and date of the proposed visit, and the primary interest of the group. The air traffic facility will provide further instructions if a request can be approved.

3.12 Operation Rain Check. Operation Rain Check is a program designed and managed by local air traffic control facility management. Its purpose is to familiarize pilots and aspiring pilots with the ATC system, its functions, responsibilities and benefits.

4. En Route Procedures

4.1 Air Route Traffic Control Center (ARTCC)

An ARTCC is a facility established to provide air traffic control service to aircraft operating on instrument flight rule (IFR) flight plans within CONTROLLED AIRSPACE and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to visual flight rule (VFR) aircraft.

4.2 ARTCC Communications

4.2.1 Direct Communications, Controllers and Pilots

4.2.1.1 ARTCCs are capable of direct communications with IFR air traffic on certain frequencies. Maximum communications coverage is possible through the use of Remote Center Air/Ground (RCAG) sites comprised of very high frequency (VHF) and ultra high frequency (UHF) transmitters and receivers. These sites are located throughout the U.S. Although they may be several hundred miles away from the ARTCC, they are remoted to the various centers by land lines or microwave links. As IFR operations are expedited through the use of direct communications, pilots are requested to use these frequencies strictly for communications pertinent to the control of IFR aircraft. Flight plan filing, en route weather, weather forecasts, and similar data should be requested through Flight Service Stations, company radio, or appropriate military facilities capable of performing these services.

4.2.1.2 An ARTCC is divided into sectors. Each sector is handled by one or a team of controllers and has its own sector discrete frequency. As a flight progresses from one sector to another, the pilot is requested to change to the appropriate sector discrete frequency.

4.2.1.3 Controller Pilot Data Link Communications (CPDLC) is a system that supplements air/ground voice communications. The CPDLC's principal operating criteria are:

a) Voice remains the primary and controlling air/ground communications means.

b) Participating aircraft will need to have the appropriate CPDLC avionics equipment in order to receive uplink or transmit downlink messages.

c) En Route CPDLC Initial Services offer the following services: Altimeter Setting (AS), Transfer of Communications (TOC), Initial Contact (IC), and limited route assignments, including airborne reroutes (ABRR), limited altitude assignments, and emergency messages.

1) Altimeter settings will be uplinked automatically when appropriate after a Monitor TOC. Altimeter settings will also be uplinked automatically when an aircraft receives an uplinked altitude assignment below FL 180. A controller may also manually send an altimeter setting message.

9.2.3.3 In Alaska, pilots of aircraft conducting other than arriving or departing operations in designated CTAF areas should monitor/communicate on the appropriate frequency while within the designated area, unless required to do otherwise by CFRs or local procedures. Such operations include parachute jumping/dropping, en route, practicing maneuvers, etc.

9.2.4 Airport Advisory/Information Services Provided by a FSS

9.2.4.1 There are two advisory type services provided at selected airports.

a) Local Airport Advisory (LAA) is available only in Alaska and provided at airports that have a FSS physically located on the airport, which does not have a control tower or where the tower is operated on a part−time basis. The CTAF for LAA airports is disseminated in the appropriate aeronautical publications.

b) Remote Airport Information Service (RAIS) is provided in support of special events at nontowered airports by request from the airport authority and must be published as a NOTAM D.

9.2.4.2 In communicating with a CTAF FSS, check the airport's automated weather and establish two−way communications before transmitting outbound/inbound intentions or information. An inbound aircraft should initiate contact approximately 10 miles from the airport, reporting aircraft identification and type, altitude, location relative to the airport, intentions (landing or over flight), possession of the automated weather, and request airport advisory or airport information service. A departing aircraft should initiate contact before taxiing, reporting aircraft identification and type, VFR or IFR, location on the airport, intentions, direction of take−off, possession of the automated weather, and request airport advisory or information service, as applicable. Also, report intentions before taxiing onto the active runway for departure. If you must change frequencies for other service after initial report to FSS, return to FSS frequency for traffic update.

a) Inbound

EXAMPLE−
Vero Beach radio, Centurion Six Niner Delta Delta is ten miles south, two thousand, landing Vero Beach. I have the automated weather, request airport advisory.

b) Outbound

EXAMPLE−
Vero Beach radio, Centurion Six Niner Delta Delta, ready to taxi to runway 22, VFR, departing to the southwest. I have the automated weather, request airport advisory.

9.2.4.3 Airport advisory service includes wind direction and velocity, favored or designated runway, altimeter setting, known airborne and ground traffic, NOTAMs, airport taxi routes, airport traffic pattern information, and instrument approach procedures. These elements are varied so as to best serve the current traffic situation. Some airport managers have specified that under certain wind or other conditions designated runways be used. Pilots should advise the FSS of the runway they intend to use.

9.2.4.4 Automatic Flight Information Service (AFIS) − Alaska FSSs Only

a) AFIS is the continuous broadcast of recorded non−control information at airports in Alaska where an FSS provides local airport advisory service. Its purpose is to improve FSS specialist efficiency by reducing frequency congestion on the local airport advisory frequency.

1) The AFIS broadcast will automate the repetitive transmission of essential but routine information (for example, weather, favored runway, braking action, airport NOTAMs, etc.). The information is continuously broadcast over a discrete VHF radio frequency (usually the ASOS frequency).

2) Use of AFIS is not mandatory, but pilots who choose to utilize two−way radio communications with the FSS are urged to listen to AFIS, as it relieves frequency congestion on the local airport advisory frequency. AFIS broadcasts are updated upon receipt of any official hourly and special weather, and changes in other pertinent data.

3) When a pilot acknowledges receipt of the AFIS broadcast, FSS specialists may omit those items contained in the broadcast if they are current. When rapidly changing conditions exist, the latest ceiling, visibility, altimeter, wind or other conditions may be omitted from the AFIS and will be issued by the FSS specialist on the appropriate radio frequency.

EXAMPLE−
"Kotzebue information ALPHA. One six five five zulu. Wind, two one zero at five; visibility two, fog; ceiling one hundred overcast; temperature minus one two, dew point minus one four; altimeter three one zero five. Altimeter in excess of three one zero zero, high pressure altimeter setting procedures are in effect. Favored runway two six. Weather in Kotzebue surface area is below V−F−R minima − an ATC clearance is required. Contact Kotzebue Radio on 123.6 for traffic advisories and advise intentions. Notice to Airmen, Hotham NDB out of service. Transcribed Weather Broadcast out of service. Advise on initial contact you have ALPHA."

NOTE−
The absence of a sky condition or ceiling and/or visibility on Alaska FSS AFIS indicates a sky condition or ceiling of 5,000 feet or above and visibility of 5 miles or more. A remark may be made on the broadcast, "the weather is better than 5000 and 5."

b) Pilots should listen to Alaska FSSs AFIS broadcasts whenever Alaska FSSs AFIS is in operation.

NOTE−
Some Alaska FSSs are open part time and/or seasonally.

c) Pilots should notify controllers on initial contact that they have received the Alaska FSSs AFIS broadcast by repeating the phonetic alphabetic letter appended to the broadcast.

EXAMPLE−
"Information Alpha received."

d) While it is a good operating practice for pilots to make use of the Alaska FSS AFIS broadcast where it is available, some pilots use the phrase "have numbers" in communications with the FSS. Use of this phrase means that the pilot has received wind, runway, and altimeter information ONLY and the Alaska FSS does not have to repeat this information. It does not indicate receipt of the AFIS broadcast and should never be used for this purpose.

CAUTION−
All aircraft in the vicinity of an airport may not be in communication with the FSS.

9.2.5 Information Provided by Aeronautical Advisory Stations (UNICOM)

9.2.5.1 UNICOM is a nongovernment air/ground radio communication station which may provide airport information at public use airports where there is no tower or FSS.

9.2.5.2 On pilot request, UNICOM stations may provide pilots with weather information, wind direction, the recommended runway, or other necessary information. If the UNICOM frequency is designated as the CTAF, it will be identified in appropriate aeronautical publications.

9.2.5.3 Unavailability of Information from FSS or UNICOM. Should LAA by an FSS or Aeronautical Advisory Station UNICOM be unavailable, wind and weather information may be obtainable from nearby controlled airports via Automatic Terminal Information Service (ATIS) or Automated Weather Observing System (AWOS) frequency.

9.2.6 Self−Announce Position and/or Intentions

9.2.6.1 General. Self-announce is a procedure whereby pilots broadcast their position or intended flight activity or ground operation on the designated CTAF. This procedure is used primarily at airports which do not have an FSS on the airport. The self-announce procedure should also be used if a pilot is unable to communicate with the FSS on the designated CTAF. Pilots stating, *"Traffic in the area, please advise"* is not a recognized Self−Announce Position and/or Intention phrase and should not be used under any condition.

9.2.6.2 If an airport has a tower which is temporarily closed or operated on a part−time basis, and there is no FSS on the airport or the FSS is closed, use the CTAF to self−announce your position or intentions.

9.2.6.3 Where there is no tower, FSS, or UNICOM station on the airport, use MULTICOM frequency 122.9 for self−announce procedures. Such airports will be identified in appropriate aeronautical information publications.

GEN 3.4 Communication Service

1. Responsible Authority

1.1 The authority responsible for the administration of communications services in the U.S. is the Federal Aviation Administration, Communications, Information and Network Programs Group, AJM−31.

Postal Address:
Federal Aviation Administration
Communications, Information and Network
Programs Group, AJM−31
800 Independence Ave, SW
Washington, D.C. 20591
AFTN Address: KRWAYAYX
Commercial Telegraphic Address:
FAA WASH

2. Area of Responsibility

2.1 Communications services are available on a continuous basis without charge to the user. The Air Traffic Services Division is responsible for the establishment of the operational requirements of the U.S. communications system. Responsibility for the day to day operation of these services resides with the local air traffic facility. Enquiries or complaints regarding any communications services or facilities should be referred to the relevant air traffic facility or to the Federal Aviation Administration, Air Traffic Operations Services, as appropriate.

3. Types of Services

3.1 Radio Navigation Service

3.1.1 Various types of air navigation aids are in use today, each serving a special purpose. These aids have varied owners and operators, namely: the Federal Aviation Administration, the military services, private organizations; and individual states and foreign governments. The Federal Aviation Administration has the statutory authority to establish, operate, and maintain air navigation facilities and to prescribe standards for the operation of any of these aids which are used by both civil and military aircraft for instrument flight in federally controlled airspace. These aids are tabulated in the Chart Supplement by State.

3.1.2 Pilots should be aware of the possibility of momentary erroneous indications on cockpit displays when the primary signal generator for a ground−based navigational transmitter (for example, a glideslope, VOR, or nondirectional beacon) is inoperative. Pilots should disregard any navigation indication, regardless of its apparent validity, if the particular transmitter was identified by NOTAM or otherwise as unusable or inoperative.

3.1.3 The following types of radio navigation aids are provided in the U.S.:

3.1.3.1 VHF Direction−Finding (VHF−DF).

3.1.3.2 LF Non−Directional Beacon (NDB).

3.1.3.3 VHF Omni−Directional Radio Range (VOR).

3.1.3.4 Distance Measuring Equipment (DME).

3.1.3.5 Tactical Air Navigation (TACAN).

3.1.3.6 Instrument Landing System (ILS).

3.1.3.7 Final Approach Simplified Directional Facility (SDF).

3.1.3.8 Precision Approach Radar (PAR) at certain military aerodromes.

3.1.3.9 Global Positioning System (GPS).

3.1.4 NAVAID Service Volumes

3.1.4.1 The FAA publishes Standard Service Volumes (SSVs) for most NAVAIDs. The SSV is a three−dimensional volume within which the FAA ensures that a signal can be received with adequate signal strength and course quality, and is free from interference from other NAVAIDs on similar frequencies (e.g., co−channel or adjacent−channel interference). However, the SSV signal protection does not include potential blockage from terrain or obstructions. The SSV is principally intended for off−route navigation, such as proceeding direct to or from a VOR when not on a published instrument procedure or route. Navigation on published instrument procedures (e.g., approaches or departures) or routes (e.g., Victor routes) may use NAVAIDs outside of the SSV, when Extended Service Volume (ESV) is approved, since adequate signal strength, course quality, and freedom from interference are verified by the FAA prior to the publishing of the instrument procedure or route.

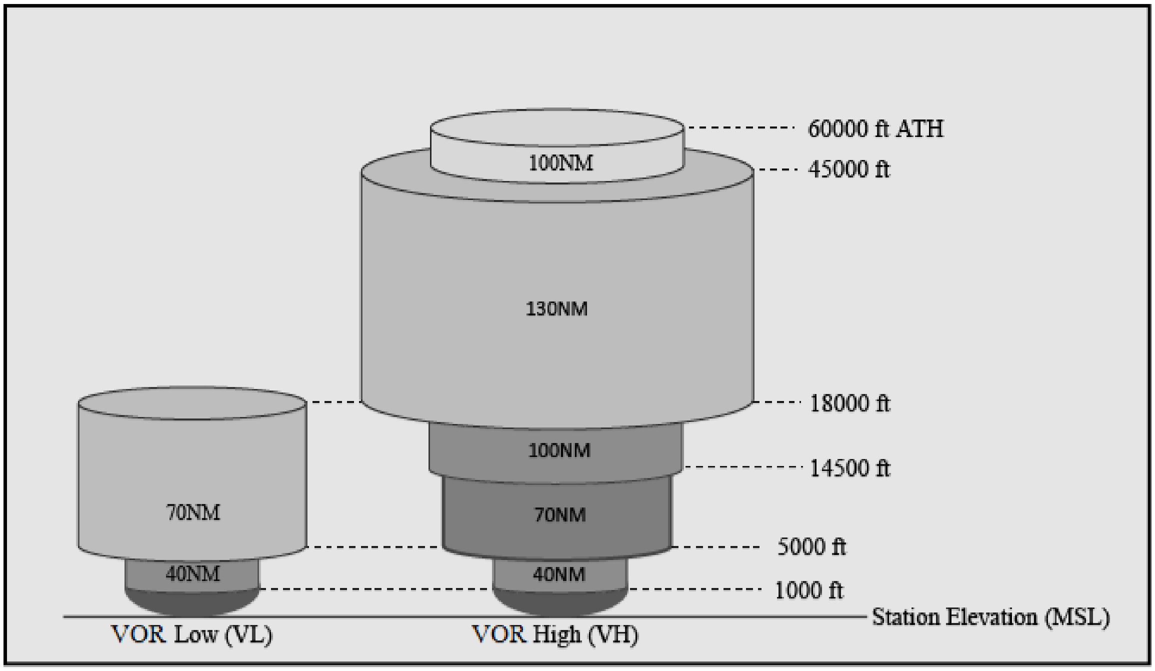
NOTE−
A conical area directly above the NAVAID is generally not usable for navigation.

3.1.4.2 A NAVAID will have service volume restrictions if it does not conform to signal strength and course quality standards throughout the published SSV. Service volume restrictions are first published in Notices to Airmen (NOTAMs) and then with the alphabetical listing of the NAVAIDs in the Chart Supplement. Service volume restrictions do not generally apply to published instrument procedures or routes unless published in NOTAMs for the affected instrument procedure or route.

3.1.4.3 VOR/DME/TACAN Standard Service Volumes (SSV).

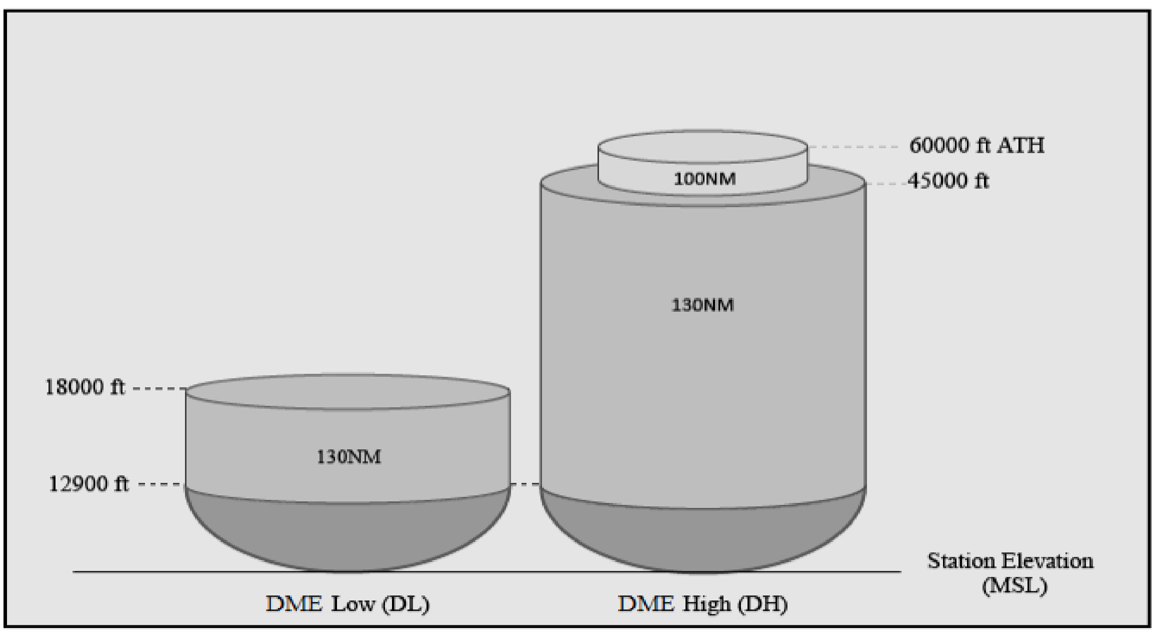
a) The three original SSVs are shown in FIG GEN 3.4−1 and are designated with three classes of NAVAIDs: Terminal (T), Low (L), and High (H). The usable distance of the NAVAID depends on the altitude Above the Transmitter Height (ATH) for each class. The lower edge of the usable distance when below 1,000 feet ATH is shown in FIG GEN 3.4−2 for Terminal NAVAIDs and in FIG GEN 3.4−3 for Low and High NAVAIDs.

FIG GEN 3.4−4
New VOR Service Volumes



Mean Sea level (MSL)
Above Transmitter Height (ATH)

FIG GEN 3.4−5
New DME Service Volumes



Mean Sea level (MSL)
Above Transmitter Height (ATH)

NOTE−

1. *In the past, NAVAIDs at one location typically all had the same SSV. For example, a VORTAC typically had a High (H) SSV for the VOR, the TACAN azimuth, and the TACAN DME, or a Low (L) or Terminal (T) SSV for all three. A VOR/DME* *typically had a High (H), Low (L), or Terminal (T) for both the VOR and the DME. A common SSV may no longer be the case at all locations. A VOR/DME, for example, could have an SSV of VL for the VOR and DH for the DME, or other combinations.*

2. *The TACAN azimuth will only be classified as T, L, or H.*

c) TBL GEN 3.4−1 is a tabular summary of the VOR, DME, and TACAN NAVAID SSVs, not including altitudes below 1,000 feet ATH for VOR and TACAN Azimuth, and not including ranges for altitudes below 12,900 feet for TACAN and DME.

TBL GEN 3.4−1

VOR/DME/TACAN Standard Service Volumes

SSV Designator	Altitude and Range Boundaries
T (Terminal)	From 1,000 feet ATH up to and including 12,000 feet ATH at radial distances out to 25 NM.
L (Low Altitude)	From 1,000 feet ATH up to and including 18,000 feet ATH at radial distances out to 40 NM.
H (High Altitude)	From 1,000 feet ATH up to and including 14,500 feet ATH at radial distances out to 40 NM. From 14,500 ATH up to and including 60,000 feet at radial distances out to 100 NM. From 18,000 feet ATH up to and including 45,000 feet ATH at radial distances out to 130 NM.
VL (VOR Low)	From 1,000 feet ATH up to but not including 5,000 feet ATH at radial distances out to 40 NM. From 5,000 feet ATH up to but not including 18,000 feet ATH at radial distances out to 70 NM.
VH (VOR High)	From 1,000 feet ATH up to but not including 5,000 feet ATH at radial distances out to 40 NM. From 5,000 feet ATH up to but not including 14,500 feet ATH at radial distances out to 70 NM. From 14,500 ATH up to and including 60,000 feet at radial distances out to 100 NM. From 18,000 feet ATH up to and including 45,000 feet ATH at radial distances out to 130 NM.
DL (DME Low)	For altitudes up to 12,900 feet ATH at a radial distance corresponding to the LOS to the NAVAID. From 12,900 feet ATH up to but not including 18,000 feet ATH at radial distances out to 130 NM
DH (DME High)	For altitudes up to 12,900 feet ATH at a radial distance corresponding to the LOS to the NAVAID. From 12,900 ATH up to and including 60,000 feet at radial distances out to 100 NM. From 12,900 feet ATH up to and including 45,000 feet ATH at radial distances out to 130 NM.

3.1.4.4 Nondirectional Radio Beacon (NDB) SSVs. NDBs are classified according to their intended use. The ranges of NDB service volumes are shown in TBL GEN 3.4−2. The distance (radius) is the same at all altitudes for each class.

TBL GEN 3.4−2

NDB Service Volumes

Class	Distance (Radius) (NM)
Compass Locator	15
MH	25
H	50*
HH	75
**Service ranges of individual facilities may be less than 50 nautical miles (NM). Restrictions to service volumes are first published as a Notice to Airmen and then with the alphabetical listing of the NAVAID in the Chart Supplement.*	

Station and Operating Agency	Radio Call	Transmitting Frequencies	Remarks
NEW YORK (RADIO)	New York	3016 5598 8906 13306 17946 21964 kHz	North Atlantic Family A Network.
		2962 6628 8825 11309 13354 17952 kHz	North Atlantic Family E Network.
		2887 3455 5550 6577 8846 11396 kHz	Caribbean Family A Network.
		5520 6586 8918 11330 13297 17907 kHz	Caribbean Family B Network.
		3494 6640 8933 11342 13330 17925 kHz	Long Distance Operations Control (LDOC) Service (phone−patch). Communications are limited to operational control matters only. Public correspondence (personal messages) to/from crew or passengers cannot be accepted. **Note:** New York RADIO can also provide HF communications over South America on these LDOC frequencies through their remote site located in Santa Cruz, Bolivia.
		129.90 MHz	Extended range VHF. Coverage area includes Canadian Maritime Provinces, and oceanic routes to the Caribbean, from Boston, New York and Washington areas to approximately 250 nautical miles from the east coast.
		130.7 MHz	Extended range VHF. Full period service is provided within most of the Gulf of America. Also on routes between Miami and San Juan to a distance of approximately 250 nautical miles from the Florida coast and within approximately 250 nautical miles of San Juan. **Note:** New York RADIO also provides VHF communications over the Northern two−thirds of Mexico on 130.7 MHz for 14 CFR Section 121.99 compliance.
		436623	Aircraft operating within the New York Oceanic FIR.
SAN FRANCISCO (RADIO)	San Francisco	3413 3452 5574 5667 6673 8843 10057 11330 13354 kHz	Central East Pacific One Network.
		2869 5547 11282 13288 21964 kHz	Central East Pacific Two Network.
		2998 4666 6532 8903 11384 13300 17904 21985 kHz	Central West Pacific Network.
		3467 5643 8867 13261 17904 kHz	South Pacific Network.
		2932 5628 6655 8915 8951 10048 11330 13273 13339 17946 21925 kHz	North Pacific Network

Station and Operating Agency	Radio Call	Transmitting Frequencies	Remarks
		3494 6640 8903 11342 13348 17925 21964 kHz	Long Distance Operations Control (LDOC) Service (phone−patch). Communications are limited to operational control matters only. Public correspondence (personal messages) to/from crew or passengers cannot be accepted. **Note:** San Francisco RADIO can also provide HF communications along the polar routes on these LDOC frequencies through their remote site located at Barrow, Alaska.
		131.95 MHz	Extended range VHF. Coverage area includes area surrounding the Hawaiian Islands and Guam. Coverage extends out approximately 250 NM from Hawaii and from the West coast.
		129.40 MHz	For en route communications for aircraft operating on Seattle/Anchorage/Routes.
		436625	Aircraft operating within the Oakland and Anchorage Oceanic FIRs.
OAKLAND (FAA)	Oakland Radio	122.5 122.2 #121.5 MHz	#Emergency.
SAN JUAN P.R. (FAA)	San Juan Radio	122.2 122.3 122.6 108.2 108.6 110.6 MHz	For frequencies 108.2 and 110.6, MHz use 122.1 MHz, for transmissions to San Juan Radio. For frequency 108.6 use 123.6 MHz.

9. Selective Calling System (SELCAL) Facilities Available

9.1 The SELCAL is a communication system which permits the selective calling of individual aircraft over radio−telephone channels from the ground station to properly equipped aircraft, so as to eliminate the need for the flight crew to constantly monitor the frequency in use.

TBL GEN 3.4−7

Location	Operator	HF	VHF
New York	RADIO	X	X
San Francisco	RADIO	X	X

10. Special North Atlantic, Caribbean, and Pacific Area Communications

10.1 VHF air−to−air frequencies enable aircraft engaged on flights over remote and oceanic areas out of range of VHF ground stations to exchange necessary operational information and to facilitate the resolution of operational problems.

10.2 Frequencies have been designated as follows:

TBL GEN 3.4−8

Area	Frequency
North Atlantic	123.45 MHz
Caribbean	123.45 MHz
Pacific	123.45 MHz

11. Distress and Urgency Communications

11.1 A pilot who encounters a distress or urgency condition can obtain assistance simply by contacting the air traffic facility or other agency in whose area of responsibility the aircraft is operating, stating the nature of the regular airport meteorological stations. English is the language used for all U.S. flight documentation. Briefings can be provided either in person or received by telephone at all airport meteorological offices.

2.2.3 All airport forecasts (TAF) prepared for U.S. international airports cover the following validity periods: 00−24 UTC, 06−06 UTC, 12−12 UTC, and 18−18 UTC. At the present time, specific landing forecasts are not made for any U.S. airport. The portion of the airport's TAF valid closest to the time of landing is used in lieu of a landing forecast.

2.2.4 Supplementary information available at U.S. meteorological airport offices includes extended weather and severe weather outlooks, pilot reports, runway braking action reports (during the winter), relative humidity, times of sunrise and sunset, surface and upper air analyses, radar echo charts, and forecasts of maximum and minimum surface temperatures.

2.2.5 All meteorological offices shown as taking routine aviation observations also take unscheduled special aviation observations when meteorological conditions warrant.

3. Types of Service Provided

3.1 Area Forecast Charts (Facsimile Form)

3.1.1 The U.S. has one Area Forecast Center, the National Center for Environmental Predictions (NCEP), located in Suitland, Maryland. The NCEP prepares current weather, significant weather, forecast weather, constant pressure, and tropopause−vertical wind shear charts for the U.S., the Caribbean and Northern South America, the North Atlantic, and the North Pacific areas. The NCEP also prepares a constant pressure and tropopause−vertical wind shear chart for Canada.

3.2 Local and Regional Aviation Forecasts (Printed Form)

3.2.1 Numerous forecasts and weather advisories are prepared which serve local and regional areas of the U.S. These forecasts are generally prepared by the NWS on a scheduled basis or, as in the case of severe weather advisories, as needed. These forecasts are Area Forecast (FA), Airport Forecast (TAF), Severe Weather Forecast (WW), Hurricane Advisories (WT), Winds and Temperature Aloft Forecast (FD), Simplified Surface Analyses (AS), 12− and 24−Hour Prognoses (FS), and flight advisory notices, such as SIGMETs (WS), AIRMETs (text bulletins−[WA] and graphics [G−AIRMET]), Center Weather Advisories (CWA), and Radar Weather Reports (SD).

3.3 Preflight Briefing Services

3.3.1 Preflight briefing services and flight documentation are provided through FAA Flight Service Stations (FSS).

3.4 National Weather Service Aviation Weather Service Program

3.4.1 Weather service to aviation is a joint effort of the National Oceanic and Atmospheric Administration (NOAA), the National Weather Service (NWS), the Federal Aviation Administration (FAA), Department of Defense, and various private sector aviation weather service providers. Requirements for all aviation weather products originate from the FAA, which is the Meteorological Authority for the U.S.

3.4.2 NWS meteorologists are assigned to all air route traffic control centers (ARTCC) as part of the Center Weather Service Units (CWSU) as well as the Air Traffic Control System Command Center (ATCSCC). These meteorologists provide specialized briefings as well as tailored forecasts to support the needs of the FAA and other users of the NAS.

3.4.3 Aviation Products

3.4.3.1 The NWS maintains an extensive surface, upper air, and radar weather observing program; and a nationwide aviation weather forecasting service.

3.4.3.2 Airport observations (METAR and SPECI) supported by the NWS are provided by automated observing systems.

3.4.3.3 Terminal Aerodrome Forecasts (TAF) are prepared by 123 NWS Weather Forecast Offices (WFOs) for over 700 airports. These forecasts are valid for 24 or 30 hours and amended as required.

3.4.3.4 Inflight aviation advisories (for example, Significant Meteorological Information (SIGMETs) and Airmen's Meteorological Information (AIRMETs)) are issued by three NWS Meteorological Watch Offices (MWOs); the Aviation Weather Center (AWC) in Kansas City, MO, the Alaska Aviation Weather Unit (AAWU) in Anchorage, AK, and the Weather Service Forecast Office (WFO) in Honolulu, HI. The AWC, the AAWU, and WSFO Honolulu issue area forecasts for selected areas. In addition, NWS meteorologists assigned to most ARTCCs as part of the Center Weather Service Unit (CWSU) provide Center Weather Advisories (CWAs) and gather weather information to support the needs of the FAA and other users of the system.

3.4.3.5 Several NWS National Centers for Environmental Production (NCEP) provide aviation specific weather forecasts, or select public forecasts which are of interest to pilots and operators.

a) The Aviation Weather Center (AWC) displays a variety of domestic and international aviation forecast products over the Internet at aviationweather.gov.

b) The NCEP Central Operations (NCO) is responsible for the operation of many numerical weather prediction models, including those which produce the many wind and temperature aloft forecasts.

c) The Storm Prediction Center (SPC) issues tornado and severe weather watches along with other guidance forecasts.

d) The National Hurricane Center (NHC) issues forecasts on tropical weather systems (for example, hurricanes).

e) The Space Weather Prediction Center (SWPC) provides alerts, watches, warnings and forecasts for space weather events (for example, solar storms) affecting or expected to affect Earth's environment.

f) The Weather Prediction Center (WPC) provides analysis and forecast products on a national scale including surface pressure and frontal analyses.

3.4.3.6 NOAA operates two Volcanic Ash Advisory Centers (VAAC) which issue forecasts of ash clouds following a volcanic eruption in their area of responsibility.

3.4.3.7 Details on the products provided by the above listed offices and centers is available in FAA−H−8083−28, Aviation Weather Handbook.

3.4.4 Weather element values may be expressed by using different measurement systems depending on several factors, such as whether the weather products will be used by the general public, aviation interests, international services, or a combination of these users. FIG GEN 3.5−1 provides conversion tables for the most used weather elements that will be encountered by pilots.

observations; for example, contract towers and airport operators may be approved by the Federal Government to provide weather observations.

3.6.11.2 Enhanced Weather Information System (EWINS). An EWINS is an FAA authorized, proprietary system for tracking, evaluating, reporting, and forecasting the presence or lack of adverse weather phenomena. The FAA authorizes a certificate holder to use an EWINS to produce flight movement forecasts, adverse weather phenomena forecasts, and other meteorological advisories. For more detailed information regarding EWINS, see the FAA−H−8083−28, Aviation Weather Handbook, and the Flight Standards Information Management System 8900.1.

3.6.11.3 Commercial Weather Information Providers. In general, commercial providers produce proprietary weather products based on NWS/FAA products with formatting and layout modifications but no material changes to the weather information itself. This is also referred to as "repackaging." In addition, commercial providers may produce analyses, forecasts, and other proprietary weather products that substantially alter the information contained in government−produced products. However, those proprietary weather products that substantially alter government−produced weather products or information, may only be approved for use by 14 CFR Part 121 and Part 135 certificate holders if the commercial provider is EWINS qualified.

NOTE−
Commercial weather information providers contracted by FAA to provide weather observations, analyses, and forecasts (e.g., contract towers) are included in the Federal Government category of approved sources by virtue of maintaining required technical and quality assurance standards under Federal Government oversight.

3.7 Graphical Forecasts for Aviation (GFA)

3.7.1 The GFA website is intended to provide the necessary aviation weather information to give users a complete picture of the weather that may affect flight in the continental United States (CONUS). The website includes observational data, forecasts, and warnings that can be viewed from 14 hours in the past to 15 hours in the future, including thunderstorms, clouds, flight category, precipitation, icing, turbulence, and wind. Hourly model data and forecasts, including information on clouds, flight category, precipitation, icing, turbulence, wind, and graphical output from the National Weather Service's (NWS) National Digital Forecast Data (NDFD) are available. Wind, icing, and turbulence forecasts are available in 3,000 ft increments from the surface up to 30,000 ft MSL, and in 6,000 ft increments from 30,000 ft MSL to 48,000 ft MSL. Turbulence forecasts are also broken into low (below 18,000 ft MSL) and high (at or above 18,000 ft MSL) graphics. A maximum icing graphic and maximum wind velocity graphic (regardless of altitude) are also available. Built with modern geospatial information tools, users can pan and zoom to focus on areas of greatest interest. Target users are commercial and general aviation pilots, operators, briefers, and dispatchers.

3.7.2 Weather Products.

3.7.2.1 The Aviation Forecasts include gridded displays of various weather parameters as well as NWS textual weather observations, forecasts, and warnings. Icing, turbulence, and wind gridded products are three−dimensional. Other gridded products are two−dimensional and may represent a "composite" of a three−dimensional weather phenomenon or a surface weather variable, such as horizontal visibility. The following are examples of aviation forecasts depicted on the GFA:

a) Terminal Aerodrome Forecast (TAF)

b) Ceiling & Visibility (CIG/VIS)

c) Clouds

d) Precipitation / Weather (PCPN/WX)

e) Thunderstorm (TS)

f) Winds

g) Turbulence

h) Ice

3.7.2.2 Observations & Warnings (Obs/Warn). The Obs/Warn option provides an option to display weather data for the current time and the previous 14 hours (rounded to the nearest hour). Users may advance through time using the arrow buttons or by clicking on the desired hour. Provided below are the Obs/Warn product tabs available on the GFA website:

a) METAR

b) Precipitation/Weather (PCPN/WX)

c) Ceiling & Visibility (CIG/VIS)

d) Pilot Weather Report (PIREP)

e) Radar & Satellite (RAD/SAT)

3.7.2.3 The GFA will be continuously updated and available online at http://aviationweather.gov/gfa. Upon clicking the link above, select INFO on the top right corner of the map display. The next screen presents the option of selecting Overview, Products, and Tutorial. Simply select the tab of interest to explore the enhanced digital and graphical weather products designed to replace the legacy FA. Users should also refer to the *Aviation Weather Handbook*, FAA−H−8083−28, Graphical Forecasts for Aviation (GFA) Tool, for more detailed information on the GFA.

3.7.2.4 GFA Static Images. Some users with limited internet connectivity may access static images via the Aviation Weather Center (AWC) Decision Support Imagery at: https://aviationweather.gov/graphics/ . There are two static graphical images available, titled Aviation Cloud Forecast and Aviation Surface Forecast. The Aviation Cloud Forecast provides cloud coverage, bases, layers, and tops with AIRMETs for mountain obscuration and AIRMETs for icing overlaid. The Aviation Surface Forecast provides visibility, weather phenomena, and winds (including wind gusts) with AIRMETs for instrument flight rules conditions and AIRMETs for sustained surface winds of 30 knots or more overlaid. These images are presented on ten separate maps providing forecast views for the entire contiguous United States (U.S.) on one and nine regional views which provide more detail for the user. They are updated every 3 hours and provide forecast snapshots for 3, 6, 9, 12, 15, and 18 hours into the future. (See FIG GEN 3.5−2 and FIG GEN 3.5−2.)

NOTE−
The contiguous United States (U.S.) refers to the 48 adjoining U.S. states on the continent of North America that are south of Canada and north of Mexico, plus the District of Columbia. The term excludes the states of Alaska, Hawaii, and all off−shore U.S. territories and possessions, such as Puerto Rico.

advise that you have the international cautionary advisory. The briefer will automatically provide the following information in the sequence listed, except as noted, when it is applicable to your proposed flight.

3.8.2.1 Adverse Conditions. Significant meteorological and/or aeronautical information that might influence the pilot to alter or cancel the proposed flight; for example, hazardous weather conditions, airport closures, air traffic delays, etc. Pilots should be especially alert for current or forecast weather that could reduce flight minimums below VFR or IFR conditions. Pilots should also be alert for any reported or forecast icing if the aircraft is not certified for operating in icing conditions. Flying into areas of icing or weather below minimums could have disastrous results.

3.8.2.2 VFR Flight Not Recommended. When VFR flight is proposed and sky conditions or visibilities are present or forecast, surface or aloft, that, in the briefer's judgment, would make flight under VFR doubtful, the briefer will describe the conditions, describe the affected locations, and use the phrase *"VFR flight not recommended."* This recommendation is advisory in nature. The final decision as to whether the flight can be conducted safely rests solely with the pilot. Upon receiving a "*VFR flight not recommended*" statement, the non−IFR rated pilot will need to make a "go or no go" decision. This decision should be based on weighing the current and forecast weather conditions against the pilot's experience and ratings. The aircraft's equipment, capabilities and limitations should also be considered.

NOTE−
Pilots flying into areas of minimal VFR weather could encounter unforecasted lowering conditions that place the aircraft outside the pilot's ratings and experience level. This could result in spatial disorientation and/or loss of control of the aircraft.

3.8.2.3 Synopsis. A brief statement describing the type, location, and movement of weather systems and/or air masses which might affect the proposed flight.

NOTE−
The first 3 elements of a standard briefing may be combined in any order when the briefer believes it will help to describe conditions more clearly.

3.8.2.4 Current Conditions. Reported weather conditions applicable to the flight will be summarized from all available sources; e.g., METARs, PIREPs, RAREPs. This element may be omitted if the proposed time of departure is beyond two hours, unless the information is specifically requested by the pilot. For more detailed information on PIREPS, users can refer to the current version of AC 00−45, Aviation Weather Services.

3.8.2.5 En Route Forecast. En route conditions forecast for the proposed route are summarized in logical order; i.e., departure−climbout, en route, and descent.

3.8.2.6 Destination Forecast. The destination forecast (TAF) for the planned estimated time of arrival (ETA). Any significant changes within 1 hour before and after the planned arrival are included.

3.8.2.7 Winds Aloft. Forecast winds aloft for the proposed route will be provided in knots and degrees, referenced to true north. The briefer will interpolate wind directions and speeds between levels and stations as necessary to provide expected conditions at planned altitudes.

3.8.2.8 Notices to Airmen (NOTAMs)

a) Available NOTAM (D) information pertinent to the proposed flight, including special use airspace (SUA) NOTAMs for restricted areas, aerial refueling, and night vision goggles (NVG).

NOTE−
Other SUA NOTAMs (D), such as military operations area (MOA), military training route (MTR), and warning area NOTAMs, are considered "upon request" briefing items as indicated in paragraph 3.8.2.10.

b) Prohibited Areas P−40, P−49, P−56, and the special flight rules area (SFRA) for Washington, DC.

NOTE−
For information on SFRAs, see ENR 5, Navigation Warnings, paragraph 2.4.2.

c) FSS briefers do not provide FDC NOTAM information for special instrument approach procedures unless specifically asked. Pilots authorized by the FAA to use special instrument approach procedures must specifically request FDC NOTAM information for these procedures.

NOTE−
1. *NOTAM information may be combined with current conditions when the briefer believes it is logical to do so.*

2. *Airway NOTAMs, procedural NOTAMs, and NOTAMs that are general in nature and not tied to a specific airport/facility (for example, flight advisories and restrictions, open duration special security instructions, and special flight rules areas) are briefed solely by pilot request. NOTAMs, graphic notices, and other information published in the Domestic Notices and International Notices are not included in pilot briefings unless the pilot specifically requests a review of these notices. For complete flight information, pilots are urged to review the Domestic Notices and International Notices found in the External Links section of the Federal NOTAM System (FNS) NOTAM Search or Air Traffic Plans and Publications website and the Chart Supplement in addition to obtaining a briefing.*

3.8.2.9 Air Traffic Control (ATC) Delays. Any known ATC delays and flow control advisories which might affect the proposed flight.

3.8.2.10 Pilots may obtain the following from flight service station briefers upon request:

a) Information on Special Use Airspace (SUA) and SUA related airspace, except those listed in paragraph 3.8.2.8.

NOTE−
1. *For the purpose of this paragraph, SUA and related airspace includes the following types of airspace: alert area, military operations area (MOA), warning area, and air traffic control assigned airspace (ATCAA). MTR data includes the following types of airspace: IFR training routes (IR), VFR training routes (VR), and slow training routes (SR).*

2. *Pilots are encouraged to request updated information from ATC facilities while in flight.*

b) A review of airway NOTAMs, procedural NOTAMs, and NOTAMs that are general in nature and not tied to a specific airport/facility (for example, flight advisories and restrictions, open duration special security instructions, and special flight rules areas), Domestic Notices and International Notices. Domestic Notices and International Notices are found in the External Links section of the Federal NOTAM System (FNS) NOTAM Search System.

c) Approximate density altitude data.

d) Information regarding such items as air traffic services and rules, customs/immigration procedures, ADIZ rules, and search and rescue.

e) NOTAMs, available military NOTAMs, runway friction measurement value NOTAMs.

f) GPS RAIM availability for 1 hour before to 1 hour after ETA, or a time specified by the pilot.

g) Other assistance as required.

3.8.3 Abbreviated Briefing. Request an Abbreviated Briefing when you need information to supplement mass disseminated data, to update a previous briefing, or when you need only one or two specific items. Provide the briefer with appropriate background information, the time you received the previous information, and/or the specific items needed. You should indicate the source of the information already received so that the briefer can limit the briefing to the information that you have not received, and/or appreciable changes in meteorological/aeronautical conditions since your previous briefing. To the extent possible, the briefer will provide the information in the sequence shown for a Standard Briefing. If you request only one or two specific items, the briefer will advise you if adverse conditions are present or forecast. Adverse conditions contain both meteorological and aeronautical information. Details on these conditions will be provided at your request.

3.8.4 Outlook Briefing. You should request an Outlook Briefing whenever your proposed time of departure is 6 or more hours from the time of the briefing. The briefer will provide available forecast data applicable to the proposed flight. This type of briefing is provided for planning purposes only. You should obtain a Standard or Abbreviated Briefing prior to departure in order to obtain such items as adverse conditions, current conditions, updated forecasts, winds aloft, and NOTAMs.

3.8.5 Inflight Briefing. You are encouraged to conduct a self−briefing using online resources or obtain your preflight briefing by telephone or in person before departure (Alaska only). In those cases where you need to obtain a preflight briefing or an update to a previous briefing by radio, you should contact the nearest FSS to obtain this information. After communications have been established, advise the specialist of the type briefing you require and provide appropriate background information. You will be provided information as specified in the above paragraphs, depending on the type of briefing requested. En Route advisories tailored to the phase of flight that begins after climb−out and ends with descent to land are provided upon pilot request. Besides flight service, there are other resources available to the pilot inflight, including:

Automatic Dependent Surveillance–Broadcast (ADS−B). Free traffic, weather, and flight information are available on ADS−B In receivers that can receive data over 978 MHz (UAT) broadcasts. These services are available across the nation to aircraft owners who equip with ADS−B In, with further advances coming from airborne and runway traffic awareness. Even search−and−rescue operations benefit from accurate ADS−B tracking.

Flight Information Services−Broadcast (FIS−B). FIS−B is a free service; but is only available to aircraft who can receive data over 978 MHz (UAT). FIS−B automatically transmits a wide range of weather products with national and regional focus to all equipped aircraft. Having current weather and aeronautical information in the cockpit helps pilots plan more safe and efficient flight paths, as well as make strategic decisions during flight to avoid potentially hazardous weather.

Pilots are encouraged to provide a continuous exchange of information on weather, winds, turbulence, flight visibility, icing, etc., between pilots and inflight specialists. Pilots should report good weather as well as bad, and confirm expected conditions as well as unexpected. Remember that weather conditions can change rapidly and that a "go or no go" decision, as mentioned in paragraph 3.8.2.2, should be assessed at all phases of flight.

3.8.6 Following any briefing, feel free to ask for any information that you or the briefer may have missed. It helps to save your questions until the briefing has been completed. This way the briefer is able to present the information in a logical sequence and lessens the chance of important items being overlooked.

3.9 Inflight Aviation Weather Advisories

3.9.1 Inflight Aviation Weather Advisories are forecasts to advise en route aircraft of development of potentially hazardous weather. Inflight aviation weather advisories in the conterminous U.S. are issued by the Aviation Weather Center (AWC) in Kansas City, MO, as well as 20 Center Weather Service Units (CWSU) associated with ARTCCs. AWC also issues advisories for portions of the Gulf of America, Atlantic and Pacific Oceans, which are under the control of ARTCCs with Oceanic flight information regions (FIRs). The Weather Forecast Office (WFO) in Honolulu issues advisories for the Hawaiian Islands and a large portion of the Pacific Ocean. In Alaska, the Alaska Aviation Weather Unit (AAWU) issues inflight aviation weather advisories along with the Anchorage CWSU. All heights are referenced MSL, except in the case of ceilings (CIG) which indicate AGL.

3.9.2 There are four types of inflight aviation weather advisories: the SIGMET, the Convective SIGMET, the AIRMET, and the Center Weather Advisory (CWA). All of these advisories use VORs, airports, or well−known geographic areas to describe the hazardous weather areas.

3.9.3 The Severe Weather Watch Bulletins (WWs), (with associated Alert Messages) (AWW) supplements these Inflight Aviation Weather Advisories.

3.9.4 SIGMET. A SIGMET is a concise description of the occurrence or expected occurrence of specified en route weather phenomena which is expected to affect the safety of aircraft operations.

3.9.4.1 SIGMETs:

a) Are intended for dissemination to all pilots in flight to enhance safety.

b) Are issued by the responsible MWO as soon as it is practical to alert operators and aircrews of hazardous en route conditions.

c) Are unscheduled products that are valid for 4 hours; except SIGMETs associated with tropical cyclones and volcanic ash clouds are valid for 6 hours. Unscheduled updates and corrections are issued as necessary.

d) Use geographical points to describe the hazardous weather areas. These points can reference either VORs, airports, or latitude−longitude depending on SIGMET location. If the total area to be affected during the forecast period is very large, it could be that in actuality only a small portion of this total area would be affected at any one time.

EXAMPLE−
Example of a SIGMET:
BOSR WS 050600
SIGMET ROMEO 2 VALID UNTIL 051000
ME NH VT
FROM CAR TO YSJ TO CON TO MPV TO CAR
OCNL SEV TURB BLW 080 EXP DUE TO STG NWLY FLOW. CONDS CONTG BYD 1000Z.

3.9.4.2 SIGMETs over the contiguous U.S.:

a) Are issued corresponding to the areas described in FIG GEN 3.5−5 and are only for non−convective weather. The U.S. issues a special category of SIGMETs for convective weather called Convective SIGMETs.

b) Are identified by an alphabetic designator, from November through Yankee, excluding Sierra and Tango. Issuance for the same phenomenon will be sequentially numbered using the original designator until the phenomenon ends. For example, the first issuance in the Chicago (CHI) area (reference FIG GEN 3.5−5) for phenomenon moving from the Salt Lake City (SLC) area will be SIGMET Papa 3, if the previous two issuances, Papa 1 and Papa 2, had been in the SLC area. Note that no two different phenomena across the country can have the same alphabetic designator at the same time.

c) Use location identifiers (either VORs or airports) to describe the hazardous weather areas.

d) Are issued when the following phenomena occur or are expected to occur:

1) Severe icing not associated with thunderstorms.

2) Severe or extreme turbulence or clear air turbulence (CAT) not associated with thunderstorms.

3) Widespread dust storms or sandstorms lowering surface visibilities to below 3 miles.

4) Volcanic ash.

3.9.4.3 SIGMETs over Alaska:

a) Are issued for the Anchorage FIR including Alaska and nearby coastal waters corresponding to the areas described in FIG GEN 3.5−4 and are only for non−convective weather. The U.S. issues a special category of SIGMETs for convective weather called Convective SIGMETs.

b) Use location identifiers (either VORs or airports) to describe the hazardous weather areas.

c) Use points of latitude and longitude over the ocean areas of the Alaska FIR.

d) Are identified by an alphabetic designator from India through Mike.

e) In addition to the phenomenon applicable to SIGMETs over the contiguous U.S., SIGMETs over Alaska are also issued for:

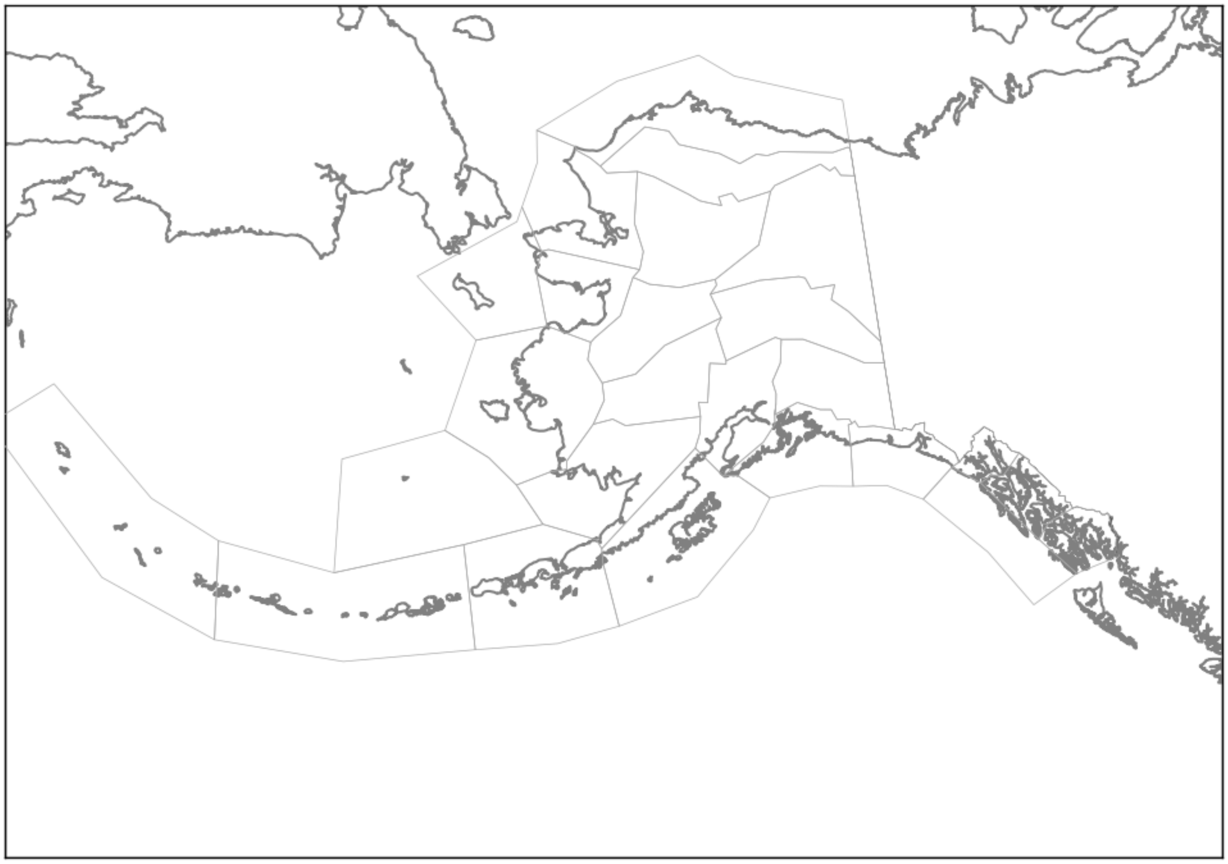
1) Tornadoes.

2) Lines of thunderstorms.

3) Embedded thunderstorms.

4) Hail greater than or equal to ¾ inch in diameter.

FIG GEN 3.5−4
Alaska SIGMET and Area Forecast Zones



3.9.4.4 SIGMETs over oceanic regions (New York Oceanic FIR, Oakland Oceanic FIR including Hawaii, Houston Oceanic FIR, Miami Oceanic FIR, San Juan FIR), points of latitude and longitude are used to describe the hazard area.

a) SIGMETs over the Oakland Oceanic FIR west of 140 west and south of 30 north (including the Hawaiian Islands), are identified by an alphabetic designator from November through Zulu.

b) SIGMETs over the Oakland Oceanic FIR east of 140 west and north of 30 north are identified by an alphabetic designator from Alpha through Mike.

c) SIGMETs over the New York Oceanic FIR, Houston Oceanic FIR, Miami Oceanic FIR, and San Juan FIR are identified by an alphabetic designator from Alpha through Mike.

d) In addition to SIGMETs issued for the phenomenon for the contiguous U.S., SIGMETs in the oceanic regions are also issued for:

1) Tornadoes.

2) Lines of thunderstorms.

3) Embedded thunderstorms.

4) Hail greater than or equal to ¾ inch in diameter.

3.9.5 Convective SIGMET

3.9.5.1 Convective SIGMETs are issued in the conterminous U.S. for any of the following:

a) Severe thunderstorm due to:

1) Surface winds greater than or equal to 50 knots.

2) Hail at the surface greater than or equal to $^3/_4$ inches in diameter.

3) Tornadoes.

b) Embedded thunderstorms.

c) A line of thunderstorms.

d) Thunderstorms producing precipitation greater than or equal to heavy precipitation affecting 40 percent or more of an area at least 3,000 square miles.

3.9.5.2 Any convective SIGMET implies severe or greater turbulence, severe icing, and low−level wind shear. A convective SIGMET may be issued for any convective situation that the forecaster feels is hazardous to all categories of aircraft.

3.9.5.3 Convective SIGMET bulletins are issued for the western (W), central (C), and eastern (E) United States. (Convective SIGMETs are not issued for Alaska or Hawaii.) The areas are separated at 87 and 107 degrees west longitude with sufficient overlap to cover most cases when the phenomenon crosses the boundaries. Bulletins are issued hourly at H+55. Special bulletins are issued at any time as required and updated at H+55. If no criteria meeting convective SIGMET requirements are observed or forecasted, the message "CONVECTIVE SIGMET... NONE" will be issued for each area at H+55. Individual convective SIGMETs for each area (W, C, E) are numbered sequentially from number one each day, beginning at 00Z. A convective SIGMET for a continuing phenomenon will be reissued every hour at H+55 with a new number. The text of the bulletin consists of either an observation and a forecast or just a forecast. The forecast is valid for up to 2 hours.

EXAMPLE−
CONVECTIVE SIGMET 44C
VALID UNTIL 1455Z
AR TX OK
FROM 40NE ADM-40ESE MLC-10W TXK-50WNW LFK-40ENE SJT-40NE ADM
AREA TS MOV FROM 26025KT. TOPS ABV FL450.
OUTLOOK VALID 061455-061855
FROM 60WSW OKC-MLC-40N TXK-40WSW IGB-VUZ-MGM-HRV-60S BTR-40N
IAH-60SW SJT-40ENE LBB-60WSW OKC
WST ISSUANCES EXPD. REFER TO MOST RECENT ACUS01 KWNS FROM STORM PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS

FIG GEN 3.5−5
SIGMET Locations – Contiguous U.S.

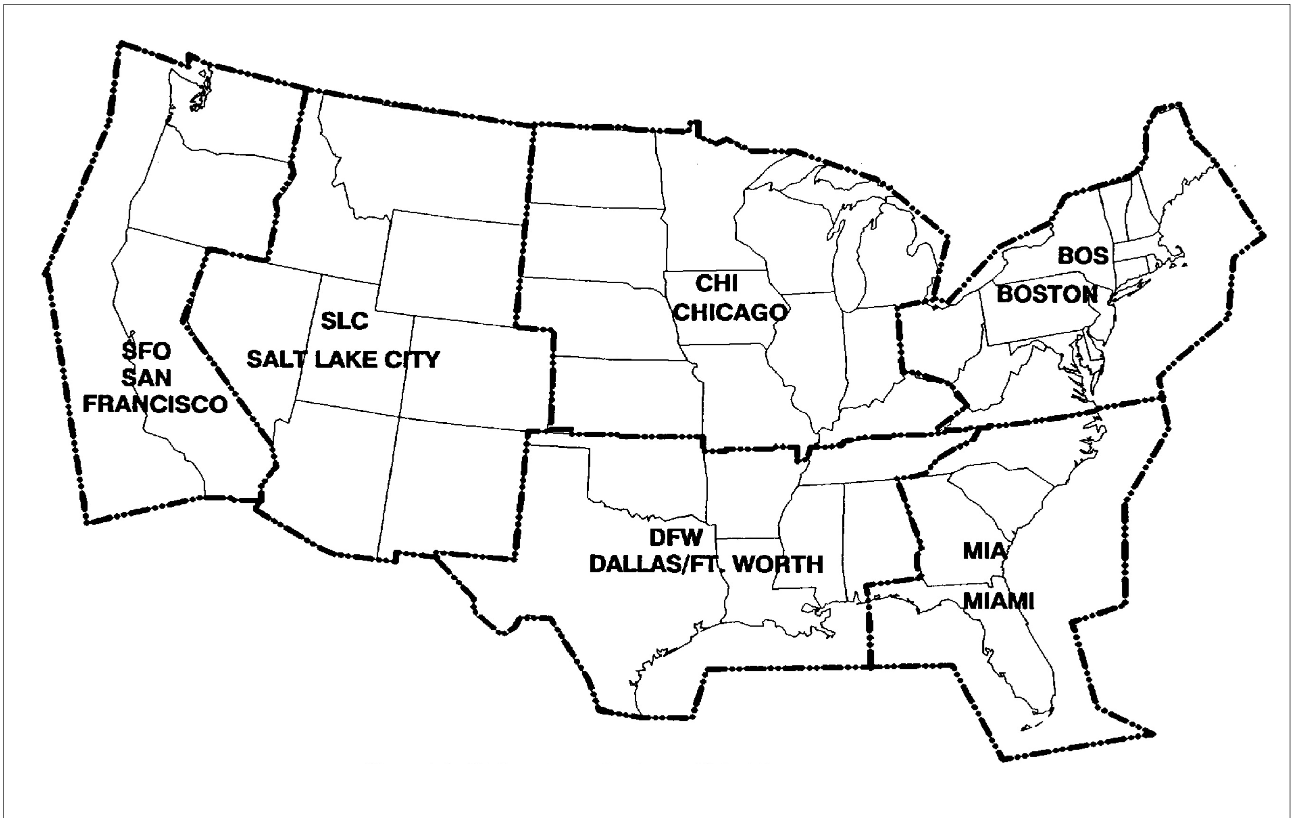
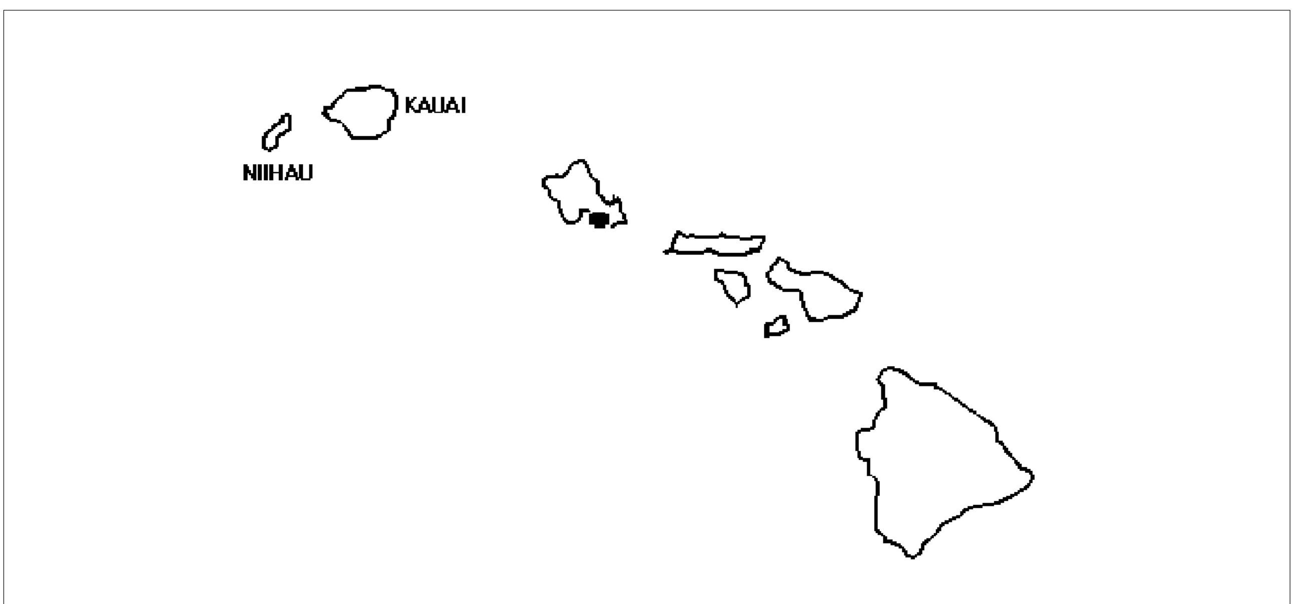


FIG GEN 3.5−6
Hawaii Area Forecast Locations



3.9.6 AIRMET. An AIRMET is a concise description of the occurrence or expected occurrence of specified en route weather phenomena that may affect the safety of aircraft operations, but at intensities lower than those which require the issuance of a SIGMET.

3.9.6.1 AIRMETS contain details about Instrument Flight Rule (IFR) conditions, extensive mountain obscuration, turbulence, strong surface winds, icing, and freezing levels. Unscheduled updates and corrections are issued as necessary.

3.9.6.2 AIRMETs:

a) Are intended to inform all pilots, but especially Visual Flight Rules pilots and operators of sensitive aircraft, of potentially hazardous weather phenomena.

b) Are issued on a scheduled basis every 6 hours, except every 8 hours in Alaska. Unscheduled updates and corrections are issued as necessary.

c) Are intended for dissemination to all pilots in the preflight and en route phase of flight to enhance safety. En route, AIRMETs are available over Flight Service frequencies. Over the contiguous U.S., AIRMETs are also available on equipment intended to display weather and other non−air traffic control−related flight information to pilots using the Flight Information Service−Broadcast (FIS−B). In Alaska and Hawaii, AIRMETs are broadcast on air traffic frequencies.

d) Are issued for the contiguous U.S., Alaska, and Hawaii. No AIRMETs are issued for U.S. Oceanic FIRs in the Gulf of America, Caribbean, Western Atlantic and Pacific Oceans.

TBL GEN 3.5−3

U.S. AIRMET Issuance Time and Frequency

Product Type	Issuance Time	Issuance Frequency
AIRMETs over the Contiguous U.S.	0245, 0845, 1445, 2045 UTC	Every 6 hours
AIRMETs over Alaska	0515, 1315, 2115 UTC (standard time) 0415, 1215, 2015 UTC (Daylight savings time)	Every 8 hours
AIRMETs over Hawaii	0400, 1000, 1600, 2200 UTC	Every 6 hours

3.9.6.3 AIRMETs over the Contiguous U.S.:

a) Are displayed graphically on websites, such as aviationweather.gov and 1800wxbrief.com, and equipment receiving FIS−B information.

b) Provide a higher forecast resolution than AIRMETs issued in text format.

c) Are valid at discrete times no more than 3 hours apart for a period of up to 12 hours into the future (for example; 00, 03, 06, 09, and 12 hours). Additional forecasts may be inserted during the first 6 hours (for example; 01, 02, 04, and 05). 00−hour represents the initial conditions, and the subsequent graphics depict the area affected by the particular hazard at that valid time. Forecasts valid at 00 through 06 hours correspond to the text AIRMET bulletin.

d) Depict the following en route aviation weather hazards:

1) Instrument flight rule conditions (ceiling < 1000’ and/or surface visibility <3 miles).

2) Widespread mountain obscuration.

3) Moderate icing.

4) Freezing levels.

5) Moderate turbulence.

meteorological reasoning and technical information for the aviation community. SPC may enhance a Public Tornado Watch Notification Message by using the words "THIS IS A PARTICULARLY DANGEROUS SITUATION" when there is a likelihood of multiple strong (damage of EF2 or EF3) or violent (damage of EF4 or EF5) tornadoes.

3.9.7.4 Public severe thunderstorm and tornado watch notification messages were formerly known as the Severe Weather Watch Bulletins (WW). The NWS no longer uses that title or acronym for this product but retains WW in the product header for processing by weather data systems.

EXAMPLE−
Example of a Public Tornado Watch Notification Message:
WWUS20 KWNS 050550
SEL2
SPC WW 051750
URGENT - IMMEDIATE BROADCAST REQUESTED
TORNADO WATCH NUMBER 243
NWS STORM PREDICTION CENTER NORMAN OK
1250 AM CDT MON MAY 5 2011
THE NWS STORM PREDICTION CENTER HAS ISSUED A
**TORNADO WATCH FOR PORTIONS OF*
WESTERN AND CENTRAL ARKANSAS
SOUTHERN MISSOURI
FAR EASTERN OKLAHOMA
**EFFECTIVE THIS MONDAY MORNING FROM 1250 AM UNTIL 600 AM CDT.*
...THIS IS A PARTICULARLY DANGEROUS SITUATION...
**PRIMARY THREATS INCLUDE*
NUMEROUS INTENSE TORNADOES LIKELY
NUMEROUS SIGNIFICANT DAMAGING WIND GUSTS TO 80 MPH LIKELY
NUMEROUS VERY LARGE HAIL TO 4 INCHES IN DIAMETER LIKELY
THE TORNADO WATCH AREA IS APPROXIMATELY ALONG AND 100 STATUTE MILES EAST AND WEST OF A LINE FROM 15 MILES WEST NORTHWEST OF FORT LEONARD WOOD MISSOURI TO 45 MILES SOUTHWEST OF HOT SPRINGS ARKANSAS. FOR A COMPLETE DEPICTION OF THE WATCH SEE THE ASSOCIATED WATCH OUTLINE UPDATE (WOUS64 KWNS WOU2).
REMEMBER...A TORNADO WATCH MEANS CONDITIONS ARE FAVORABLE FOR TORNADOES AND SEVERE THUNDERSTORMS IN AND CLOSE TO THE WATCH AREA. PERSONS IN THESE AREAS SHOULD BE ON THE LOOKOUT FOR THREATENING WEATHER CONDITIONS AND LISTEN FOR LATER STATEMENTS AND POSSIBLE WARNINGS.
OTHER WATCH INFORMATION...THIS TORNADO WATCH REPLACES TORNADO WATCH NUMBER 237. WATCH NUMBER 237 WILL NOT BE IN EFFECT AFTER
1250 AM CDT. CONTINUE...WW 239...WW 240...WW 241...WW 242...
DISCUSSION...SRN MO SQUALL LINE EXPECTED TO CONTINUE EWD...WHERE LONG/HOOKED HODOGRAPHS SUGGEST THREAT FOR EMBEDDED SUPERCELLS/POSSIBLE TORNADOES. FARTHER S...MORE WIDELY SCATTERED
SUPERCELLS WITH A THREAT FOR TORNADOES WILL PERSIST IN VERY STRONGLY DEEP SHEARED/LCL ENVIRONMENT IN AR.
AVIATION...TORNADOES AND A FEW SEVERE THUNDERSTORMS WITH HAIL SURFACE AND ALOFT TO 4 INCHES. EXTREME TURBULENCE AND SURFACE WIND GUSTS TO 70 KNOTS. A FEW CUMULONIMBI WITH MAXIMUM TOPS TO 500. MEAN STORM MOTION VECTOR 26045.

3.9.7.5 Status reports are issued as needed to show progress of storms and to delineate areas no longer under the threat of severe storm activity. Cancellation bulletins are issued when it becomes evident that no severe weather will develop or that storms have subsided and are no longer severe.

3.9.8 Center Weather Advisories (CWA)

3.9.8.1 CWAs are unscheduled inflight, flow control, air traffic, and air crew advisory. By nature of its short lead time, the CWA is not a flight planning product. It is generally a nowcast for conditions beginning within the next two hours. CWAs will be issued:

a) As a supplement to an existing SIGMET, Convective SIGMET or AIRMET.

b) When an Inflight Advisory has not been issued but observed or expected weather conditions meet SIGMET/AIRMET criteria based on current pilot reports and reinforced by other sources of information about existing meteorological conditions.

c) When observed or developing weather conditions do not meet SIGMET, Convective SIGMET, or AIRMET criteria; e.g., in terms of intensity or area coverage, but current pilot reports or other weather information sources indicate that existing or anticipated meteorological phenomena will adversely affect the safe flow of air traffic within the ARTCC area of responsibility.

3.9.8.2 The following example is a CWA issued from the Kansas City, Missouri, ARTCC. The "3" after ZKC in the first line denotes this CWA has been issued for the third weather phenomena to occur for the day. The "301" in the second line denotes the phenomena number again (3) and the issuance number (01) for this phenomena. The CWA was issued at 2140Z and is valid until 2340Z.

EXAMPLE−
ZKC3 CWA 032140
ZKC CWA 301 VALID UNTIL 032340
ISOLD SVR TSTM over KCOU MOVG SWWD 10 KTS ETC.

4. Categorical Ceiling and Visibility Conditions

4.1 Categorical terms, describing either reported or forecast general ceiling and visibility conditions, are defined as follows:

4.1.1 LIFR (Low IFR). Ceiling less than 500 feet and/or visibility less than 1 mile.

4.1.2 IFR. Ceiling 500 to less than 1,000 feet and/or visibility 1 to less than 3 miles.

4.1.3 MVFR (Marginal VFR). Ceiling 1,000 or 3,000 feet and/or visibility 3 to 5 miles inclusive.

4.1.4 VFR. Ceiling greater than 3,000 feet and visibility greater than 5 miles; includes sky clear.

4.2 The cause of LIFR, IFR, or MVFR is indicated by either ceiling or visibility restrictions or both. The contraction "CIG" and/or weather and obstruction to vision symbols are used. If winds or gusts of 25 knots or greater are forecast for the outlook period, the word "WIND" is also included for all categories, including VFR.

EXAMPLE−
1. *LIFR CIG−low IFR due to low ceiling.*

2. *IFR FG−IFR due to visibility restricted by fog.*

3. *MVFR CIG HZ FU−marginal VFR due both to ceiling and to visibility restricted by haze and smoke.*

4. *IFR CIG RA WIND−IFR due both to low ceiling and to visibility restricted by rain; wind expected to be 25 knots or greater.*

5. Inflight Weather Advisory Broadcasts

ARTCCs broadcast a Convective SIGMET, SIGMET, AIRMET (except in the contiguous U.S.), Urgent Pilot Report, or CWA alert once on all frequencies, except emergency frequencies, when any part of the area described is within 150 miles of the airspace under their jurisdiction. These broadcasts advise pilots of the availability of hazardous weather advisories and to contact the nearest flight service facility for additional details.

EXAMPLE−
1. *Attention all aircraft, SIGMET Delta Three, from Myton to Tuba City to Milford, severe turbulence and severe clear icing below one zero thousand feet. Expected to continue beyond zero three zero zero zulu.*

2. *Attention all aircraft, Convective SIGMET Two Seven Eastern. From the vicinity of Elmira to Phillipsburg. Scattered embedded thunderstorms moving east at one zero knots. A few intense level five cells, maximum tops four five zero.*

3. *Attention all aircraft, Kansas City Center weather advisory one zero three. Numerous reports of moderate to severe icing from eight to niner thousand feet in a three zero mile radius of St. Louis. Light or negative icing reported from four thousand to one two thousand feet remainder of Kansas City Center area.*

b) TBL GEN 3.5−4 lists the text and graphical products available through FIS−B and provided free−of−charge. Detailed information concerning FIS−B meteorological products can be found in FAA−H−8083−28, Aviation Weather Handbook and AC 00−63, Use of Cockpit Displays of Digital Weather and Aeronautical Information. Information on Special Use Airspace (SUA), Temporary Flight Restriction (TFR), and Notice to Airmen (NOTAM) products can be found in Chapters ENR 1 and ENR 5 of this manual.

c) Users of FIS−B should familiarize themselves with the operational characteristics and limitations of the system, including: system architecture; service environment; product lifecycles; modes of operation; and indications of system failure.

d) FIS−B products are updated and transmitted at specific intervals based primarily on product issuance criteria. Update intervals are defined as the rate at which the product data is available from the source for transmission. Transmission intervals are defined as the amount of time within which a new or updated product transmission must be completed and/or the rate or repetition interval at which the product is rebroadcast. Update and transmission intervals for each product are provided in TBL GEN 3.5−4.

NOTE−
The NOTAM−D and NOTAM−FDC products broadcast via FIS−B are limited to those issued or effective within the past 30 days. Except for TFRs, NOTAMs older than 30 days are not provided. The pilot in command is responsible for reviewing all necessary information prior to flight.

e) Where applicable, FIS−B products include a look−ahead range expressed in nautical miles (NM) for three service domains: Airport Surface; Terminal Airspace; and Enroute/Gulf−of−America. TBL GEN 3.5−5 provides service domain availability and look−ahead ranging for each FIS−B product.

f) Prior to using this capability, users should familiarize themselves with the operation of FIS−B avionics by referencing the applicable User's Guides. Guidance concerning the interpretation of information displayed should be obtained from the appropriate avionics manufacturer.

g) FIS−B malfunctions not attributed to aircraft system failures or covered by active NOTAM should be reported by radio or telephone to the nearest FSS facility, or by sending an email to the ADS−B help desk at adsb@faa.gov. Reports should include:

1) Condition observed;

2) Date and time of observation;

3) Altitude and location of observation;

4) Type and call sign of the aircraft; and

5) Type and software version of avionics system.

6.2 Non−FAA FIS Systems. Several commercial vendors also provide customers with FIS data over both the aeronautical spectrum and on other frequencies using a variety of data link protocols. In some cases, the vendors provide only the communications system that carries customer messages, such as the Aircraft Communications Addressing and Reporting System (ACARS) used by many air carrier and other operators.

6.2.1 Operators using non−FAA FIS data for inflight weather and other operational information should ensure that the products used conform to FAA/NWS standards. Specifically, aviation weather and NAS status information should meet the following criteria:

6.2.1.1 The products should be either FAA/NWS "accepted" aviation weather reports or products, or based on FAA/NWS accepted aviation weather reports or products. If products are used which do not meet this criteria, they should be so identified. The operator must determine the applicability of such products to their particular flight operations.

6.2.1.2 In the case of a weather product which is the result of the application of a process which alters the form, function or content of the base FAA/NWS accepted weather product(s), that process, and any limitations to the application of the resultant product, should be described in the vendor's user guidance material. An example would be a NEXRAD radar composite/mosaic map, which has been modified by changing the scaling resolution. The methodology of assigning reflectivity values to the resultant image components should be described in the vendor's guidance material to ensure that the user can accurately interpret the displayed data.

TBL GEN 3.5−4

FIS−B Over UAT Product Update and Transmission Intervals

Product	Update Interval[1]	Transmission Interval (95%)[2]	Basic Product
AIRMET	As Available	5 minutes	Yes
AWW/WW	As Available, then at 15 minute intervals for 1 hour	5 minutes	No
Ceiling	As Available	10 minutes	No
Convective SIGMET	As Available, then at 15 minute intervals for 1 hour	5 minutes	Yes
D−ATIS	As Available	1 minute	No
Echo Top	5 minutes	5 minutes	No
METAR/SPECI	1 minute (where available), As Available otherwise	5 minutes	Yes
MRMS NEXRAD (CONUS)	2 minutes	15 minutes	Yes
MRMS NEXRAD (Regional)	2 minutes	2.5 minutes	Yes
NOTAMs−D/FDC	As Available	10 minutes	Yes
NOTAMs−TFR	As Available	10 minutes	Yes
PIREP	As Available	10 minutes	Yes
SIGMET	As Available, then at 15 minute intervals for 1 hour	5 minutes	Yes
SUA Status	As Available	10 minutes	Yes
TAF/AMEND	6 Hours (±15 minutes)	10 minutes	Yes
Temperature Aloft	12 Hours (±15 minutes)	10 minutes	Yes
TWIP	As Available	1 minute	No
Winds aloft	12 Hours (±15 minutes)	10 minutes	Yes
Lightning strikes [3]	5 minutes	5 minutes	Yes
Turbulence [3]	1 minute	15 minutes	Yes
Icing, Forecast Potential (FIP) [3]	60 minutes	15 minutes	Yes
Cloud tops [3]	30 minutes	15 minutes	Yes
1 Minute AWOS [3]	1 minute	10 minutes	No
Graphical−AIRMET [3]	As Available	5 minutes	Yes
Center Weather Advisory (CWA) [3]	As Available	10 minutes	Yes
Temporary Restricted Areas (TRA)	As Available	10 minutes	Yes
Temporary Military Operations Areas (TMOA)	As Available	10 minutes	Yes

[1] The Update Interval is the rate at which the product data is available from the source.

ENR 0.1 Table of Contents to Part 2

ENR 7. OCEANIC OPERATIONS

ENR 8. UNMANNED AIRCRAFT SYSTEMS (UAS)

ENR 1. GENERAL RULES AND PROCEDURES

ENR 1.1 General Rules

1. Differences between National and International Rules and Procedures

1.1 The air traffic rules and procedures applicable to air traffic in U.S. Class A, B, C, D and E airspace conform with Annexes 2 and 11 to the Convention on International Civil Aviation and to those portions applicable to aircraft in the Procedures for Air Navigation Services − Rules of the Air and Air Traffic Services (Doc 4444 − RAC/501/10) and to the Regional Supplementary Procedures (DOC 7030) applicable to the NAM, NAT, CAR and PAC Regions, except as noted in the cases below. All differences have been registered with the International Civil Aviation Organization.

1.1.1 Annex 2 − Rules of the Air

NOTE−
See GEN 1.7.

1.1.2 Annex 11 − Air Traffic Services

NOTE−
See GEN 1.7.

1.1.3 Procedures for Air Navigation Services − Rules of the Air (DOC 4444) and Air Traffic Services (RAC/501/10)

NOTE−
See GEN 1.7.

1.1.4 Regional Supplementary Procedures (Doc 7030)

NOTE−
See GEN 1.7.

2. Airport Operations

2.1 General

2.1.1 Increased traffic congestion, aircraft in climb and descent attitudes, and pilots preoccupation with cockpit duties are some factors that increase the hazardous accident potential near the airport. The situation is further compounded when the weather is marginal; that is, just meeting VFR requirements. Pilots must be particularly alert when operating in the vicinity of an airport. This section defines some rules, practices, and procedures that pilots should be familiar with, and adhere to, for safe airport operations.

2.1.2 Each airport operator regularly serving scheduled air carriers has put into use security measures designed to prevent or deter unauthorized persons from having access to "Air Operations Area." The "Air Operations Area" means any area of the airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. Pilots are encouraged to obtain airport security instructions by posted signs or radio communication.

3. Airports With an Operating Control Tower

3.1 Towers have been established to provide for a safe, orderly, and expeditious flow of traffic on and in the vicinity of an airport. When the responsibility has been so delegated, towers also provide for the separation of IFR aircraft in the terminal areas (Approach Control).

3.2 When operating at an airport where traffic control is being exercised by a control tower, pilots are required to maintain two−way radio contact with the tower while operating within the Class B, Class C, and Class D surface area unless the tower authorizes otherwise. Initial callup should be made about 15 miles from the airport. Unless there is a good reason to leave the tower frequency before exiting the Class B, Class C, and Class D surface area, it is a good operating practice to remain on the tower frequency for the purpose of receiving traffic information. In the interest of reducing tower frequency congestion, pilots are reminded that it is not necessary to request permission to leave the tower frequency once outside of Class B, Class C, and Class D surface area. Not all airports with an operating control tower will have Class D airspace. These airports do not have weather reporting which is a requirement for surface−based controlled airspace, previously known as a control zone. The controlled airspace over these airports will normally begin at 700 feet or 1,200 feet above ground level and can be determined from the visual aeronautical charts. Pilots are expected to use good operating practices and communicate with the control tower as described in this section.

3.3 When necessary, the tower controller will issue clearances or other information for aircraft to generally follow the desired flight path (traffic pattern) when flying in the Class D airspace, and the proper taxi routes when operating on the ground. If not otherwise authorized or directed by the tower, pilots approach to land in an airplane must circle the airport to the left, and pilots approaching to land in a helicopter must avoid the flow of fixed−wing traffic. However, an appropriate clearance must be received from the tower before landing.

3.4 The following terminology for the various components of a traffic pattern has been adopted as standard for use by control towers and pilots:

3.4.1 Upwind leg. A flight path that begins after departure and continues straight ahead along the extended runway centerline. Upwind leg is an extension of departure and is used when issuing control instructions for separation, spacing, or sequencing.

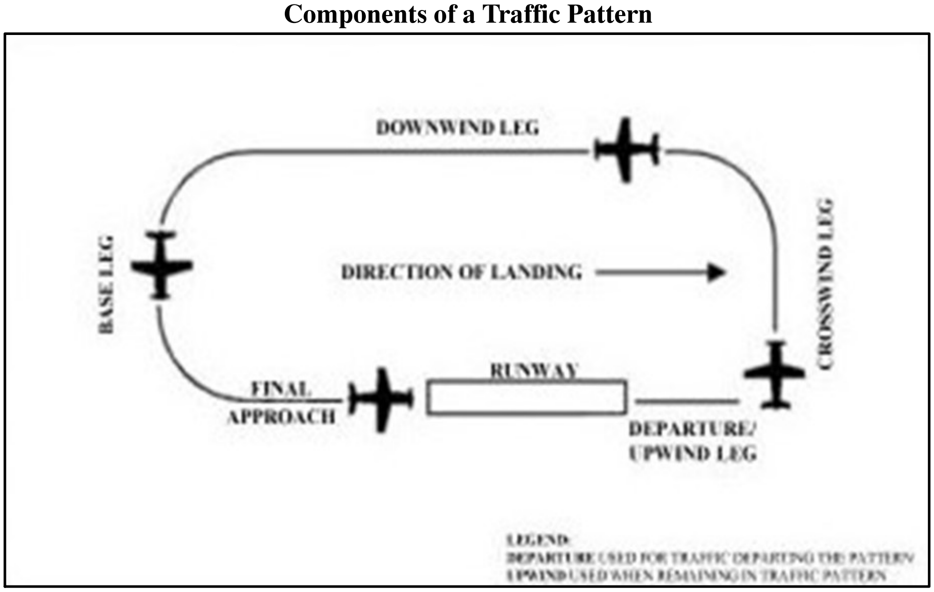
3.4.2 Crosswind leg. A flight path at right angles to the landing runway off its takeoff end.

3.4.3 Downwind leg. A flight path parallel to the landing runway in the opposite direction of landing.

3.4.4 Base leg. A flight path at right angles to the landing runway off its approach end and extending from the downwind leg to the intersection of the extended runway centerline.

3.4.5 Final approach. A flight path in the direction of landing along the extended runway centerline from the base leg to the runway.

FIG ENR 1.1−1
Components of a Traffic Pattern



NOTE−
FIG ENR 1.1−1 is intended only to illustrate terminology used in identifying various components of a traffic pattern. It should not be used as a reference or guide on how to enter a traffic pattern.

3.5 Many towers are equipped with a tower radar display. The radar uses are intended to enhance the effectiveness and efficiency of the local control, or tower, position. They are not intended to provide radar services or benefits to pilots except as they may accrue through a more efficient tower operation. The four basic uses are:

3.5.1 To determine an aircraft's exact location. This is accomplished by radar identifying the VFR aircraft through any of the techniques available to a radar position; such as, having the aircraft ident. Once identified, the aircraft's position and spatial relationship to other aircraft can be quickly determined, and standard instructions regarding VFR operation in the aircraft traffic area will be issued. Once initial radar identification of a VFR aircraft has been established and the appropriate instructions have been issued, radar monitoring may be discontinued; the reason being that the local controller's primary means of surveillance in VFR conditions is usually scanning the airport and local area.

3.5.2 To provide radar traffic advisories. Radar traffic advisories may be provided to the extent that the local controller is able to monitor the radar display. Local control has primary control responsibilities to the aircraft operating on the runways which will normally supersede radar monitoring duties.

3.5.3 To provide a direction or suggested heading. The local controller may provide pilots flying VFR with generalized instructions which will facilitate operations; e.g., "PROCEED SOUTHWEST BOUND, ENTER A RIGHT DOWNWIND RUNWAY THREE ZERO;" or provide a suggested heading to establish radar identification or as an advisory aid to navigation; e.g., "SUGGESTED HEADING TWO TWO ZERO, FOR RADAR IDENTIFICATION." In both cases, the instructions are advisory aids to the pilot flying VFR and are not radar vectors. PILOTS HAVE COMPLETE DISCRETION REGARDING ACCEPTANCE OF THE SUGGESTED HEADING OR DIRECTION AND HAVE SOLE RESPONSIBILITY FOR SEEING AND AVOIDING OTHER AIRCRAFT.

3.5.4 To provide information and instructions to aircraft operating within Class D airspace. In an example of this situation, the local controller would use the radar to advise a pilot on an extended downwind when to turn base leg.

NOTE−
The above tower radar applications are intended to augment the standard functions of the local control position. There is no controller requirement to maintain constant radar identification and, in fact, such a requirement could compromise the local controller's ability to visually scan the airport and local area to meet FAA responsibilities to the aircraft operating on the runways and within Class D airspace. Normally, pilots will not be advised of being in radar contact since that continued status cannot be guaranteed and since the purpose of the radar identification is not to establish a link for the provision of radar services.

3.6 A few of the radar−equipped towers are authorized to use the radar to ensure separation between aircraft in specific situations, while still others may function as limited radar approach controls. The various radar uses are strictly a function of FAA operational need. The facilities may be indistinguishable to pilots since they are all referred to as tower and no publication lists the degree of radar use. THEREFORE, WHEN IN COMMUNICATION WITH A TOWER CONTROLLER WHO MAY HAVE RADAR AVAILABLE, DO NOT ASSUME THAT CONSTANT RADAR MONITORING AND COMPLETE ATC RADAR SERVICES ARE BEING PROVIDED.

4. Traffic Patterns

4.1 It is recommended that aircraft enter the airport traffic pattern at one of the following altitudes listed below. These altitudes should be maintained unless another traffic pattern altitude is published in the Chart Supplement or unless otherwise required by the applicable distance from cloud criteria (14 CFR Section 91.155). (See FIG ENR 1.1−2 and FIG ENR 1.1−3.):

4.1.1 Propeller−driven aircraft enter the traffic pattern at 1,000 feet above ground level (AGL).

4.1.2 Large and turbine−powered aircraft enter the traffic pattern at an altitude of not less than 1,500 feet AGL or 500 feet above the established pattern altitude.

4.1.3 Helicopters operating in the traffic pattern may fly a pattern similar to the fixed−wing aircraft pattern, but at a lower altitude (500 AGL) and closer to the runway. This pattern may be on the opposite side of the runway from fixed−wing traffic when airspeed requires or for practice power−off landings (autorotation) and if local policy permits. Landings not to the runway must avoid the flow of fixed wing traffic.

4.2 A pilot may vary the size of the traffic pattern depending on the aircraft's performance characteristics. Pilots of en route aircraft should be constantly alert for aircraft in traffic patterns and avoid these areas whenever possible.

4.3 Unless otherwise indicated, all turns in the traffic pattern must be made to the left, except for helicopters, as applicable.

4.4 On Sectional, Aeronautical, and VFR Terminal Area Charts, right traffic patterns are indicated at public−use and joint−use airports with the abbreviation "RP" (for Right Pattern), followed by the appropriate runway number(s) at the bottom of the airport data block.

EXAMPLE−
RP 9, 18, 22R

NOTE−
1. *Pilots are encouraged to use the standard traffic pattern. However, those pilots who choose to execute a straight−in approach, maneuvering for and execution of the approach should not disrupt the flow of arriving and departing traffic. Likewise, pilots operating in the traffic pattern should be alert at all times for aircraft executing straight−in approaches.*

REFERENCE−
AC 90−66, Non−Towered Airport Flight Operations

2. **RP indicates special conditions exist and refers pilots to the Chart Supplement.*

3. *Right traffic patterns are not shown at airports with full−time control towers.*

4.5 Wind conditions affect all airplanes in varying degrees. FIG ENR 1.1−4 is an example of a chart used to determine the headwind, crosswind, and tailwind components based on wind direction and velocity relative to the runway. Pilots should refer to similar information provided by the aircraft manufacturer when determining these wind components.

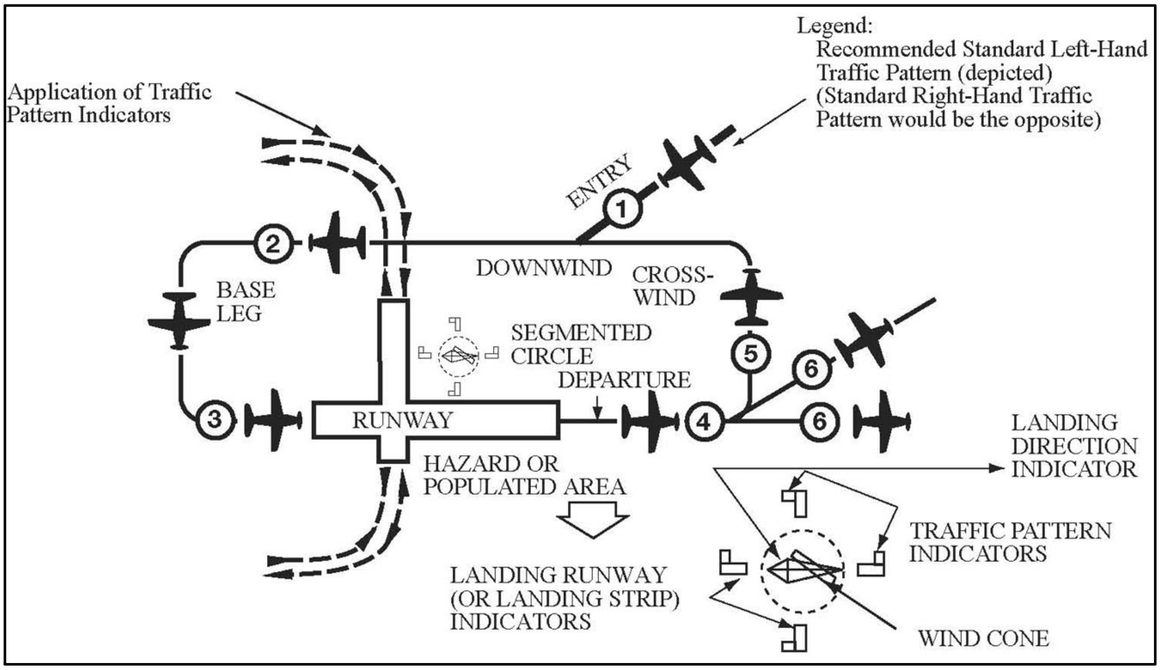
4.6 Unexpected Maneuvers in the Airport Traffic Pattern

4.6.1 There have been several incidents in the vicinity of controlled airports that were caused primarily by aircraft executing unexpected maneuvers. ATC service is based upon observed or known traffic and airport conditions. Controllers establish the sequence of arriving and departing aircraft by requiring them to adjust flight as necessary to achieve proper spacing. These adjustments can only be based on observed traffic, accurate pilot reports, and anticipated aircraft maneuvers. Pilots are expected to cooperate so as to preclude disruption of traffic flow or creation of conflicting patterns. The pilot in command of an aircraft is directly responsible for and is the final authority as to the operation of that aircraft.

4.6.2 On occasion it may be necessary for pilots to maneuver their aircraft to maintain spacing with the traffic they have been sequenced to follow. The controller can anticipate minor maneuvering such as shallow "S" turns. The controller cannot, however, anticipate a major maneuver such as a 360−degree turn. If a pilot makes a 360−degree turn after obtaining a landing sequence, the result is usually a gap in the landing interval and more importantly it causes a chain reaction which may result in a conflict with following traffic and interruption of the sequence established by the tower or approach controller. Should a pilot decide to make maneuvering turns to maintain spacing behind a preceding aircraft, the pilot should always advise the controller if at all possible. Except when requested by the controller or in emergency situations, a 360−degree turn should never be executed in the traffic pattern or when receiving radar service without first advising the controller.

FIG ENR 1.1−2

Traffic Pattern Operations
Single Runway



EXAMPLE−
KEY TO TRAFFIC PATTERN OPERATIONS

1. *Enter pattern in level flight, abeam the midpoint of the runway, at pattern altitude.*

2. *Maintain pattern altitude until abeam approach end of the landing runway on downwind leg.*

3. *Complete turn to final at least $^1/_4$ mile from the runway.*

4. *Continue straight ahead until beyond departure end of runway.*

5. *If remaining in the traffic pattern, commence turn to crosswind leg beyond the departure end of the runway within 300 feet of pattern altitude.*

6. *If departing the traffic pattern, continue straight out, or exit with a 45 degree turn (to the left when in a left−hand traffic pattern; to the right when in a right−hand traffic pattern) beyond the departure end of the runway, after reaching pattern altitude.*

38.5 Airport Surface Detection Equipment (ASDE−X)/Airport Surface Surveillance Capability (ASSC)

38.5.1 ASDE−X/ASSC is a multi−sensor surface surveillance system the FAA has acquired for airports in the United States. This system provides high resolution, short−range, clutter free surveillance information about aircraft and vehicles, both moving and fixed, located on or near the surface of the airport's runways and taxiways under all weather and visibility conditions. The system consists of:

38.5.1.1 A Primary Radar System. ASDE−X/ASSC system coverage includes the airport surface and the airspace 5 miles from the arrival and departure ends of the runway and up to 200 feet above the surface. Typically located on the control tower or other strategic location on the airport, the Primary Radar antenna is able to detect and display aircraft that are not equipped with or have malfunctioning transponders or ADS−B.

38.5.1.2 Interfaces. ASDE−X/ASSC contains an automation interface for flight identification via all automation platforms and interfaces with the terminal radar for position information.

38.5.1.3 ASDE−X/ASSC Automation. A Multi−sensor Data Processor (MSDP) combines all sensor reports into a single target which is displayed to the air traffic controller.

38.5.1.4 Air Traffic Control Tower Display. A high resolution, color monitor in the control tower cab provides controllers with a seamless picture of airport operations on the airport surface.

38.5.2 The combination of data collected from the multiple sensors ensures that the most accurate information about aircraft location is received in the tower, thereby increasing surface safety and efficiency.

38.5.3 The following facilities are operational with ASDE−X:

TBL ENR 1.1−2

BWI	Baltimore Washington International
BOS	Boston Logan International
BDL	Bradley International
MDW	Chicago Midway
ORD	Chicago O'Hare International
CLT	Charlotte Douglas International
DFW	Dallas/Fort Worth International
DEN	Denver International
DTW	Detroit Metro Wayne County
FLL	Fort Lauderdale/Hollywood Intl
MKE	General Mitchell International
IAH	George Bush International
ATL	Hartsfield−Jackson Atlanta Intl
HNL	Honolulu International
JFK	John F. Kennedy International
SNA	John Wayne−Orange County
LGA	LaGuardia
STL	Lambert St. Louis International
LAS	Las Vegas Harry Reid International
LAX	Los Angeles International
SDF	Louisville International
MEM	Memphis International
MIA	Miami International
MSP	Minneapolis St. Paul International
EWR	Newark International
MCO	Orlando International
PHL	Philadelphia International
PHX	Phoenix Sky Harbor International
DCA	Ronald Reagan Washington National
SAN	San Diego International
SLC	Salt Lake City International
SEA	Seattle−Tacoma International
PVD	Theodore Francis Green State
IAD	Washington Dulles International
HOU	William P. Hobby International

38.5.4 The following facilities have been projected to receive ASSC:

TBL ENR 1.1−3

SFO	San Francisco International
CLE	Cleveland−Hopkins International
MCI	Kansas City International

CVG	Cincinnati/Northern Kentucky Intl	PIT	Pittsburgh International
PDX	Portland International	ANC	Ted Stevens Anchorage International
MSY	Louis Armstrong New Orleans Intl	ADW	Joint Base Andrews AFB

38.6 Radar Availability

38.6.1 FAA radar units operate continuously at the locations shown in the Chart Supplement, and their services are available to all pilots, both civil and military. Contact the associated FAA control tower or ARTCC on any frequency guarded for initial instructions, or in an emergency, any FAA facility for information on the nearest radar service.

38.7 Transponder and ADS−B Out Operation

38.7.1 General

38.7.1.1 Pilots should be aware that proper application of transponder and ADS-B operating procedures will provide both VFR and IFR aircraft with a higher degree of safety while operating on the ground and airborne. Transponder/ADS-B panel designs differ; therefore, a pilot should be thoroughly familiar with the operation of their particular equipment to maximize its full potential. ADS-B Out, and transponders with altitude reporting mode turned ON (Mode C or S), substantially increase the capability of surveillance systems to see an aircraft. This provides air traffic controllers, as well as pilots of suitably equipped aircraft (TCAS and ADS-B In), increased situational awareness and the ability to identify potential traffic conflicts. Even VFR pilots who are not in contact with ATC will be afforded greater protection from IFR aircraft and VFR aircraft that are receiving traffic advisories. Nevertheless, pilots should never relax their visual scanning for other aircraft, and should include the ADS-B In display (if equipped) in their normal traffic scan.

38.7.1.2 ATCRBS is similar to and compatible with military coded radar beacon equipment. Civil Mode A is identical to military Mode 3.

38.7.1.3 Transponder and ADS-B operations on the ground. Civil and military aircraft should operate with the transponder in the altitude reporting mode (consult the aircraft's flight manual to determine the specific transponder position to enable altitude reporting) and ADS-B Out transmissions enabled at all airports, any time the aircraft is positioned on any portion of the airport movement area. This includes all defined taxiways and runways. Pilots must pay particular attention to ATIS and airport diagram notations, General Notes (included on airport charts), and comply with directions pertaining to transponder and ADS-B usage. Generally, these directions are:

a) Departures. Select the transponder mode which allows altitude reporting and enable ADS-B during pushback or taxi-out from parking spot. Select TA or TA/RA (if equipped with TCAS) when taking the active runway.

b) Arrivals. If TCAS equipped, deselect TA or TA/RA upon leaving the active runway, but continue transponder and ADS−B transmissions in the altitude reporting mode. Select STBY or OFF for transponder and ADS−B upon arriving at the aircraft's parking spot or gate.

38.7.1.4 Transponder and ADS-B Operations While Airborne.

a) Unless otherwise requested by ATC, aircraft equipped with an ATC transponder maintained in accordance with 14 CFR Section 91.413 MUST operate with this equipment on the appropriate Mode 3/A code, or other code as assigned by ATC, and with altitude reporting enabled whenever in controlled airspace. If practicable, aircraft SHOULD operate with the transponder enabled in uncontrolled airspace.

b) Aircraft equipped with ADS−B Out MUST operate with this equipment in the transmit mode at all times, unless otherwise requested by ATC.

38.7.1.5 Transponder and ADS−B Operation Under Visual Flight Rules (VFR)

a) Unless otherwise instructed by an ATC facility, adjust transponder/ADS−B to reply on Mode 3/A Code 1200 regardless of altitude.

b) When required to operate their transponder/ADS−B, pilots must always operate that equipment with altitude reporting enabled unless otherwise instructed by ATC or unless the installed equipment has not been tested and calibrated as required by 14 CFR Section 91.217. If deactivation is required, turn off altitude reporting.

c) When participating in a VFR standard formation flight that is not receiving ATC services, only the lead aircraft should operate its transponder and ADS−B Out and squawk code 1203. Once established in formation, all other aircraft should squawk standby and disable ADS−B transmissions.

NOTE−

1. *If the formation flight is receiving ATC services, pilots can expect ATC to direct all non-lead aircraft to STOP Squawk, and should not do so until instructed.*

2. *Firefighting aircraft not in contact with ATC may squawk 1255 in lieu of 1200 while en route to, from , or within the designated firefighting area(s).*

3. *VFR aircraft flying authorized SAR missions for the USAF or USCG may be advised to squawk 1277 in lieu of 1200 while en route to, from, or within the designated search area.*

4. *VFR gliders should squawk 1202 in lieu of 1200.*

REFERENCE−
FAA Order JO 7110.66, National Beacon Code Allocation Plan (NBCAP).

38.7.1.6 A pilot on an IFR flight who elects to cancel the IFR flight plan prior to reaching their destination, should adjust the transponder/ADS−B according to VFR operations.

38.7.1.7 If entering a U.S. OFFSHORE AIRSPACE AREA from outside the U.S., the pilot should advise on first radio contact with a U.S. radar ATC facility that such equipment is available by adding "transponder" or "ADS−B" (if equipped) to the aircraft identification.

38.7.1.8 It should be noted by all users of ATC transponders and ADS−B Out systems that the surveillance coverage they can expect is limited to "line of sight" with ground radar and ADS−B radio sites. Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range or loss of aircraft contact. Though ADS−B often provides superior reception at low altitudes, poor coverage from any surveillance system can be improved by climbing to a higher altitude.

NOTE−
Pilots should refer to AIP, ENR 1.1, paragraph 46., Automatic Dependent Surveillance − Broadcast Services (ADS−B) Services, for a complete description of operating limitations and procedures.

38.7.2 Transponder/ADS−B Code Designation

38.7.2.1 For ATC to utilize one of the 4096 discrete codes, a four−digit code designation will be used; for example, code 2102 will be expressed as "TWO ONE ZERO TWO."

NOTE−
Circumstances may occasionally require ATC to assign a non−discrete code; i.e., a code ending in "00."

REFERENCE−
FAA Order JO 7110.66, National Beacon Code Allocation Plan (NBCAP).

38.7.3 Automatic Altitude Reporting

38.7.3.1 Most transponders (Modes C and S) and all ADS−B Out systems are capable of automatic altitude reporting. This system converts aircraft altitude in 100−foot increments to coded digital information that is transmitted to the appropriate surveillance facility as well as to ADS−B In and TCAS systems.

38.7.3.2 Adjust the transponder/ADS−B to reply on the Mode 3/A code specified by ATC and with altitude reporting enabled, unless otherwise directed by ATC or unless the altitude reporting equipment has not been tested and calibrated as required by 14 CFR Section 91.217. If deactivation is required by ATC, turn off the altitude reporting feature of your transponder/ADS−B. An instruction by ATC to "STOP ALTITUDE SQUAWK, ALTITUDE DIFFERS BY (number of feet) FEET," may be an indication that the transmitted altitude information is incorrect, or that the aircraft's altimeter setting is incorrect. While an incorrect altimeter setting has no effect on the transmitted altitude information, it will cause the aircraft to fly at a true altitude different from the assigned altitude. When a controller indicates that an altitude readout is invalid, the pilot should verify that the aircraft altimeter is set correctly.

NOTE−
Altitude encoders are preset at standard atmospheric pressure. Local altimeter correction is applied by the surveillance facility before the altitude information is presented to ATC.

38.7.3.3 Pilots should report exact altitude or flight level to the nearest hundred foot increment when establishing initial contact with an ATC facility. Exact altitude or flight level reports on initial contact provide ATC with information that is required prior to using automatically reported altitude information for separation purposes. This will significantly reduce altitude verification requests.

38.7.4 IDENT Feature

38.7.4.1 Transponder/ADS−B Out equipment must be operated only as specified by ATC. Activate the "IDENT" feature only when requested by ATC.

38.7.5 Code Changes

38.7.5.1 When making routine code changes, pilots should avoid inadvertent selection of Codes 7500, 7600, or 7700 thereby causing momentary false alarms at automated ground facilities. For example when switching from Code 2700 to Code 7200, switch first to 2200 then 7200, NOT to 7700 and then 7200. This procedure applies to nondiscrete Code 7500 and all discrete codes in the 7600 and 7700 series (i.e., 7600−7677, 7700−7777) which will trigger special indicators in automated facilities. Only nondiscrete Code 7500 will be decoded as the hijack code.

38.7.5.2 Under no circumstances should a pilot of a civil aircraft operate the transponder on Code 7777. This code is reserved for military interceptor operations.

38.7.5.3 Military pilots operating VFR or IFR within restricted/warning areas should adjust their transponders to Code 4000, unless another code has been assigned by ATC.

38.7.6 Mode C Transponder and ADS−B Out Requirements

38.7.6.1 Specific details concerning requirements to carry and operate Mode C transponders and ADS−B Out, as well as exceptions and ATC authorized deviations from those requirements, are found in 14 CFR Sections 91.215, 91.225, and 99.13.

38.7.6.2 In general, the CFRs require aircraft to be equipped with an operable Mode C transponder and ADS−B Out when operating:

a) In Class A, Class B, or Class C airspace areas;

b) Above the ceiling and within the lateral boundaries of Class B or Class C airspace up to 10,000 feet MSL;

c) Class E airspace at and above 10,000 feet MSL within the 48 contiguous states and the District of Columbia, excluding the airspace at and below 2,500 feet AGL;

d) Within 30 miles of a Class B airspace primary airport, below 10,000 feet MSL (commonly referred to as the "Mode C Veil");

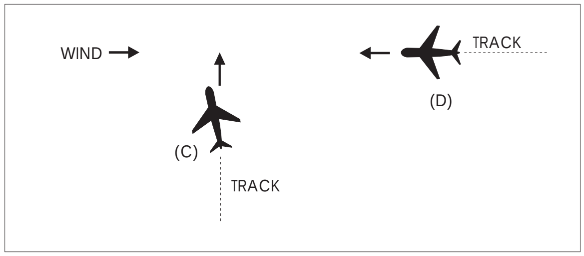
e) For ADS−B Out: Class E airspace at and above 3,000 feet MSL over the Gulf of America from the coastline of the United States out to 12 nautical miles.

NOTE−
The airspace described in (e) above is specified in 14 CFR § 91.225 for ADS−B Out requirements. However, 14 CFR § 91.215 does not include this airspace for ATC transponder requirements.

f) Transponder and ADS−B Out requirements do not apply to any aircraft that was not originally certificated with an electrical system, or that has not subsequently been certified with such a system installed, including balloons and gliders. These aircraft may conduct operations without a transponder or ADS−B Out when operating:

FIG ENR 1.1−28

Induced Error in Position of Traffic



EXAMPLE−

In FIG ENR 1.1−28, traffic information would be issued to the pilot of aircraft "C" as two o'clock. The actual position of the traffic as seen by the pilot of aircraft "C" would be three o'clock. Traffic information issued to aircraft "D" would be at an 11 o'clock position. Since it is not necessary for the pilot of aircraft "D" to apply wind correction (CRAB) to remain on track, the actual position of the traffic issued would be correct. Since the radar controller can only observe aircraft track (course) on the radar display, traffic advisories are issued accordingly, and pilots should give due consideration to this fact when looking for reported traffic.

38.11 Radar Assistance to VFR Aircraft

38.11.1 Radar equipped FAA ATC facilities provide radar assistance and navigation service (vectors) to VFR aircraft provided the aircraft can communicate with the facility, are within radar coverage, and can be radar identified.

38.11.2 Pilots should clearly understand that authorization to proceed in accordance with such radar navigational assistance does not constitute authorization for the pilot to violate Federal Aviation Regulations. In effect, assistance provided is on the basis that navigational guidance information issued is advisory in nature and the job of flying the aircraft safely remains with the pilot.

38.11.3 In many cases, controllers will be unable to determine if flight into instrument conditions will result from their instructions. To avoid possible hazards resulting from being vectored into IFR conditions, pilots should keep controllers advised of the weather conditions in which they are operating and along the course ahead.

38.11.4 Radar navigation assistance (vectors) may be initiated by the controller when one of the following conditions exist:

38.11.4.1 The controller suggests the vector and the pilot concurs.

38.11.4.2 A special program has been established and vectoring service has been advertised.

38.11.4.3 In the controller's judgment the vector is necessary for air safety.

38.11.5 Radar navigation assistance (vectors) and other radar derived information may be provided in response to pilot requests. Many factors, such as limitations of radar, volume of traffic, communications frequency, congestion, and controller workload could prevent the controller from providing it. Controllers have complete discretion for determining if they are able to provide the service in a particular case. Their decision not to provide the service in a particular case is not subject to question.

39. Operational Policy/Procedures for Reduced Vertical Separation Minimum (RVSM) in the Domestic U.S., Alaska, Offshore Airspace and the San Juan FIR

39.1 Applicability and RVSM Mandate (Date/Time and Area)

39.1.1 Applicability. The policies, guidance and direction in this section are consistent with the policies and procedures used in Domestic U.S. RVSM Airspace, as specified in the Aeronautical Information Manual, Chapter 4, Section 6. For any oceanic area specific items, see Part II, ENR 7, Oceanic Procedures.

39.1.2 Requirement. The FAA implemented RVSM between flight level (FL) 290−410 (inclusive) in the following airspace: the airspace of the lower 48 states of the United States, Alaska, Atlantic and Gulf of America

Offshore Airspace and the San Juan FIR. RVSM has been implemented worldwide and may be applied in all ICAO Flight Information Regions (FIR).

39.1.3 In accordance with 14 CFR Section 91.706, with only limited exceptions, prior to operating in RVSM airspace, operators must comply with the standards of Part 91, Appendix G, and be authorized by the Administrator. If the operator has not been authorized for RVSM operations, or the aircraft is not RVSM compliant, the aircraft will be referred to as "non−RVSM" aircraft. Paragraph 39.10 discusses ATC policies for accommodation of non−RVSM aircraft flown by the Department of Defense, Air Ambulance (MEDEVAC) operators, foreign State governments and aircraft flown for certification and development. Paragraph 39.11, Non−RVSM Aircraft Requesting Climb to and Descent from Flight Levels Above RVSM Airspace Without Intermediate Level Off, contains policies for non−RVSM aircraft climbing and descending through RVSM airspace to/from flight levels above RVSM airspace.

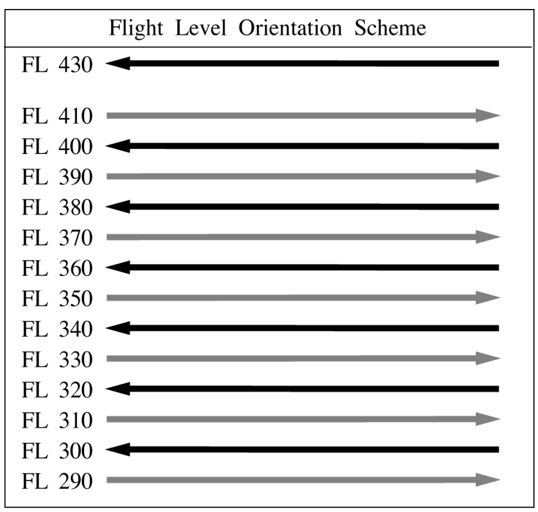
39.1.4 Benefits. RVSM enhances ATC flexibility, mitigates conflict points, enhances sector throughput, reduces controller workload and enables crossing traffic. Operators gain fuel savings and operating efficiency benefits by flying at more fuel efficient flight levels and on more user preferred routings.

39.2 Flight Level Orientation Scheme

Altitude assignments for direction of flight follow a scheme of odd altitude assignment for magnetic courses 000−179 degrees and even altitudes for magnetic courses 180−359 degrees for flights up to and including FL 410, as indicated in FIG ENR 1.1−29.

FIG ENR 1.1−29

Flight Level Orientation Scheme



NOTE−
Odd Flight Levels: Magnetic Course 000−179 Degrees Even Flight Levels: Magnetic Course 180−359 Degrees.

39.3 Aircraft and Operator Approval Policy/Procedures, RVSM Monitoring and Databases for Aircraft and Operator Approval

39.3.1 RVSM Authority. 14 CFR Section 91.180 applies to RVSM operations within the U.S. 14 CFR Section 91.706 applies to RVSM operations outside the U.S. Both sections require that the operator obtain authorization prior to operating in RVSM airspace.

39.3.2 Sources of Information. Advisory Circular (AC) 91−85, Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum (RVSM) Airspace, and the FAA RVSM Website.

39.3.3 TCAS Equipage. TCAS equipage requirements are contained in 14 CFR Sections 121.356, 125.224, 129.18 and 135.189. Part 91 Appendix G does not contain TCAS equipage requirements specific to RVSM, however, Appendix G does require that aircraft equipped with TCAS II and flown in RVSM airspace be modified to incorporate TCAS II Version 7.0 or a later version.

40.2.10 ATC will normally advise participating VFR aircraft when leaving the geographical limits of the TRSA. Radar service is not automatically terminated with this advisory unless specifically stated by the controller.

40.3 Class C Service. This service provides, in addition to basic radar service, approved separation between IFR and VFR aircraft, and sequencing of VFR arrivals to the primary airport.

40.4 Class B Service. This service provides, in addition to basic radar service, approved separation of aircraft based on IFR, VFR, and/or weight, and sequencing of VFR arrivals to the primary airport(s).

40.5 PILOT RESPONSIBILITY. THESE SERVICES ARE NOT TO BE INTERPRETED AS RELIEVING PILOTS OF THEIR RESPONSIBILITIES TO SEE AND AVOID OTHER TRAFFIC OPERATING IN BASIC VFR WEATHER CONDITIONS, TO ADJUST THEIR OPERATIONS AND FLIGHT PATH AS NECESSARY TO PRECLUDE SERIOUS WAKE ENCOUNTERS, TO MAINTAIN APPROPRIATE TERRAIN AND OBSTRUCTION CLEARANCE, OR TO REMAIN IN WEATHER CONDITIONS EQUAL TO OR BETTER THAN THE MINIMUMS REQUIRED BY 14 CFR SECTION 91.155. WHENEVER COMPLIANCE WITH AN ASSIGNED ROUTE, HEADING AND/OR ALTITUDE IS LIKELY TO COMPROMISE PILOT RESPONSIBILITY RESPECTING TERRAIN AND OBSTRUCTION CLEARANCE, VORTEX EXPOSURE, AND WEATHER MINIMUMS, APPROACH CONTROL SHOULD BE SO ADVISED AND A REVISED CLEARANCE OR INSTRUCTION OBTAINED.

40.6 ATC services for VFR aircraft participating in terminal radar services are dependent on ATC radar. Services for VFR aircraft are not available during periods of radar outages. The pilot will be advised when VFR services are limited or not available.

NOTE−
Class B and Class C airspace are areas of regulated airspace. The absence of ATC radar does not negate the requirement of an ATC clearance to enter Class B airspace or two−way radio contact with ATC to enter Class C airspace.

41. Tower En Route Control (TEC)

41.1 TEC is an ATC program to provide a service to aircraft proceeding to and from metropolitan areas. It links designated approach control areas by a network of identified routes made up of the existing airway structure of the National Airspace System. The FAA has initiated an expanded TEC program to include as many facilities as possible. The program's intent is to provide an overflow resource in the low altitude system which would enhance ATC services. A few facilities have historically allowed turbojets to proceed between certain city pairs, such as Milwaukee and Chicago, via tower en route and these locations may continue this service. However, the expanded TEC program will be applied, generally, for nonturbojet aircraft operating at and below 10,000 feet. The program is entirely within the approach control airspace of multiple terminal facilities. Essentially, it is for relatively short flights. Participating pilots are encouraged to use TEC for flights of 2 hours duration or less. If longer flights are planned, extensive coordination may be required with the multiple complex which could result in unanticipated delays.

41.2 There are no unique requirements upon pilots to use the TEC program. Normal flight plan filing procedures will ensure proper flight plan processing. Pilots should include the acronym "TEC" in the remarks selection of the flight plan when requesting tower en route.

41.3 All approach controls in the system may not operate up to the maximum TEC altitude of 10,000 feet. IFR flight may be planned to any satellite airport in proximity to the major primary airport via the same routing.

42. Services in Offshore Controlled Airspace

42.1 Pilots requesting TEC are subject to the same delay factor at the destination airport as other aircraft in the ATC system. In addition, departure and en route delays may occur depending upon individual facility workload. When a major metropolitan airport is incurring significant delays, pilots in the TEC program may want to consider an alternative airport experiencing no delay.

42.2 Flights which operate between the U.S. 3−mile territorial limit and the adjoining oceanic controlled airspace/flight information region (CTA/FIR) boundaries generally operate in airspace designated by federal regulation as "controlled airspace," or "offshore controlled airspace."

42.3 Within the designated areas ATC radar surveillance, ground based navigational signal coverage, and air/ground communications are capable of supporting air traffic services comparable to those provided over U.S. domestic controlled airspace.

42.4 Pilots should be aware that domestic procedures will be applied in offshore controlled airspace to both VFR and IFR aircraft using ATC services.

43. Pilot/Controller Roles/Responsibilities

43.1 General

43.2 The pilot in command of an aircraft is directly responsible for and is the final authority as to the safe operation of that aircraft. In an emergency requiring immediate action, the pilot in command may deviate from any rule in the General, Subpart A, and Flight Rules, Subpart B, in accordance with 14 CFR Section 91.3.

43.2.1 The roles and responsibilities of the pilot and controller for effective participation in the ATC system are contained in several documents. Pilot responsibilities are in the Federal Aviation Regulations (Title 14 of the U.S. Code of Federal Regulations) and the air traffic controller's are in FAA Order JO 7110.65, Air Traffic Control, and supplemental FAA directives. Additional and supplemental information for pilots can be found in the current Aeronautical Information Manual, Notices to Airmen, advisory circulars, and aeronautical charts. Since there are many other excellent publications produced by nongovernment organizations as well as other Government organizations with various updating cycles, questions concerning the latest or most current material can be resolved by cross−checking with the above mentioned documents.

43.2.2 The pilot in command of an aircraft is directly responsible for and is the final authority as to the safe operation of that aircraft. In an emergency requiring immediate action, the pilot in command may deviate from any rule in the General, Subpart A, and Flight Rules, Subpart B, in accordance with 14 CFR Section 91.3.

43.2.3 The air traffic controller is responsible to give first priority to the separation of aircraft and to the issuance of radar safety alerts; second priority to other services that are required, but do not involve separation of aircraft; and third priority to additional services to the extent possible.

43.2.4 In order to maintain a safe and efficient air traffic system, it is necessary that every party fulfill their responsibilities to the fullest.

43.2.5 The responsibilities of the pilot and the controller intentionally overlap in many areas providing a degree of redundancy. Should one or the other fail in any manner, this overlapping responsibility is expected to compensate, in many cases, for failures that may affect safety.

43.2.6 The following, while not intended to be all inclusive, is a brief listing of pilot and controller responsibilities for some commonly used procedures or phases of flight. More detailed explanations are contained in the appropriate Federal Aviation Regulations, Advisory Circulars, and similar publications. The information provided here is an overview of the principles involved and is not meant as an interpretation of the rules nor is it intended to extend or diminish responsibilities.

43.3 Air Traffic Clearance

43.3.1 Pilot

43.3.1.1 Acknowledges receipt and understanding of an ATC clearance.

43.3.1.2 Reads back any hold short of runway instructions issued by ATC.

43.3.1.3 Requests clarification or amendment, as appropriate, any time a clearance is not fully understood, or considered unacceptable from a safety standpoint.

43.3.1.4 Promptly complies with an air traffic clearance upon receipt, except as necessary to cope with an emergency. Advises ATC as soon as possible and obtains an amended clearance if deviation is necessary.

NOTE−
A clearance to land means that appropriate separation on the landing runway will be ensured. A landing clearance does not relieve the pilot from compliance with any previously issued altitude crossing restriction.

47.3.2 Only transponder−equipped targets (i.e., Mode A/C or Mode S transponders) are transmitted through the ATC ground system architecture. Current radar siting may result in limited radar surveillance coverage at lower altitudes near some airports, with subsequently limited TIS−B service volume coverage. If there is no radar coverage in a given area, then there will be no TIS−B coverage in that area.

47.4 TIS−B Limitations

47.4.1 TIS−B is NOT intended to be used as a collision avoidance system and does not relieve the pilot's responsibility to "see and avoid" other aircraft, in accordance with 14 CFR §91.113b. TIS−B must not be used for avoidance maneuvers during times when there is no visual contact with the intruder aircraft. TIS−B is intended only to assist in the visual acquisition of other aircraft.

NOTE−
No aircraft avoidance maneuvers are authorized as a direct result of a TIS−B target being displayed in the cockpit.

47.4.2 While TIS−B is a useful aid to visual traffic avoidance, its inherent system limitations must be understood to ensure proper use.

47.4.2.1 A pilot may receive an intermittent TIS−B target of themselves, typically when maneuvering (e.g., climbing turns) due to the radar not tracking the aircraft as quickly as ADS−B.

47.4.2.2 The ADS−B−to−radar association process within the ground system may at times have difficulty correlating an ADS−B report with corresponding radar returns from the same aircraft. When this happens the pilot may see duplicate traffic symbols (i.e., "TIS−B shadows") on the cockpit display.

47.4.2.3 Updates of TIS−B traffic reports will occur less often than ADS−B traffic updates. TIS−B position updates will occur approximately once every 3−13 seconds depending on the type of radar system in use within the coverage area. In comparison, the update rate for ADS−B is nominally once per second.

47.4.2.4 The TIS−B system only uplinks data pertaining to transponder−equipped aircraft. Aircraft without a transponder will not be displayed as TIS−B traffic.

47.4.2.5 There is no indication provided when any aircraft is operating inside or outside the TIS−B service volume, therefore it is difficult to know if one is receiving uplinked TIS−B traffic information.

47.4.3 Pilots and operators are reminded that the airborne equipment that displays TIS−B targets is for pilot situational awareness only and is not approved as a collision avoidance tool. Unless there is an imminent emergency requiring immediate action, any deviation from an air traffic control clearance in response to perceived converging traffic appearing on a TIS−B display must be approved by the controlling ATC facility before commencing the maneuver, except as permitted under certain conditions in 14CFR §91.123. Uncoordinated deviations may place an aircraft in close proximity to other aircraft under ATC control not seen on the airborne equipment and may result in a pilot deviation or other incident.

47.5 Reports of TIS−B Malfunctions

Users of TIS−B can provide valuable assistance in the correction of malfunctions by reporting instances of undesirable system performance. Since TIS−B performance is monitored by maintenance personnel rather than ATC, report malfunctions to the nearest Flight Service Station (FSS) facility by radio or telephone, or by sending an email to the ADS−B help desk at adsb@faa.gov. Reports should include:

47.5.1 Condition observed;

47.5.2 Date and time of observation;

47.5.3 Altitude and location of observation;

47.5.4 Type and call sign of the aircraft; and

47.5.5 Type and software version of avionics system.

48. Flight Information Service− Broadcast (FIS−B)

48.1 Introduction.

FIS−B is a ground broadcast service provided through the ADS−B Services network over the 978 MHz UAT data link. The FAA FIS−B system provides pilots and flight crews of properly equipped aircraft with a cockpit display of certain aviation weather and aeronautical information. FIS−B reception is line−of−sight within the service volume of the ground infrastructure. (See FIG ENR 1.1−34 and FIG ENR 1.1−35.)

48.2 Weather Products Provided by FIS−B.

FIS-B does not replace a preflight weather briefing from a source listed in GEN 3.5, paragraph 3.5, FAA Weather Services, or inflight updates from an FSS or ATC. FIS-B information may be used by the pilot for the safe conduct of flight and aircraft movement; however, the information should not be the only source of weather or aeronautical information. A pilot should be particularly alert and understand the limitations and quality assurance issues associated with individual products. This includes graphical representation of next generation weather radar (NEXRAD) imagery and Notices to Airmen (NOTAM)/temporary flight restrictions (TFR).

REFERENCE−
AIP, ENR 3.5, Para 7, Flight Information Services (FIS).
Advisory Circular AC 00−63, Use of Cockpit Displays of Digital Weather and Aeronautical Information.

48.3 Reports of FIS−B Malfunctions.

Users of FIS−B can provide valuable assistance in the correction of malfunctions by reporting instances of undesirable system performance. Since FIS−B performance is monitored by maintenance personnel rather than ATC, report malfunctions to the nearest Flight Service Station (FSS) facility by radio or telephone, or by sending an email to the ADS−B help desk at adsb@faa.gov. Reports should include:

48.3.1 Condition observed;

48.3.2 Date and time of observation;

48.3.3 Altitude and location of observation;

48.3.4 Type and call sign of the aircraft; and

48.3.5 Type and software version of avionics system.

2.3.4.2 VFR Flights

a) Arriving aircraft must obtain an ATC clearance prior to entering Class B airspace and must contact ATC on the appropriate frequency, and in relation to geographical fixes shown on local charts. Although a pilot may be operating beneath the floor of the Class B airspace on initial contact, communications with ATC should be established in relation to the points indicated for spacing and sequencing purposes.

b) Departing aircraft require a clearance to depart Class B airspace and should advise the clearance delivery position of their intended altitude and route of flight. ATC will normally advise VFR aircraft when leaving the geographical limits of the Class B airspace. Radar service is not automatically terminated with this advisory unless specifically stated by the controller.

c) Aircraft not landing or departing the primary airport may obtain an ATC clearance to transit the Class B airspace when traffic conditions permit and provided the requirements of 14 CFR Section 91.131 are met. Such VFR aircraft are encouraged, to the extent possible, to operate at altitudes above or below the Class B airspace or transit through established VFR corridors. Pilots operating in VFR corridors are urged to use frequency 122.750 MHz for the exchange of aircraft position information.

2.3.5 ATC Clearances and Separation. An ATC clearance is required to enter and operate within Class B airspace. VFR pilots are provided sequencing and separation from other aircraft while operating within Class B airspace. (See ENR 1.1, paragraph 40., Terminal Radar Service for VFR Aircraft.)

NOTE−
Separation and sequencing of VFR will be suspended in the event of a power outage as this service is dependent on radar. The pilot will be advised that the service is not available and issued wind, runway information, and the time or place to contact the tower.

2.3.5.1 VFR aircraft are separated from all VFR/IFR aircraft which weigh 19,000 pounds or less by a minimum of:

a) Target resolution; or

b) 500 feet vertical separation; or

c) Visual separation.

2.3.5.2 VFR aircraft are separated from all VFR/IFR aircraft which weigh more than 19,000 and turbojets by no less than:

a) 1 $^{1}/_{2}$ miles lateral separation; or

b) 500 feet vertical separation; or

c) Visual separation.

2.3.5.3 This program is not to be interpreted as relieving pilots of their responsibilities to see and avoid other traffic operating in basic VFR weather conditions, to adjust their operations and flight path as necessary to preclude serious wake encounters, to maintain appropriate terrain and obstruction clearance, or to remain in weather conditions equal to or better than the minimums required by 14 CFR Section 91.155. Approach control should be advised and a revised clearance or instruction obtained when compliance with an assigned route, heading, and/or altitude is likely to compromise pilot responsibility with respect to terrain and obstruction clearance, vortex exposure, and weather minimums.

2.3.5.4 ATC may assign altitudes to VFR aircraft that do not conform to 14 CFR Section 91.159. "RESUME APPROPRIATE VFR ALTITUDES" will be broadcast when the altitude assignment is no longer needed for separation or when leaving Class B airspace. Pilots must return to an altitude that conforms to 14 CFR Section 91.159.

2.3.5.5 Proximity Operations. VFR aircraft operating in proximity to Class B airspace are cautioned against operating too closely to the boundaries, especially where the floor of the Class B airspace is 3,000 feet or less above the surface or where VFR cruise altitudes are at or near the floor of higher levels. Observance of this precaution will reduce the potential for encountering an aircraft operating at the altitudes of Class B floors. Additionally, VFR aircraft are encouraged to utilize the VFR Planning Chart as a tool for planning flight in proximity to Class B airspace. Charted VFR Flyway Planning charts are published on the back of the existing VFR Terminal Area Charts.

2.4 Class C Airspace

2.4.1 Definition. Generally, that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a surface area with a 5 NM radius, and an outer area with a 10 NM radius that extends no lower than 1,200 feet up to 4,000 feet above the airport elevation.

2.4.2 Outer Area. Class C airspace areas have a procedural (nonregulatory) Outer Area. Normally this area is 20 NM from the primary Class C airspace airport. Its vertical limit extends from the lower limits of radio/radar coverage up to the ceiling of the approach control's delegated airspace, excluding the Class C airspace itself, and other airspace as appropriate. (This outer area is not charted.)

2.4.3 Charts. Class C airspace is charted on Sectional Charts, IFR En Route Low Altitude, and Terminal Area Charts where appropriate.

2.4.4 Operating Rules and Pilot Equipment Requirements

2.4.4.1 Pilot Certification. No specific certification required.

2.4.4.2 Equipment

a) Two-way radio.

b) Unless otherwise authorized by ATC, an operable radar beacon transponder with automatic altitude reporting capability and operable ADS−B Out equipment.

1) Within the 48 contiguous states and the District of Columbia at and above 10,000 feet MSL, excluding the airspace at and below 2,500 feet above the surface, and

2) At and above 3,000 feet MSL over the Gulf of America from the coastline of the United States out to 12 nautical miles.

NOTE−
See Section ENR 1.1, paragraph 38.7, Transponder/ADS−B Operation, subparagraph 38.7.6 for Mode C Transponder Requirements and ENR 1.1, paragraph 46., for ADS−B requirements for operating above Class C airspace.

c) Arrival or Through Flight Entry Requirements. Two−way radio communication must be established with the ATC facility providing ATC services prior to entry and thereafter maintain those communications while in Class C airspace. Pilots of arriving aircraft should contact the Class C airspace ATC facility on the publicized frequency and give their position, altitude, radar beacon code, destination, and request Class C service. Radio contact should be initiated far enough from the Class C airspace boundary to preclude entering Class C airspace before two−way radio communications are established.

NOTE−
1. *If the controller responds to a radio call with, "(aircraft callsign) standby," radio communications have been established and the pilot can enter the Class C airspace.*

2. *If workload or traffic conditions prevent immediate provision of Class C services, the controller will inform the pilot to remain outside the Class C airspace until conditions permit the services to be provided.*

3. *It is important to understand that if the controller responds to the initial radio call without using the aircraft identification, radio communications have not been established and the pilot may not enter the Class C airspace.*

4. *Class C airspace areas have a procedural Outer Area. Normally this area is 20 NM from the primary Class C airspace airport. Its vertical limit extends from the lower limits of radio/radar coverage up to the ceiling of the approach control's delegated airspace, excluding the Class C airspace itself, and other airspace as appropriate. (This outer area is not charted.)*

2.5.2.3 Arrival or Through Flight Entry Requirements. Two−way radio communication must be established with the ATC facility providing ATC services prior to entry and thereafter maintain those communications while in the Class D airspace. Pilots of arriving aircraft should contact the control tower on the publicized frequency and give their position, altitude, destination, and any request(s). Radio contact should be initiated far enough from the Class D airspace boundary to preclude entering the Class D airspace before two−way radio communications are established.

NOTE−
1. *If the controller responds to a radio call with, "(aircraft callsign) standby," radio communications have been established, and the pilot can enter the Class D airspace.*

2. *If workload or traffic conditions prevent immediate entry into Class D airspace, the controller will inform the pilot to remain outside the Class D airspace until conditions permit entry.*

EXAMPLE−
1. *"[Aircraft callsign] remain outside the Class Delta airspace and standby."*
It is important to understand that if the controller responds to the initial radio call without using the aircraft callsign, radio communications have not been established, and the pilot may not enter the Class D airspace.

2. *"Aircraft calling Manassas tower standby."*
At those airports where the control tower does not operate 24 hours a day, the operating hours of the tower will be listed on the appropriate charts and in the Chart Supplement. During the hours the tower is not in operation, the Class E surface area rules or a combination of Class E rules to 700 feet above ground level and Class G rules to the surface will become applicable. Check the Chart Supplement for specifics.

2.5.2.4 Departures from:

a) A primary or satellite airport with an operating control tower. Two−way radio communications must be established and maintained with the control tower, and thereafter as instructed by ATC while operating in the Class D airspace.

b) A satellite airport without an operating control tower. Two−way radio communications must be established with the ATC facility having jurisdiction over the Class D airspace as soon as practicable after departing.

2.5.2.5 Aircraft Speed. Unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class D airspace area at an indicated airspeed of more than 200 knots (230 mph).

2.5.3 Class D airspace areas are depicted on Sectional and Terminal charts with blue segmented lines, and on IFR En Route Low Altitude charts with a boxed [D].

2.5.4 Arrival extensions.

2.5.4.1 Class D airspace arrival extensions for instrument approach procedures may be Class D or Class E airspace. As a general rule, if all extensions are 2 miles or less, they remain part of the Class D surface area. However, if any one extension is greater than 2 miles, then all extensions become Class E.

2.5.4.2 Surface area arrival extensions are effective concurrent with the published times of the Class D surface area. For example, if a part−time Class D surface area changes to Class E airspace, the arrival extensions will remain in effect as Class E airspace. If a part−time Class D surface area changes to Class G airspace, the associated arrival extensions will become Class G at the same time.

2.5.5 Separation for VFR Aircraft. No separation services are provided to VFR aircraft.

2.6 Class E Airspace

2.6.1 Definition. Class E airspace is a type of controlled airspace that is designated to serve a variety of terminal or en route purposes as described below.

2.6.2 Operating Rules and Pilot/Equipment Requirements.

2.6.2.1 Pilot Certification. No specific certification required.

2.6.2.2 Equipment. Unless otherwise authorized by ATC:

a) An operable radar beacon transponder with automatic altitude reporting capability and operable ADS−B Out equipment are required at and above 10,000 feet MSL within the 48 contiguous states and the District of Columbia, excluding the airspace at and below 2,500 feet above the surface, and

b) Operable ADS−B Out equipment at and above 3,000 feet MSL over the Gulf of America from the coastline of the United States out to 12 nautical miles.

NOTE−
The airspace described in (b) is specified in 14 CFR § 91.225 for ADS−B Out requirements. However, 14 CFR § 91.215 does not include this airspace for transponder requirements.

2.6.2.3 Arrival or Through Flight Entry Requirements. No specific requirements.

2.6.3 Charts. Class E airspace below 14,500 feet MSL is charted on Sectional, Terminal, and IFR Enroute Low Altitude charts.

2.6.4 Vertical limits. Except where designated at a lower altitude, Class E airspace in the United States consists of the airspace extending upward from 14,500 feet MSL to, but not including, 18,000 feet MSL overlying: the 48 contiguous states, including the waters within 12 miles from the coast of the 48 contiguous states; the District of Columbia; Alaska, including the waters within 12 miles from the coast of Alaska, and that airspace above FL 600; excluding:

2.6.4.1 The Alaska peninsula west of longitude 160°00'00"W.; and

2.6.4.2 The airspace below 1,500 feet above the surface of the earth unless specifically designated lower.

NOTE−
Class E airspace above FL 600 has no upper limit.

2.6.5 Types of Class E Airspace

2.6.5.1 Surface area designated for an airport. Class E designated as a surface area for an airport where a control tower is not in operation. The airspace will be configured to contain all instrument procedures. Class E surface areas normally extend from the surface up to but not including the overlying controlled airspace.

2.6.5.2 Extension to a surface area:

a) Class E airspace areas may be designated as extensions to Class B, Class C, and Class D surface areas. Such extensions provide controlled airspace to contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR. Surface area arrival extensions for instrument approach procedures become part of the primary core surface area and are effective concurrent with the times of the primary core surface area.

b) When a part–time Class C or Class D surface area defaults to Class E, the arrival extensions will remain in effect as Class E airspace. When a part–time Class C, Class D, or Class E surface area defaults to Class G, the associated arrival extensions will default to Class G at the same time.

2.6.5.3 Airspace used for transition:

a) Class E airspace areas extending upward from either 700 feet AGL (shown as magenta vignette on sectional charts) or 1,200 feet AGL (blue vignette) are designated in conjunction with an airport with an approved instrument procedure. These areas are used for transitioning aircraft to/from the terminal or en route environment.

b) Unless otherwise specified, 700/1200−foot AGL Class E airspace areas remain in effect continuously, regardless of airport operating hours or surface area status. The 700/1200−foot transition areas should not be confused with surface areas or arrival extensions.

2.6.5.4 En Route Domestic Areas. There are Class E airspace areas that extend upward from a specified altitude and are en route domestic airspace areas that provide controlled airspace in those areas where there is a requirement to provide IFR en route ATC services, but the Federal airway system is inadequate.

4.2 A fuel efficient descent is basically an uninterrupted descent (except where level flight is required for speed adjustment) from cruising altitude to the point when level flight is necessary for the pilot to stabilize the aircraft on final approach. The procedure for a fuel efficient descent is based on an altitude loss which is most efficient for the majority of aircraft being served. This will generally result in a descent gradient window of 250−350 feet per nautical mile.

4.3 When crossing altitudes and speed restrictions are issued verbally or are depicted on a chart, ATC will expect the pilot to descend first to the crossing altitude and then reduce speed. Verbal clearances for descent will normally permit an uninterrupted descent in accordance with the procedure as described in paragraph 4.2 above. Acceptance of a charted fuel efficient descent (Runway Profile Descent) clearance requires the pilot to adhere to the altitudes, speeds, and headings depicted on the charts unless otherwise instructed by ATC. PILOTS RECEIVING A CLEARANCE FOR A FUEL EFFICIENT DESCENT ARE EXPECTED TO ADVISE ATC IF THEY DO NOT HAVE RUNWAY PROFILE DESCENT CHARTS PUBLISHED FOR THAT AIRPORT OR ARE UNABLE TO COMPLY WITH THE CLEARANCE.

5. Advance Information on Instrument Approaches

5.1 When landing at airports with approach control services and where two or more instrument approach procedures are published, pilots will be provided in advance of their arrival with the type of approach to expect or that they may be vectored for a visual approach. This information will be broadcast either by a controller or on ATIS. It will not be furnished when the visibility is three miles or better and the ceiling is at or above the highest initial approach altitude established for any low altitude instrument approach procedure for the airport.

5.2 The purpose of this information is to aid the pilot in planning arrival actions; however, it is not an ATC clearance or commitment and is subject to change. Pilots should bear in mind that fluctuating weather, shifting winds, blocked runway, etc., are conditions which may result in changes to approach information previously received. It is important that pilots advise ATC immediately if they are unable to execute the approach ATC advised will be used, or if they prefer another type of approach.

5.3 Aircraft destined to uncontrolled airports which have automated weather data with broadcast capability should monitor the ASOS/AWOS frequency to ascertain the current weather for the airport. The pilot must advise ATC when he/she has received the broadcast weather and state his/her intentions.

NOTE−

1. *ASOS/AWOS should be set to provide one−minute broadcast weather updates at uncontrolled airports that are without weather broadcast capability by a human observer.*

2. *Controllers will consider the long line disseminated weather from an automated weather system at an uncontrolled airport as trend and planning information only and will rely on the pilot for current weather information for the airport. If the pilot is unable to receive the current broadcast weather, the last long−line disseminated weather will be issued to the pilot. When receiving IFR services, the pilot/aircraft operator is responsible for determining if weather/visibility is adequate for approach/landing.*

5.4 When making an IFR approach to an airport not served by a tower or FSS, after the ATC controller advises "CHANGE TO ADVISORY FREQUENCY APPROVED," you should broadcast your intentions, including the type of approach being executed, your position, and when over the final approach fix inbound (nonprecision approach) or when over the outer marker or the fix used in lieu of the outer marker inbound (precision approach). Continue to monitor the appropriate frequency (UNICOM, etc.) for reports from other pilots.

6. Approach Clearance

6.1 An aircraft which has been cleared to a holding fix and subsequently "cleared . . . approach" has not received new routing. Even though clearance for the approach may have been issued prior to the aircraft reaching the holding fix, ATC would expect the pilot to proceed via the holding fix (the last assigned route), and the feeder route associated with that fix (if a feeder route is published on the approach chart) to the initial approach fix (IAF) to commence the approach. WHEN CLEARED FOR THE APPROACH, THE PUBLISHED OFF AIRWAY (FEEDER) ROUTES THAT LEAD FROM THE EN ROUTE STRUCTURE TO THE IAF ARE PART OF THE APPROACH CLEARANCE.

6.2 If a feeder route to an IAF begins at a fix located along the route of flight prior to reaching the holding fix, and clearance for an approach is issued, a pilot should commence the approach via the published feeder route; i.e., the aircraft would not be expected to overfly the feeder route and return to it. The pilot is expected to commence the approach in a similar manner at the IAF, if the IAF for the procedure is located along the route of flight to the holding fix.

6.3 If a route of flight directly to the initial approach fix is desired, it should be so stated by the controller with phraseology to include the words "direct . . . ," "proceed direct" or a similar phrase which the pilot can interpret without question. If a pilot is uncertain of the clearance, immediately query ATC as to what route of flight is desired.

6.4 The name of an instrument approach, as published, is used to identify the approach, even though a component of the approach aid, such as the glideslope on an Instrument Landing System, is inoperative or unreliable. The controller will use the name of the approach as published, but must advise the aircraft at the time an approach clearance is issued that the inoperative or unreliable approach aid component is unusable, except when the title of the published approach procedures otherwise allows, for example, ILS or LOC.

6.5 At times ATC may not specify a particular approach procedure in the clearance, but will state "CLEARED APPROACH."

6.5.1 This clearance indicates the pilot may execute any one of the authorized IAPs for that airport.

6.5.2 The clearance may be issued in conjunction with the route to or over an IAF or feeder fix.

6.5.3 This clearance does not constitute approval for the pilot to execute a contact approach or a visual approach to the airport or runway.

6.6 Except when being vectored to the final approach course, pilots cleared for an IAP are expected to execute the entire procedure commencing at an IAF or an associated feeder route as described on the IAP chart. Pilots are not required to execute the entire procedure if:

6.6.1 An appropriate new or revised ATC clearance is received, or

6.6.2 The IFR flight plan is canceled.

6.7 STAR to Approach Connectivity. A STAR may terminate at a fix that is also the IAF or IF for an approach. When the arrival route instructions as published on the STAR state the pilot can expect the instrument approach from the STAR terminus fix or approach IAF or IF, pilots are expected to ensure that the RNAV system is loaded with the approach beginning at that IAF or IF so that the STAR and approach are connected. ATC will clear the aircraft for the instrument approach by stating the IAF fix/waypoint by name with the approach clearance. This procedure also applies to aircraft arriving to an airport via other air traffic services (ATS) routes.

EXAMPLE−
"At RDFSH, Cleared ILS Runway 27 Approach"

NOTE−
The fix "RDFSH" is the STAR terminus fix and an IAF for the ILS runway 27 approach at KIAH. Pilots are expected to ensure that the ILS Runway 27 approach is loaded in the RNAV system with the RDFSH IAF selected. Pilots are not to select vectors or vectors to final option when loading the ILS runway 27 approach.

6.8 The following applies to aircraft on radar vectors and/or cleared "direct to" in conjunction with an approach clearance:

6.8.1 Maintain the last altitude assigned by ATC until the aircraft is established on a published segment of a transition route, or approach procedure segment, or other published route, for which a lower altitude is published on the chart. If already on an established route, or approach or arrival segment, you may descend to whatever minimum altitude is listed for that route or segment

6.8.2 Continue on the vector heading until intercepting the next published ground track applicable to the approach clearance.

6.8.3 Once reaching the final approach fix via the published segments, the pilot may continue on approach to a landing.

6.8.4 If proceeding to an IAF with a published course reversal (procedure turn or hold-in-lieu of PT pattern), except when cleared for a straight in approach by ATC, the pilot must execute the procedure turn/hold-in-lieu of PT, and complete the approach.

6.8.5 If cleared to an IAF/IF via a NoPT route, or no procedure turn/hold-in-lieu of PT is published, continue with the published approach.

6.8.6 In addition to the above, RNAV aircraft may be issued a clearance direct to the IAF/IF at intercept angles not greater than 90 degrees for both conventional and RNAV instrument approaches. Controllers may issue a heading or a course direct to a fix between the IF and FAF at intercept angles not greater than 30 degrees for both conventional and RNAV instrument approaches. In all cases, controllers will assign altitudes that ensure obstacle clearance and will permit a normal descent to the FAF. When clearing aircraft direct to the IF, ATC will radar monitor the aircraft until the IF and will advise the pilot to expect clearance direct to the IF at least 5 miles from the fix. ATC must issue a straight-in approach clearance when clearing an aircraft direct to an IAF/IF with a procedure turn or hold−in−lieu of a procedure turn, and ATC does not want the aircraft to execute the course reversal.

NOTE−
Refer to 14 CFR 91.175 (i).

6.9 RNAV aircraft may be issued a clearance direct to the FAF that is also charted as an IAF, in which case the pilot is expected to execute the depicted procedure turn or hold-in-lieu of procedure turn. ATC will not issue a straight-in approach clearance. If the pilot desires a straight-in approach, they must request vectors to the final approach course outside of the FAF or fly a published "NoPT" route. When visual approaches are in use, ATC may clear an aircraft direct to the FAF.

NOTE−
1. *In anticipation of a clearance by ATC to any fix published on an instrument approach procedure, pilots of RNAV aircraft are advised to select an appropriate IAF or feeder fix when loading an instrument approach procedure into the RNAV system.*

2. *Selection of "Vectors-to-Final" or "Vectors" option for an instrument approach may prevent approach fixes located outside of the FAF from being loaded into an RNAV system. Therefore, the selection of these options is discouraged due to increased workload for pilots to reprogram the navigation system.*

6.10 Arrival Holding. Some approach charts have an arrival holding pattern depicted at an IAF or at a feeder fix located along an airway. The arrival hold is depicted using a "thin line" since it is not always a mandatory part of the instrument procedure.

6.10.1 Arrival holding is charted where holding is frequently required prior to starting the approach procedure so that detailed holding instructions are not required. The arrival holding pattern is not authorized unless assigned by ATC. Holding at the same fix may also be depicted on the en route chart.

6.10.2 Arrival holding is also charted where it is necessary to use a holding pattern to align the aircraft for procedure entry from an airway due to turn angle limitations imposed by procedure design standards. When the turn angle from an airway into the approach procedure exceeds the permissible limits, an arrival holding pattern may be published along with a note on the procedure specifying the fix, the airway, and arrival direction where use of the arrival hold is required for procedure entry. Unlike a hold−in−lieu of procedure turn, use of the arrival holding pattern is not authorized until assigned by ATC. If ATC does not assign the arrival hold before reaching the holding fix, the pilot should request the hold for procedure entry. Once established on the inbound holding course and an approach clearance has been received, the published procedure can commence. Alternatively, if using the holding pattern for procedure entry is not desired, the pilot may ask ATC for maneuvering airspace to align the aircraft with the feeder course.

EXAMPLE−
Planview Chart Note: "Proc NA via V343 northeast bound without holding at JOXIT. ATC CLNC REQD."

6.11 An RF leg is defined as a constant radius circular path around a defined turn center that starts and terminates at a fix. An RF leg may be published as part of a procedure. Since not all aircraft have the capability to fly these leg types, pilots are responsible for knowing if they can conduct an RNAV approach with an RF leg. Requirements for RF legs will be indicated on the approach chart in the notes section or at the applicable initial approach fix. Controllers will clear RNAV-equipped aircraft for instrument approach procedures containing RF legs:

6.11.1 Via published transitions, or

6.11.2 In accordance with paragraph 6.8.6 above, and

6.11.3 ATC will not clear aircraft direct to any waypoint beginning or within an RF leg, and will not assign fix/waypoint crossing speeds in excess of charted speed restrictions.

EXAMPLE−
1. *Controllers will not clear aircraft direct to THIRD because that waypoint begins the RF leg, and aircraft cannot be vectored or cleared to TURNN or vectored to intercept the approach segment at any point between THIRD and FORTH because this is the RF leg. (See FIG ENR 1.5−9.)*

6.12 When necessary to cancel a previously issued approach clearance, the controller will advise the pilot “Cancel Approach Clearance” followed by any additional instructions when applicable.

7. Landing Priority

7.1 A clearance for a specific type of approach (ILS, RNAV, GLS, ADF, VOR, or visual approach) to an aircraft operating on an IFR flight plan does not mean that landing priority will be given over other traffic. Traffic control towers handle all aircraft, regardless of the type of flight plan, on a “first−come, first−served” basis. Therefore, because of local traffic or runway in use, it may be necessary for the controller, in the interest of safety, to provide a different landing sequence. In any case, a landing sequence will be issued to each aircraft as soon as possible to enable the pilot to properly adjust the aircraft’s flight path.

8. Procedure Turn and Hold−in−lieu of Procedure Turn

8.1 A procedure turn is the maneuver prescribed when it is necessary to reverse direction to establish the aircraft inbound on an intermediate or final approach course. The procedure turn or hold−in−lieu−of−PT is a required maneuver when it is depicted on the approach chart, unless cleared by ATC for a straight−in approach. Additionally, the procedure turn or hold−in−lieu−of−PT is not permitted when the symbol “No PT” is depicted on the initial segment being used, when a RADAR VECTOR to the final approach course is provided, or when conducting a timed approach from a holding fix. The altitude prescribed for the procedure turn is a minimum altitude until the aircraft is established on the inbound course. The maneuver must be completed within the distance specified in the profile view. For a hold−in−lieu−of−PT, the holding pattern should be flown as depicted and the specified leg length/timing must not be exceeded.

NOTE−
The pilot may elect to use the procedure turn or hold−in−lieu−of−PT when it is not required by the procedure, but must first receive an amended clearance from ATC. If the pilot is uncertain whether the ATC clearance intends for a procedure turn to be conducted or to allow for a straight−in approach, the pilot must immediately request clarification from ATC (14 CFR Section 91.123).

8.1.1 On U.S. Government charts, a barbed arrow indicates the maneuvering side of the outbound course on which the procedure turn is made. Headings are provided for course reversal using the 45 degree type procedure turn. However, the point at which the turn may be commenced and the type and rate of turn is left to the discretion of the pilot (limited by the charted remain within xx NM distance). Some of the options are the 45 degree procedure turn, the racetrack pattern, the teardrop procedure turn, or the 80 degree ↔ 260 degree course reversal. Racetrack entries should be conducted on the maneuvering side where the majority of protected airspace resides. If an entry places the pilot on the non−maneuvering side of the PT, correction to intercept the outbound course ensures remaining within protected airspace. Some procedure turns are specified by procedural track. These turns must be flown exactly as depicted.

8.1.2 Descent to the procedure turn (PT) completion altitude from the PT fix altitude (when one has been published or assigned by ATC) must not begin until crossing over the PT fix or abeam and proceeding outbound.

Some procedures contain a note in the chart profile view that says "Maintain (altitude) or above until established outbound for procedure turn" (See FIG ENR 1.5−10). Newer procedures will simply depict an "at or above" altitude at the PT fix without a chart note (See FIG ENR 1.5−11). Both are there to ensure required obstacle clearance is provided in the procedure turn entry zone (See FIG ENR 1.5−12). Absence of a chart note or specified minimum altitude adjacent to the PT fix is an indication that descent to the procedure turn altitude can commence immediately upon crossing over the PT fix, regardless of the direction of flight. This is because the minimum altitudes in the PT entry zone and the PT maneuvering zone are the same.

8.1.3 When the approach procedure involves a procedure turn, a maximum speed of not greater than 200 knots (IAS) should be observed from first overheading the course reversal IAF through the procedure turn maneuver to ensure containment within the obstruction clearance area. Pilots should begin the outbound turn immediately after passing the procedure turn fix. The procedure turn maneuver must be executed within the distance specified in the profile view. The normal procedure turn distance is 10 miles. This may be reduced to a minimum of 5 miles where only Category A or helicopter aircraft are to be operated or increased to as much as 15 miles to accommodate high performance aircraft.

8.1.4 A teardrop procedure or penetration turn may be specified in some procedures for a required course reversal. The teardrop procedure consists of departure from an initial approach fix on an outbound course followed by a turn toward and intercepting the inbound course at or prior to the intermediate fix or point. Its purpose is to permit an aircraft to reverse direction and lose considerable altitude within reasonably limited airspace. Where no fix is available to mark the beginning of the intermediate segment, it must be assumed to commence at a point 10 miles prior to the final approach fix. When the facility is located on the airport, an aircraft is considered to be on final approach upon completion of the penetration turn. However, the final approach segment begins on the final approach course 10 miles from the facility.

FIG ENR 1.5−9

Example of an RNAV Approach with RF Leg

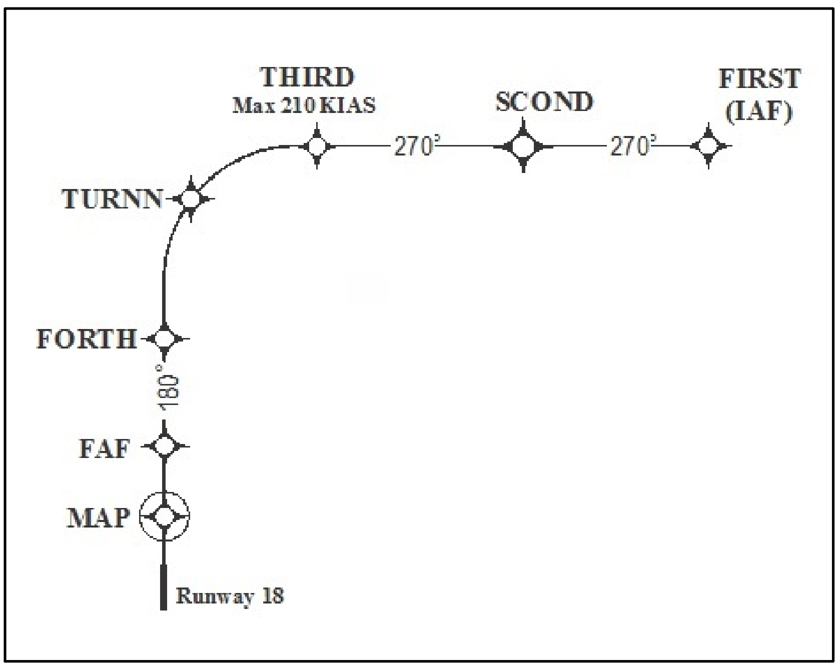


FIG ENR 1.5−10

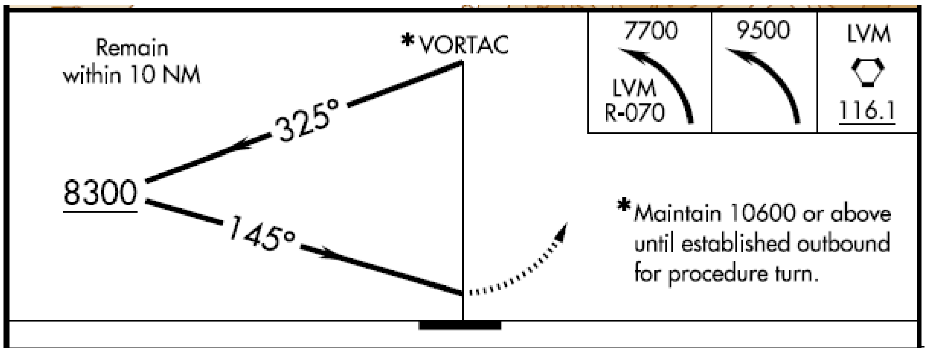
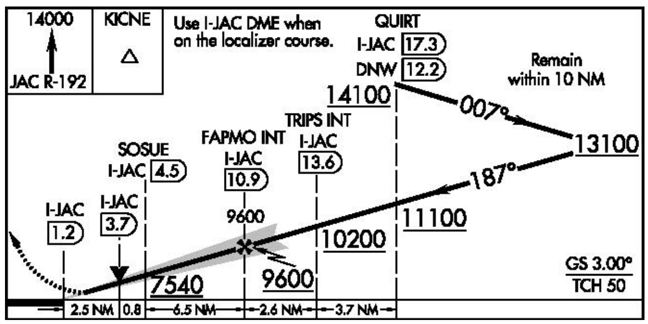


FIG ENR 1.5−11



8.1.5 A holding pattern in lieu of procedure turn may be specified for course reversal in some procedures. In such cases, the holding pattern is established over an intermediate fix or a final approach fix. The holding pattern distance or time specified in the profile view must be observed. For a hold−in−lieu−of−PT, the holding pattern direction must be flown as depicted and the specified leg length/timing must not be exceeded. Maximum holding airspeed limitations as set forth for all holding patterns apply. The holding pattern maneuver is completed when the aircraft is established on the inbound course after executing the appropriate entry. If cleared for the approach prior to returning to the holding fix, and the aircraft is at the prescribed altitude, additional circuits of the holding pattern are not necessary nor expected by ATC. If pilots elect to make additional circuits to lose excessive altitude or to become better established on course, it is their responsibility to so advise ATC upon receipt of their approach clearance.

8.1.6 A procedure turn is not required when an approach can be made directly from a specified intermediate fix to the final approach fix. In such cases, the term "NoPT" is used with the appropriate course and altitude to denote that the procedure turn is not required. If a procedure turn is desired, and when cleared to do so by ATC, descent below the procedure turn altitude should not be made until the aircraft is established on the inbound course, since some NoPT altitudes may be lower than the procedure turn altitudes.

12.1.3.1 Straight−in IAPs are identified by the navigational system providing the final approach guidance and the runway to which the approach is aligned (e.g., VOR RWY 13). Circling only approaches are identified by the navigational system providing final approach guidance and a letter (e.g., VOR A). More than one navigational system separated by a slash indicates that more than one type of equipment must be used to execute the final approach (e.g., VOR/DME RWY 31). More than one navigational system separated by the word "or" indicates either type of equipment may be used to execute the final approach (for example, VOR or GPS RWY 15).

NOTE−
This procedure identification method has changed and these procedures will be revised in the course of the normal procedure amendment process. The slash and equipment (e.g., /DME) information will be removed with future amendments. Pilots should review the procedure's notes, planview annotations,and PBN/equipment requirements boxes to determine the capability needed to accomplish the procedure.

12.1.3.2 In some cases, other types of navigation systems including radar may be required to execute other portions of the approach or to navigate to the IAF (e.g., an NDB procedure turn to an ILS, an NDB in the missed approach, or radar required to join the procedure or identify a fix). When radar or other equipment is required for procedure entry from the en route environment, a note will be charted in the planview of the approach procedure chart (for example, RADAR REQUIRED or ADF REQUIRED). When radar or other equipment is required on portions of the procedure outside the final approach segment, including the missed approach, a note will be charted in the notes box of the pilot briefing portion of the approach chart (for example, RADAR REQUIRED or DME REQUIRED). Notes are not charted when VOR is required outside the final approach segment. Pilots should ensure that the aircraft is equipped with the required NAVAID(s) in order to execute the approach, including the missed approach.

NOTE−
Some military (i.e., U.S. Air Force and U.S. Navy) IAPs have these "additional equipment required" notes charted only in the planview of the approach procedure and do not conform to the same application standards used by the FAA.

12.1.3.3 The FAA has initiated a program to provide a new notation for LOC approaches when charted on an ILS approach requiring other navigational aids to fly the final approach course. The LOC minimums will be annotated with the NAVAID required (for example, "DME Required" or "RADAR Required"). During the transition period, ILS approaches will still exist without the annotation.

12.1.3.4 Many ILS approaches having minima based on RVR are eligible for a landing minimum of RVR 1800. Some of these approaches are to runways that have touchdown zone and centerline lights. For many runways that do not have touchdown and centerline lights, it is still possible to allow a landing minimum of RVR 1800. For these runways, the normal ILS minimum of RVR 2400 can be annotated with a single or double asterisk or the dagger symbol "†"; for example "** 696/24 200 (200/1/2)." A note is included on the chart stating "**RVR 1800 authorized with use of FD or AP or HUD to DA." The pilot must use the flight director, or autopilot with an approved approach coupler, or head up display to decision altitude or to the initiation of a missed approach. In the interest of safety, single pilot operators should not fly approaches to 1800 RVR minimums on runways without touchdown and centerline lights using only a flight director, unless accompanied by the use of an autopilot with an approach coupler.

12.1.3.5 The naming of multiple approaches of the same type to the same runway is also changing. Multiple approaches with the same guidance will be annotated with an alphabetical suffix beginning at the end of the alphabet and working backwards for subsequent procedures (e.g., ILS Z RWY 28, ILS Y RWY 28, etc.). The existing annotations such as ILS 2 RWY 28 or Silver ILS RWY 28 will be phased out and replaced with the new designation. The Cat II and Cat III designations are used to differentiate between multiple ILSs to the same runway unless there are multiples of the same type.

12.1.3.6 RNAV (GPS) approaches to LNAV, LP, LNAV/VNAV and LPV lines of minima using WAAS and RNAV (GPS) approaches to LNAV and LNAV/VNAV lines of minima using GPS are charted as RNAV (GPS) RWY (Number) (e.g., RNAV (GPS) RWY 21).

12.1.3.7 Performance−Based Navigation (PBN) Box. As charts are updated, a procedure's PBN requirements and conventional equipment requirements will be prominently displayed in separate, standardized notes boxes.

For procedures with PBN elements, the PBN box will contain the procedure's navigation specification(s); and, if required: specific sensors or infrastructure needed for the navigation solution, any additional or advanced functional requirements, the minimum Required Navigation Performance (RNP) value, and any amplifying remarks. Items listed in this PBN box are REQUIRED for the procedure's PBN elements. For example, an ILS with an RNAV missed approach would require a specific capability to fly the missed approach portion of the procedure. That required capability will be listed in the PBN box. The separate Equipment Requirements box will list ground−based equipment requirements. On procedures with both PBN elements and equipment requirements, the PBN requirements box will be listed first. The publication of these notes will continue incrementally until all charts have been amended to comply with the new standard.

12.1.4 Approach minimums are based on the local altimeter setting for that airport, unless annotated otherwise; e.g., Oklahoma City/Will Rogers World approaches are based on having a Will Rogers World altimeter setting. When a different altimeter source is required, or more than one source is authorized, it will be annotated on the approach chart; e.g., use Sidney altimeter setting, if not received, use Scottsbluff altimeter setting. Approach minimums may be raised when a nonlocal altimeter source is authorized. When more than one altimeter source is authorized, and the minima are different, they will be shown by separate lines in the approach minima box or a note; e.g., use MHK altimeter setting; when not available use SLN altimeter setting and increase all MDAs 40 feet. The altimeter source location may be referenced by city name, city and state, airport name, or the FAA location identifier. When using the location identifier, an airport outside the contiguous U.S. will use both the FAA and ICAO identifiers. New approach procedures and future amendments of existing procedures will use airport identifiers as the standard reference. When the altimeter must be obtained from a source other than air traffic a note will indicate the source; e.g., Obtain local altimeter setting on CTAF. When the altimeter setting(s) on which the approach is based is not available, the approach is not authorized. Baro−VNAV must be flown using the local altimeter setting only. Where no local altimeter is available, the LNAV/VNAV line will still be published for use by WAAS receivers with a note that Baro−VNAV is not authorized. When a local and at least one other altimeter setting source is authorized and the local altimeter is not available Baro−VNAV is not authorized; however, the LNAV/VNAV minima can still be used by WAAS receivers using the alternate altimeter setting source.

NOTE−
Barometric Vertical Navigation (baro−VNAV). An RNAV system function which uses barometric altitude information from the aircraft's altimeter to compute and present a vertical guidance path to the pilot. The specified vertical path is computed as a geometric path, typically computed between two waypoints or an angle based computation from a single waypoint. Further guidance may be found in Advisory Circular 90−105.

12.1.5 A pilot adhering to the altitudes, flight paths, and weather minimums depicted on the IAP chart or vectors and altitudes issued by the radar controller, is assured of terrain and obstruction clearance and runway or airport alignment during approach for landing.

12.1.6 IAPs are designed to provide an IFR descent from the en route environment to a point where a safe landing can be made. They are prescribed and approved by appropriate civil or military authority to ensure a safe descent during instrument flight conditions at a specific airport. It is important that pilots understand these procedures and their use prior to attempting to fly instrument approaches.

12.1.7 TERPS criteria are provided for the following types of instrument approach procedures:

12.1.7.1 Precision Approach (PA). An instrument approach based on a navigation system that provides course and glidepath deviation information meeting the precision standards of ICAO Annex 10. For example, PAR, ILS,and GLS are precision approaches.

12.1.7.2 Approach with Vertical Guidance (APV). An instrument approach based on a navigation system that is not required to meet the precision approach standards of ICAO Annex 10 but provides course and glidepath deviation information. For example, Baro−VNAV, LDA with glidepath, LNAV/VNAV and LPV are APV approaches.

12.1.7.3 Nonprecision Approach (NPA). An instrument approach based on a navigation system which provides course deviation information, but no glidepath deviation information. For example, VOR, NDB and LNAV. As noted in subparagraph 12.10, Vertical Descent Angle (VDA) on Nonprecision Approaches, some approach procedures may provide a Vertical Descent Angle as an aid in flying a stabilized approach, without requiring its use in order to fly the procedure. This does not make the approach an APV procedure, since it must still be flown to an MDA and has not been evaluated with a glidepath.

12.2 The method used to depict prescribed altitudes on instrument approach charts differs according to techniques employed by different chart publishers. Prescribed altitudes may be depicted in four different configurations: minimum, maximum, mandatory, and recommended. The U.S. Government distributes charts produced by National Geospatial−Intelligence Agency (NGA) and FAA. Altitudes are depicted on these charts in the profile view with underscore, overscore, both or none to identify them as minimum, maximum, mandatory or recommended.

12.2.1 Minimum altitude will be depicted with the altitude value underscored. Aircraft are required to maintain altitude at or above the depicted value, for example, $\underline{3000}$.

12.2.2 Maximum altitude will be depicted with the altitude value overscored. Aircraft are required to maintain altitude at or below the depicted value, for example, $\overline{4000}$.

12.2.3 Mandatory altitude will be depicted with the altitude value both underscored and overscored. Aircraft are required to maintain altitude at the depicted value, for example, $\overline{\underline{5000}}$.

12.2.4 Recommended altitude will be depicted with no overscore or underscore. These altitudes are depicted for descent planning, for example, 6000.

NOTE−

1. *Pilots are cautioned to adhere to altitudes as prescribed because, in certain instances, they may be used as the basis for vertical separation of aircraft by ATC. When a depicted altitude is specified in the ATC clearance, that altitude becomes mandatory as defined above.*

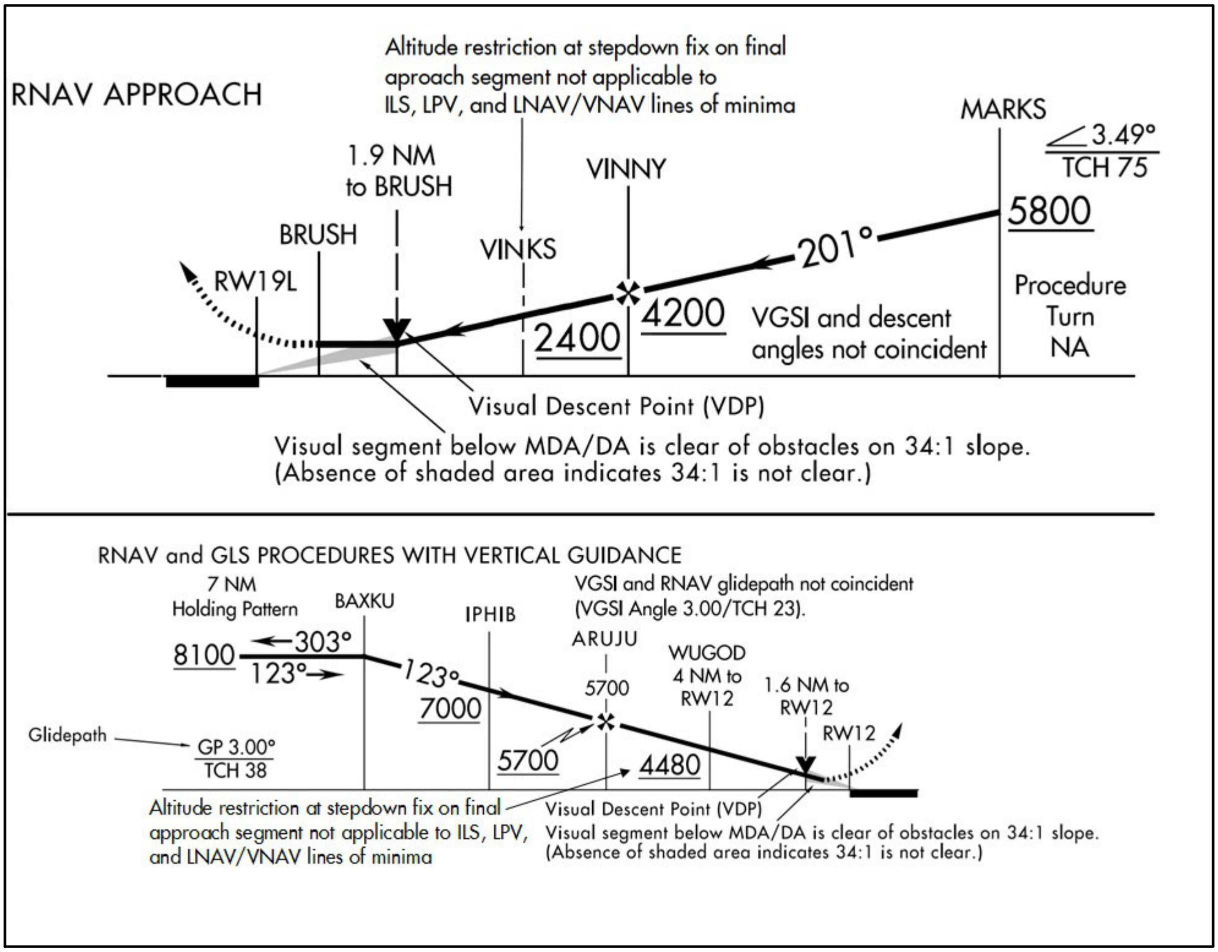
2. *The ILS glide slope is intended to be intercepted at the published glide slope intercept altitude. This point marks the PFAF and is depicted by the "lightning bolt" symbol on U.S. Government charts. Intercepting the glide slope at this altitude marks the beginning of the final approach segment and ensures required obstacle clearance during descent from the glide slope intercept altitude to the lowest published decision altitude for the approach. Interception and tracking of the glide slope prior to the published glide slope interception altitude does not necessarily ensure that minimum, maximum, and/or mandatory altitudes published for any preceding fixes will be complied with during the descent. If the pilot chooses to track the glide slope prior to the glide slope interception altitude, they remain responsible for complying with published altitudes for any preceding stepdown fixes encountered during the subsequent descent.*

3. *Approaches used for simultaneous (parallel) independent and simultaneous close parallel operations procedurally require descending on the glideslope from the altitude at which the approach clearance is issued (refer to ENR 1.5−19. and ENR 1.5−20.). For simultaneous close parallel (PRM) approaches, the Attention All Users Page (AAUP) may publish a note which indicates that descending on the glideslope/glidepath meets all crossing restrictions. However, if no such note is published, and for simultaneous independent approaches (4300 and greater runway separation) where an AAUP is not published, pilots are cautioned to monitor their descent on the glideslope/path outside of the PFAF to ensure compliance with published crossing restrictions during simultaneous operations.*

4. *When parallel approach courses are less than 2500 feet apart and reduced in-trail spacing is authorized for simultaneous dependent operations, a chart note will indicate that simultaneous operations require use of vertical guidance and that the pilot should maintain last assigned altitude until established on glide slope. These approaches procedurally require utilization of the ILS glide slope for wake turbulence mitigation. Pilots should not confuse these simultaneous dependent operations with (SOIA) simultaneous close parallel PRM approaches, where PRM appears in the approach title.*

12.2.5 Altitude restrictions depicted at stepdown fixes within the final approach segment are applicable only when flying a Non−Precision Approach to a straight−in or circling line of minima identified as an MDA. These altitude restrictions may be annotated with a note "LOC only" or "LNAV only." Stepdown fix altitude restrictions within the final approach segment do not apply to pilots using Precision Approach (ILS) or Approach with Vertical Guidance (LPV, LNAV/VNAV) lines of minima identified as a DA, since obstacle clearance on these approaches is based on the aircraft following the applicable vertical guidance. Pilots are responsible for adherence to stepdown fix altitude restrictions when outside the final approach segment (i.e., initial or intermediate segment), regardless of which type of procedure the pilot is flying. (See FIG ENR 1.5−17).

FIG ENR 1.5−17
Instrument Approach Procedure Stepdown Fixes



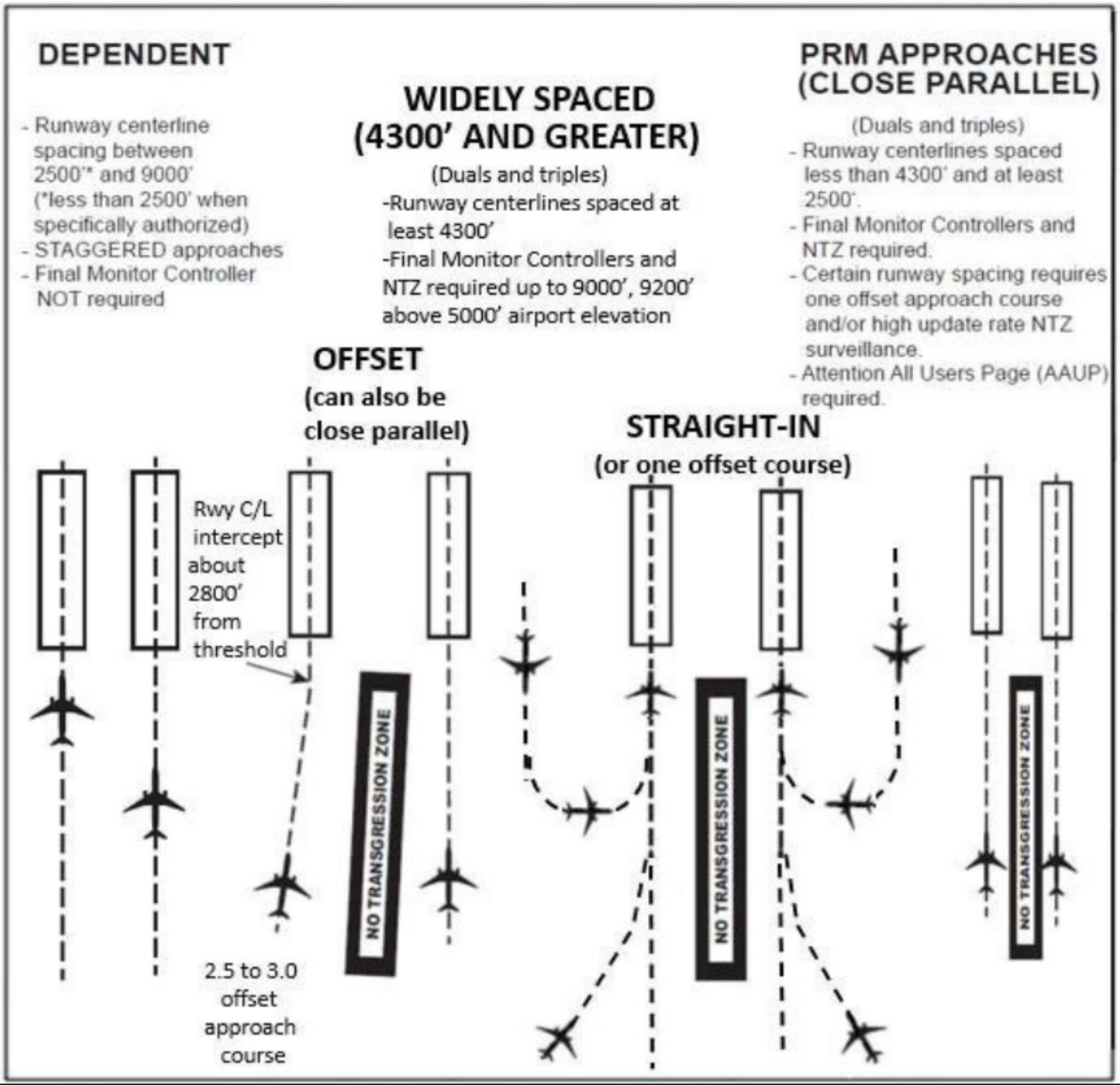
12.3 The **Minimum Safe Altitudes (MSA)** is published for emergency use on IAP or departure procedure (DP) graphic charts. MSAs provide 1,000 feet of clearance over all obstacles, but do not necessarily assure acceptable navigation signal coverage. The MSA depiction on the plan view of an approach chart or on a DP graphic chart contains the identifier of the center point of the MSA, the applicable radius of the MSA, a depiction of the sector(s), and the minimum altitudes above mean sea level which provide obstacle clearance. For conventional navigation systems, the MSA is normally based on the primary omnidirectional facility on which the IAP or DP graphic chart is predicated, but may be based on the airport reference point (ARP) if no suitable facility is available. For RNAV approaches or DP graphic charts, the MSA is based on an RNAV waypoint. MSAs normally have a 25 NM radius; however, for conventional navigation systems, this radius may be expanded to 30 NM if necessary to encompass the airport landing surfaces. A single sector altitude is normally established, however when the MSA is based on a facility and it is necessary to obtain relief from obstacles, an MSA with up to four sectors may be established.

12.4 Terminal Arrival Area (TAA)

12.4.1 The TAA provides a transition from the en route structure to the terminal environment with little required pilot/air traffic control interface for aircraft equipped with Area Navigation (RNAV) systems. A TAA provides minimum altitudes with standard obstacle clearance when operating within the TAA boundaries. TAAs are primarily used on RNAV approaches but may be used on an ILS approach when RNAV is the sole means for navigation to the IF; however, they are not normally used in areas of heavy concentration of air traffic.

17. Simultaneous Approaches to Parallel Runways

FIG ENR 1.5−31
Simultaneous Approaches
(Approach Courses Parallel and Offset between 2.5 and 3.0 degrees)



17.1 ATC procedures permit ILS/RNAV/GLS instrument approach operations to dual or triple parallel runway configurations. ILS/RNAV/GLS approaches to parallel runways are grouped into three classes: Simultaneous Dependent Approaches; Simultaneous Independent Approaches; and Simultaneous Close Parallel PRM Approaches. RNAV approach procedures that are approved for simultaneous operations require GPS as the sensor for position updating. VOR/DME, DME/DME and IRU RNAV updating is not authorized. The classification of a parallel runway approach procedure is dependent on adjacent parallel runway centerline separation, ATC procedures, and airport ATC final approach radar monitoring and communications capabilities. At some airports, one or more approach courses may be offset up to 3 degrees. ILS approaches with offset localizer configurations result in loss of Category II/III capabilities and an increase in decision altitude/height (50').

17.2 Depending on weather conditions, traffic volume, and the specific combination of runways being utilized for arrival operations, a runway may be used for different types of simultaneous operations, including closely spaced dependent or independent approaches. Pilots should ensure that they understand the type of operation that is being conducted, and ask ATC for clarification if necessary.

17.3 Parallel approach operations demand heightened pilot situational awareness. Once cleared for an approach procedure, each pilot must maintain the lateral and vertical path of the procedure unless otherwise instructed by ATC. Instrument approach procedures using a curved or straight path to transition to the final segment may be used in conjunction with simultaneous operations. Pilots may notice nearby aircraft on adjacent approaches. As each aircraft nears the final approach fix, it may appear to the pilots involved that these aircraft are on converging or intercepting flight tracks. The procedures provide safe separation between aircraft. Each pilot should maintain close adherence to the approach procedure. Each pilot should be prepared to take appropriate action should adjacent aircraft deviate in a manner that creates a collision hazard to their aircraft and notify ATC. Pilots are informed by ATC or through the ATIS that simultaneous approaches are in use.

17.4 The close proximity of adjacent aircraft conducting simultaneous independent approaches, especially simultaneous close parallel PRM approaches mandates strict pilot compliance with all ATC clearances. ATC assigned airspeeds, altitudes, and headings must be complied with in a timely manner. Autopilot coupled approaches require pilot knowledge of procedures necessary to comply with ATC instructions. Simultaneous independent approaches, particularly simultaneous close parallel PRM approaches necessitate precise approach course tracking to minimize final monitor controller intervention, and unwanted No Transgression Zone (NTZ) penetration. In the unlikely event of a breakout, ATC will not assign altitudes lower than the minimum vectoring altitude. Pilots should notify ATC immediately if there is a degradation of aircraft or navigation systems.

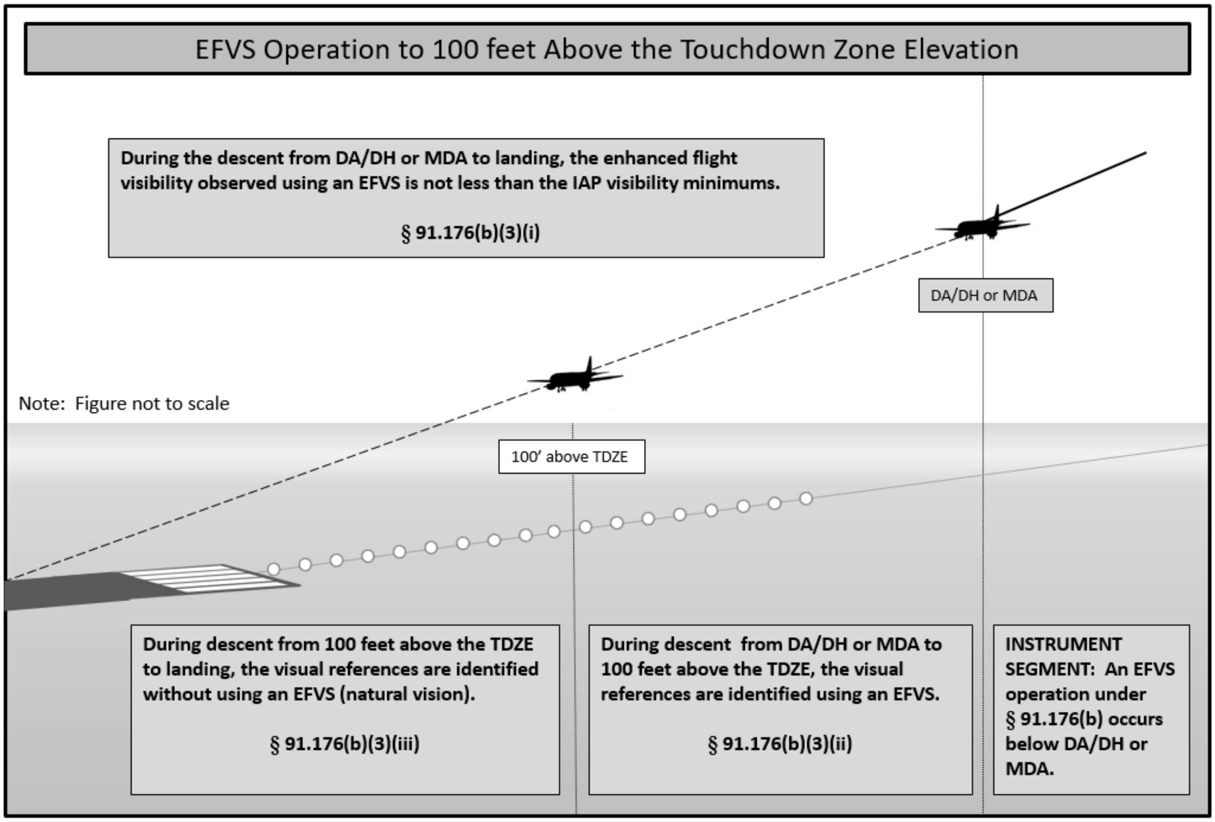
17.5 Strict radio discipline is mandatory during simultaneous independent and simultaneous close parallel PRM approach operations. This includes an alert listening watch and the avoidance of lengthy, unnecessary radio transmissions. Attention must be given to proper call sign usage to prevent the inadvertent execution of clearances intended for another aircraft. Use of abbreviated call signs must be avoided to preclude confusion of aircraft with similar sounding call signs. Pilots must be alert to unusually long periods of silence or any unusual background sounds in their radio receiver. A stuck microphone may block the issuance of ATC instructions on the tower frequency by the final monitor controller during simultaneous independent and simultaneous close parallel PRM approaches. In the case of PRM approaches, the use of a second frequency by the monitor controller mitigates the "stuck mike" or other blockage on the tower frequency.

REFERENCE−
AIP GEN 3.4, Paragraph 4.4, Radio Communications Phraseology and Techniques, gives additional communications information.

17.6 Use of Traffic Collision Avoidance Systems (TCAS) provides an additional element of safety to parallel approach operations. Pilots should follow recommended TCAS operating procedures presented in approved flight manuals, original equipment manufacturer recommendations, professional newsletters, and FAA publications.

FIG ENR 1.5−39

EFVS Operation to 100 ft Above the TDZE



24.4 EFVS Equipment Requirements. An EFVS that is installed on a U.S.−registered aircraft and is used to conduct EFVS operations must conform to an FAA−type design approval (i.e., a type certificate (TC), amended TC, or supplemental type certificate (STC)). A foreign−registered aircraft used to conduct EFVS operations that does not have an FAA−type design approval must be equipped with an EFVS that has been approved by either the State of the Operator or the State of Registry to meet the requirements of ICAO Annex 6. Equipment requirements for an EFVS operation to touchdown and rollout can be found in 14 CFR § 91.176(a)(1), and the equipment requirements for an EFVS operation to 100 feet above the TDZE can be found in 14 CFR § 91.176(b)(1). An operator can determine the eligibility of their aircraft to conduct EFVS operations by referring to the Airplane Flight Manual, Airplane Flight Manual Supplement, Rotorcraft Flight Manual, or Rotorcraft Flight Manual Supplement as applicable.

24.5 Operating Requirements. Any operator who conducts EFVS operations to touchdown and rollout (14 CFR § 91.176(a)) must have an OpSpec, MSpec, or LOA that specifically authorizes those operations. Parts 91K, 121, 125, 129, and 135 operators who conduct EFVS operations to 100 feet above the TDZE (14 CFR § 91.176(b))must have an OpSpec, MSpec, or LOA that specifically authorizes the operation. Part 91 operators (other than 91K operators) are not required to have an LOA to conduct EFVS operations to 100 feet above the TDZE in the United States. However, an optional LOA is available to facilitate operational approval from foreign Civil Aviation Authorities (CAA). To conduct an EFVS operation to touchdown and rollout during an authorized Category II or III operation, the operator must have:

24.5.1 An OpSpec, MSpec, or LOA authorizing EFVS operations to touchdown and rollout (14 CFR § 91.176(a)); and

24.5.2 An OpSpec, MSpec, or LOA authorizing Category II or Category III operations.

24.6 EFVS Operations in Rotorcraft. Currently, EFVS operations in rotorcraft can only be conducted on IAPs that are flown to a runway. Instrument approach criteria, procedures, and appropriate visual references have not yet been developed for straight−in landing operations below DA/DH or MDA under IFR to heliports or platforms. An EFVS cannot be used in lieu of natural vision to descend below published minimums on copter approaches to a point in space (PinS) followed by a "proceed visual flight rules (VFR)" visual segment, or on approaches designed to a specific landing site using a "proceed visually" visual segment.

24.7 EFVS Pilot Requirements. A pilot who conducts EFVS operations must receive ground and flight training specific to the EFVS operation to be conducted. The training must be obtained from an authorized training provider under a training program approved by the FAA. Additionally, recent flight experience and proficiency or competency check requirements apply to EFVS operations. These requirements are addressed in 14 CFR §§ 61.66, 91.1065, 121.441, Appendix F to Part 121, 125.287, and 135.293.

24.8 Enhanced Flight Visibility and Visual Reference Requirements. To descend below DA/DH or MDA during EFVS operations under 14 CFR § 91.176(a) or (b), a pilot must make a determination that the enhanced flight visibility observed by using an EFVS is not less than what is prescribed by the IAP being flown. In addition, the visual references required in 14 CFR § 91.176(a) or (b) must be distinctly visible and identifiable to the pilot using the EFVS. The determination of enhanced flight visibility is a separate action from that of identifying required visual references, and is different from ground−reported visibility. Even though the reported visibility or the visibility observed using natural vision may be less, as long as the EFVS provides the required enhanced flight visibility and a pilot meets all of the other requirements, the pilot can continue descending below DA/DH or MDA using the EFVS. Suitable enhanced flight visibility is necessary to ensure the aircraft is in a position to continue the approach and land. It is important to understand that using an EFVS does not result in obtaining lower minima with respect to the visibility or the DA/DH or MDA specified in the IAP. An EFVS simply provides another means of operating in the visual segment of an IAP. The DA/DH or MDA and the visibility value specified in the IAP to be flown do not change.

24.9 Flight Planning and Beginning or Continuing an Approach Under IFR. A Part 121, 125, or 135 operator's OpSpec or LOA for EFVS operations may authorize an EFVS operational credit dispatching or releasing a flight and for beginning or continuing an instrument approach procedure. When a pilot reaches DA/DH or MDA, the pilot conducts the EFVS operation in accordance with 14 CFR § 91.176(a) or (b) and their authorization to conduct EFVS operations.

24.10 Missed Approach Considerations. In order to conduct an EFVS operation, the EFVS must be operable. In the event of a failure of any required component of an EFVS at any point in the approach to touchdown, a missed approach is required. However, this provision does not preclude a pilot's authority to continue an approach if continuation of an approach is considered by the pilot to be a safer course of action.

24.11 Light Emitting Diode (LED) Airport Lighting Impact on EFVS Operations. Incandescent lamps are being replaced with LEDs at some airports in threshold lights, taxiway edge lights, taxiway centerline lights, low intensity runway edge lights, wind cone lights, beacons, and some obstruction lighting. Additionally, there are plans to replace incandescent lamps with LEDs in approach lighting systems. Pilots should be aware that LED lights cannot be sensed by infrared−based EFVSs. Airports with LED approach lights will be identified in the Airport Remarks paragraph of the Charting Supplement with the remarks: "Pilots conducting EFVS ops; be aware LED ALS in use." More information may be found at the FAA Flight Standards EFVS webpage at https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/efvs.

24.12 Other Vision Systems. Unlike an EFVS that meets the equipment requirements of 14 CFR § 91.176, a Synthetic Vision System (SVS) or Synthetic Vision Guidance System (SVGS) does not provide a real−time sensor image of the outside scene and also does not meet the equipment requirements for EFVS operations. A pilot cannot use a synthetic vision image on a head−up or a head−down display in lieu of natural vision to descend below DA/DH or MDA. An EFVS can, however, be integrated with an SVS, also known as a Combined Vision System (CVS). A CVS can be used to conduct EFVS operations if all of the requirements for an EFVS are satisfied and the SVS image does not interfere with the pilot's ability to see the external scene, to identify the required visual references, or to see the sensor image.

24.13 Additional Information. Operational criteria for EFVS can be found in Advisory Circular (AC) 90−106, Enhanced Flight Vision System Operations, and airworthiness criteria for EFVS can be found in AC 20−167, Airworthiness Approval of Enhanced Vision System, Synthetic Vision System, Combined Vision System, and Enhanced Flight Vision System Equipment.

25. Visual Approach

25.1 A visual approach is conducted on an IFR flight plan and authorizes a pilot to proceed visually and clear of clouds to the airport. The pilot must have either the airport or the preceding identified aircraft in sight. This approach must be authorized and controlled by the appropriate air traffic control facility. Reported weather at the airport must have a ceiling at or above 1,000 feet and visibility 3 miles or greater. ATC may authorize this type of approach when it will be operationally beneficial. Visual approaches are an IFR procedure conducted under Instrument Flight Rules in visual meteorological conditions. Cloud clearance requirements of 14 CFR Section 91.155 are not applicable, unless required by operation specifications. When conducting visual approaches, pilots are encouraged to use other available navigational aids to assist in positive lateral and vertical alignment with the runway.

25.2 Operating to an Airport Without Weather Reporting Service. ATC will advise the pilot when weather is not available at the destination airport. ATC may initiate a visual approach provided there is a reasonable assurance that weather at the airport is a ceiling at or above 1,000 feet and visibility 3 miles or greater (e.g., area weather reports, PIREPs, etc.).

25.3 Operating to an Airport With an Operating Control Tower. Aircraft may be authorized to conduct a visual approach to one runway while other aircraft are conducting IFR or VFR approaches to another parallel, intersecting, or converging runway. ATC may authorize a visual approach after advising all aircraft involved that other aircraft are conducting operations to the other runway. This may be accomplished through use of the ATIS.

25.3.1 When operating to parallel runways separated by less than 2,500 feet, ATC will ensure approved separation is provided unless the succeeding aircraft reports sighting the preceding aircraft to the adjacent parallel and visual separation is applied.

25.3.2 When operating to parallel runways separated by at least 2,500 feet but less than 4,300 feet, ATC will ensure approved separation is provided until the aircraft are issued an approach clearance and one pilot has acknowledged receipt of a visual approach clearance, and the other pilot has acknowledged receipt of a visual or instrument approach clearance, and aircraft are established on a heading or established on a direct course to a fix or cleared on an RNAV/instrument approach procedure which will intercept the extended centerline of the runway at an angle not greater than 30 degrees.

25.3.3 When operating to parallel runways separated by 4,300 feet or more, ATC will ensure approved separation is provided until one of the aircraft has been issued and the pilot has acknowledged receipt of the visual approach clearance, and each aircraft is assigned a heading, or established on a direct course to a fix, or cleared on an RNAV/instrument approach procedure which will allow the aircraft to intercept the extended centerline of the runway at an angle not greater than 30 degrees.

NOTE−
The intent of the 30 degree intercept angle is to reduce the potential for overshoots of the final and to preclude side−by−side operations with one or both aircraft in a belly−up configuration during the turn−on.

25.4 Clearance for Visual Approach. At locations with an operating control tower, ATC will issue approach clearances that will include an assigned runway. At locations without an operating control tower or where a part−time tower is closed, ATC will issue a visual approach clearance to the airport only.

25.5 Separation Responsibilities. If the pilot has the airport in sight but cannot see the aircraft to be followed, ATC may clear the aircraft for a visual approach; however, ATC retains both separation and wake vortex separation responsibility. When visually following a preceding aircraft, acceptance of the visual approach clearance constitutes acceptance of pilot responsibility for maintaining a safe approach interval and adequate wake turbulence separation.

25.6 A visual approach is not an IAP and therefore has no missed approach segment. If a go−around is necessary for any reason, aircraft operating at controlled airports will be issued an appropriate clearance or instruction by the tower to enter the traffic pattern for landing or proceed as otherwise instructed. In either case, the pilot is responsible to maintain terrain and obstruction avoidance until reaching an ATC assigned altitude if issued, and ATC will provide approved separation or visual separation from other IFR aircraft. At uncontrolled airports, aircraft are expected to remain clear of clouds and complete a landing as soon as possible. If a landing cannot be accomplished, the aircraft is expected to remain clear of clouds and contact ATC as soon as possible for further clearance. Separation from other IFR aircraft will be maintained under these circumstances.

25.7 Visual approaches reduce pilot/controller workload and expedite traffic by shortening flight paths to the airport. It is the pilot's responsibility to advise ATC as soon as possible if a visual approach is not desired.

25.8 Authorization to conduct a visual approach is an IFR authorization and does not alter IFR flight plan cancellation responsibility. See ENR 1.10, Paragraph 11.2, Canceling IFR Flight Plan.

25.9 Radar service is automatically terminated, without advising the pilot, when the aircraft is instructed to change to advisory frequency.

26. Charted Visual Flight Procedures (CVFPs)

26.1 CVFPs are charted visual approaches established for environmental/noise considerations, and/or when necessary for the safety and efficiency of air traffic operations. The approach charts depict prominent landmarks, courses, and recommended altitudes to specific runways. CVFPs are designed to be used primarily for turbojet aircraft.

26.2 These procedures will be used only at airports with an operating control tower.

26.3 Most approach charts will depict some NAVAID information which is for supplemental navigational guidance only.

26.4 Unless indicating a Class B airspace floor, all depicted altitudes are for noise abatement purposes and are recommended only. Pilots are not prohibited from flying other than recommended altitudes if operational requirements dictate.

26.5 When landmarks used for navigation are not visible at night, the approach will be annotated "PROCEDURE NOT AUTHORIZED AT NIGHT."

26.6 CVFPs usually begin within 20 flying miles from the airport.

26.7 Published weather minimums for CVFPs are based on minimum vectoring altitudes rather than the recommended altitudes depicted on charts.

26.8 CVFPs are not instrument approaches and do not have missed approach segments.

26.9 ATC will not issue clearances for CVFPs when the weather is less than the published minimum.

26.10 ATC will clear aircraft for a CVFP after the pilot reports siting a charted landmark or a preceding aircraft. If instructed to follow a preceding aircraft, pilots are responsible for maintaining a safe approach interval and wake turbulence separation.

26.11 Pilots should advise ATC if at any point they are unable to continue an approach or lose sight of a preceding aircraft. Missed approaches will be handled as a go−around.

26.12 When conducting visual approaches, pilots are encouraged to use other available navigational aids to assist in positive lateral and vertical alignment with the assigned runway.

27. Missed Approach

27.1 When a landing cannot be accomplished, advise ATC and, upon reaching the missed approach point defined on the approach procedure chart, the pilot must comply with the missed approach instructions for the procedure being used or with an alternate missed approach procedure specified by ATC.

27.2 Obstacle protection for missed approach is predicated on the missed approach being initiated at the decision altitude/decision height (DA/DH) or at the missed approach point and not lower than minimum descent altitude (MDA). A climb gradient of at least 200 feet per nautical mile is required, (except for Copter approaches, where a climb of at least 400 feet per nautical mile is required), unless a higher climb gradient is published in the notes section of the approach procedure chart. When higher than standard climb gradients are specified, the end point of the non−standard climb will be specified at either an altitude or a fix. Pilots must preplan to ensure that the aircraft can meet the climb gradient (expressed in feet per nautical mile) required by the procedure in the event of a missed approach, and be aware that flying at a higher than anticipated ground speed increases the climb rate requirement (feet per minute). Tables for the conversion of climb gradients (feet per nautical mile) to climb rate (feet per minute), based on ground speed, are included on page D1 of the U.S. Terminal Procedures booklets. Reasonable buffers are provided for normal maneuvers. However, no consideration is given to an abnormally early turn. Therefore, when an early missed approach is executed, pilots should, unless otherwise cleared by ATC, fly the IAP as specified on the approach plate to the missed approach point at or above the MDA or DH before executing a turning maneuver.

27.3 If visual reference is lost while circling to land from an instrument approach, the missed approach specified for that particular procedure must be followed (unless an alternate missed approach procedure is specified by ATC). To become established on the prescribed missed approach course, the pilot should make an initial climbing turn toward the landing runway and continue the turn until established on the missed approach course. Inasmuch as the circling maneuver may be accomplished in more than one direction, different patterns will be required to become established on the prescribed missed approach course depending on the aircraft position at the time visual reference is lost. Adherence to the procedure will help assure that an aircraft will remain laterally within the circling and missed approach obstruction clearance areas. Refer to paragraph 27.8 concerning vertical obstruction clearance when starting a missed approach at other than the MAP. (See FIG ENR 1.5−40.)

FIG ENR 1.5−40
Circling and Missed Approach Obstruction Clearance Areas

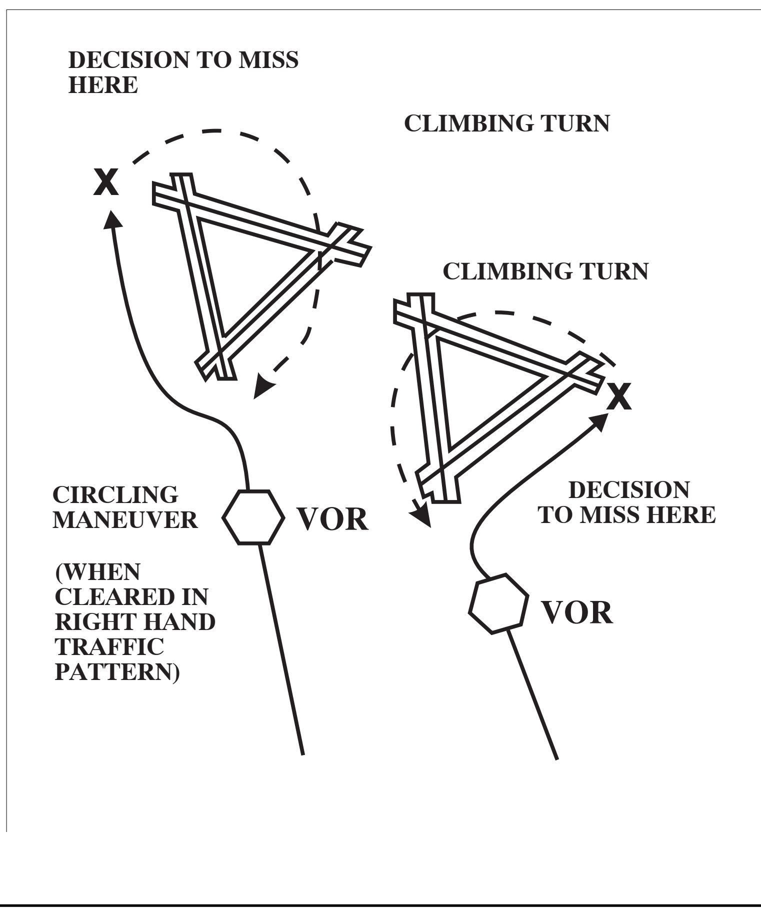


FIG ENR 1.5−41

Missed Approach

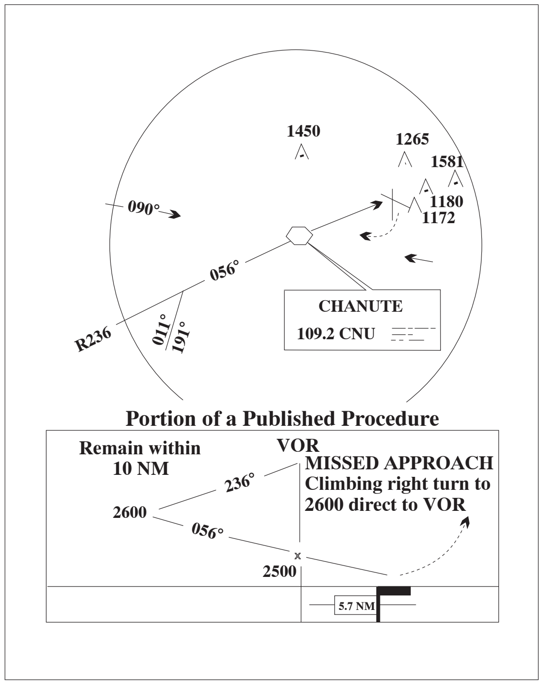
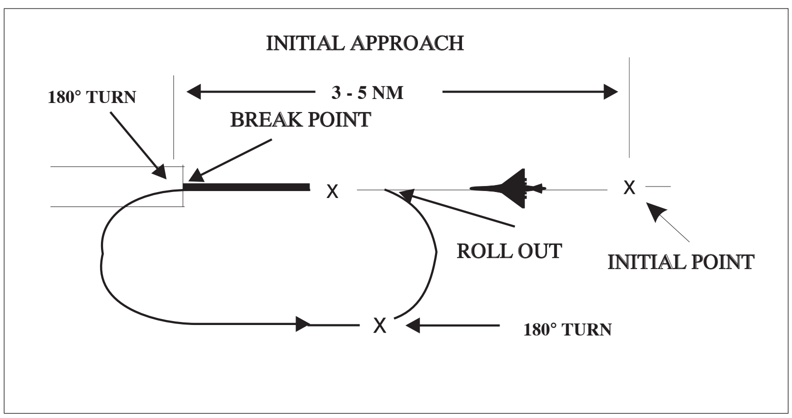


FIG ENR 1.5−42

Overhead Maneuver



27.4 At locations where ATC radar service is provided, the pilot should conform to radar vectors when provided by ATC in lieu of the published missed approach procedure.

27.5 Some locations may have a preplanned alternate missed approach procedure for use in the event the primary NAVAID used for the missed approach procedure is unavailable. To avoid confusion, the alternate missed approach instructions are not published on the chart. However, the alternate missed approach holding pattern will be depicted on the instrument approach chart for pilot situational awareness and to assist ATC by not having to issue detailed holding instructions. The alternate missed approach may be based on NAVAIDs not used in the approach procedure or the primary missed approach. When the alternate missed approach procedure is implemented by NOTAM, it becomes a mandatory part of the procedure. The NOTAM will specify both the textual instructions and any additional equipment requirements necessary to complete the procedure. Air traffic may also issue instructions for the alternate missed approach when necessary, such as when the primary missed approach NAVAID fails during the approach. Pilots may reject an ATC clearance for an alternate missed approach that requires equipment not necessary for the published approach procedure when the alternate missed

TERPS criteria for diverse departures. The DVA provides obstacle and terrain avoidance in lieu of taking off from the runway under IFR using an ODP or SID.

37.3 Pilots operating under 14 CFR Part 91 are strongly encouraged to file and fly a DP at night, during marginal Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC), when one is available. The following paragraphs will provide an overview of the DP program, why DPs are developed, what criteria are used, where to find them, how they are to be flown, and finally pilot and ATC responsibilities.

37.4 Why are DPs necessary? The primary reason is to provide obstacle clearance protection information to pilots. A secondary reason, at busier airports, is to increase efficiency and reduce communications and departure delays through the use of SIDs. When an instrument approach is initially developed for an airport, the need for DPs is assessed. The procedure designer conducts an obstacle analysis to support departure operations. If an aircraft may turn in any direction from a runway within the limits of the assessment area (see paragraph 37.5.3) and remain clear of obstacles, that runway passes what is called a diverse departure assessment and no ODP will be published. A SID may be published if needed for air traffic control purposes. However, if an obstacle penetrates what is called the 40:1 obstacle identification surface, then the procedure designer chooses whether to:

37.4.1 Establish a steeper than normal climb gradient; or

37.4.2 Establish a steeper than normal climb gradient with an alternative that increases takeoff minima to allow the pilot to visually remain clear of the obstacle(s); or

37.4.3 Design and publish a specific departure route; or

37.4.4 A combination or all of the above.

37.5 What criteria is used to provide obstruction clearance during departure?

37.5.1 Unless specified otherwise, required obstacle clearance for all departures, including diverse, is based on the pilot crossing the departure end of the runway at least 35 feet above the departure end of runway elevation, climbing to 400 feet above the departure end of runway elevation before making the initial turn, and maintaining a minimum climb gradient of 200 feet per nautical mile (FPNM), unless required to level off by a crossing restriction, until the minimum IFR altitude. A greater climb gradient may be specified in the DP to clear obstacles or to achieve an ATC crossing restriction. If an initial turn higher than 400 feet above the departure end of runway elevation is specified in the DP, the turn should be commenced at the higher altitude. If a turn is specified at a fix, the turn must be made at that fix. Fixes may have minimum and/or maximum crossing altitudes that must be adhered to prior to passing the fix. In rare instances, obstacles that exist on the extended runway centerline may make an "early turn" more desirable than proceeding straight ahead. In these cases, the published departure instructions will include the language "turn left(right) as soon as practicable." These departures will also include a ceiling and visibility minimum of at least 300 and 1. Pilots encountering one of these DPs should preplan the climb out to gain altitude and begin the turn as quickly as possible within the bounds of safe operating practices and operating limitations. This type of departure procedure is being phased out.

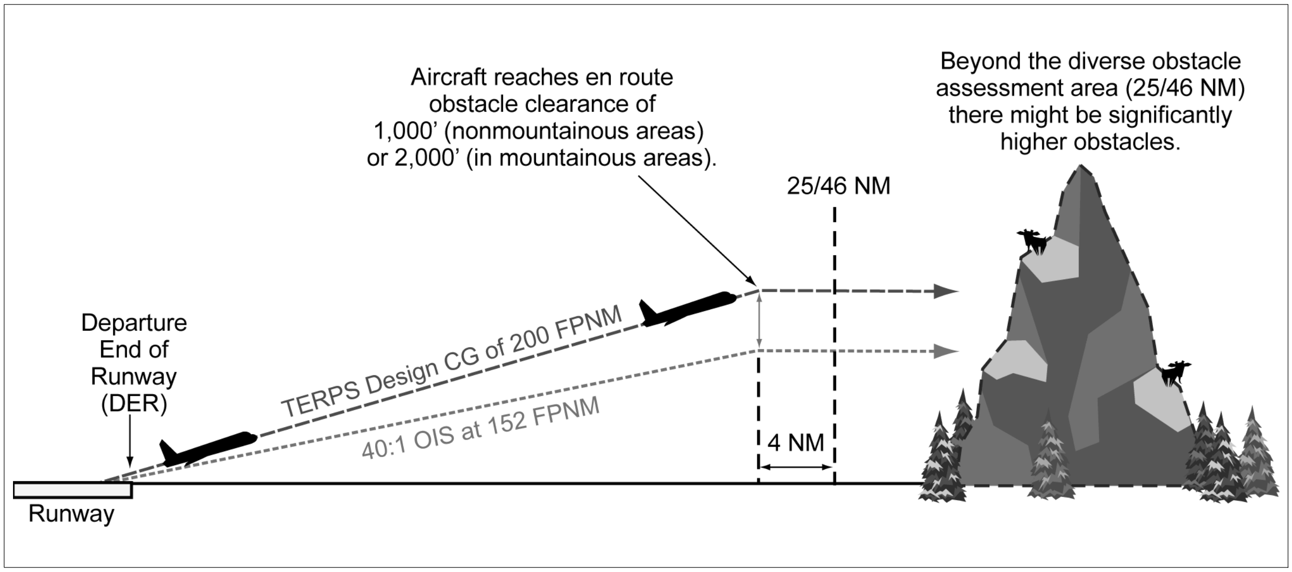
NOTE−
"Practical" or "feasible" may exist in some existing departure text instead of "practicable."

37.5.2 ODPs, SIDs, and DVAs assume normal aircraft performance, and that all engines are operating. Development of contingency procedures, required to cover the case of an engine failure or other emergency in flight that may occur after liftoff, is the responsibility of the operator. (More detailed information on this subject is available in Advisory Circular AC 120−91, Airport Obstacle Analysis, and in the "Departure Procedures" section of chapter 2 in the Instrument Procedures Handbook, FAA−H−8083−16.)

37.5.3 The 40:1 obstacle identification surface (OIS) begins at the departure end of runway (DER) and slopes upward at 152 FPNM until reaching the minimum IFR altitude or entering the en route structure. This assessment area is limited to 25 NM from the airport in nonmountainous areas and 46 NM in designated mountainous areas. Beyond this distance, the pilot is responsible for obstacle clearance if not operating on a published route, if below (having not reached) the MEA or MOCA of a published route, or an ATC assigned altitude. See FIG ENR 1.5−43. (Ref 14 CFR 91.177 for further information on en route altitudes.)

NOTE−
ODPs are normally designed to terminate within these distance limitations, however, some ODPs will contain routes that may exceed 25/46 NM; these routes will insure obstacle protection until reaching the end of the ODP.

FIG ENR 1.5−43
Diverse Departure Obstacle Assessment to 25/46 NM



37.5.4 Takeoff Obstacles. Takeoff Obstacles Notes in the "Takeoff Minimums and (OBSTACLE) Departure Procedures" section of the Terminal Procedures Publication (TPP) identifies obstacle(s) that penetrate the 40:1 OCS. The obstacle notes alert the pilot to the height and location of the obstacles relative to the DER so they can be avoided. This can be accomplished in a variety of ways: the pilot may be able to see and avoid the obstruction; early liftoff/climb performance may allow the aircraft to cross well above the obstacle(s); or if the obstacle(s) cannot be visually acquired during departure, the takeoff should be delayed or another runway selected for the IFR departure.

37.5.4.1 Takeoff obstacles will be published as low, close−in and/or takeoff minimums obstacle notes.

a) Low, close−in obstacles require a higher than standard climb gradient (within 1 NM or less from DER) to an altitude of 200 feet or less above DER elevation and do not require increased takeoff minimums.

b) Takeoff minimums obstacles require a higher than standard climb gradient (within 2.6 NM from DER) to an altitude greater than 200 feet above the DER elevation and require increased takeoff minimums. These obstacles are published with higher than standard ceiling and visibility takeoff minimums and are published in the same obstacle listing.

37.5.4.2 Obstacle notes are not required to be charted on SIDs. When a pilot is assigned a SID for departure refer to the airport entry in the TPP or the graphic ODP to obtain information on the takeoff obstacles.

37.5.4.3 The FAA redefined the initial climb area criteria that are used to evaluate and identify the obstacles that penetrate the 40:1 OCS. The takeoff obstacle notes are published in a different manner, and an additional minimums option is added for the departure. To ensure the pilot knows which evaluation was accomplished, the charting will be different by bolding certain headers and runway information. Until the FAA can amend all departures the legacy obstacle notes will still be published.

a) For textual departures, the headers Takeoff Minimums, Departure Procedures, and Takeoff Obstacle Notes will be bolded and underlined. The specific runway entries under each header will continue to be bolded.

b) For graphic departure procedures, the headers Takeoff Minimums and Takeoff Obstacle Notes will be bolded and continue to be underlined. The specific runway entries for these headers will be bolded. In the

Departure Route Description section of the graphic departure, the heading will be bolded and underlined, and the runway information will just be bolded.

c) Legacy takeoff obstacle notes combine low, close−in and takeoff obstacles for each runway.

d) New takeoff obstacle notes separate low, close−in and takeoff minimums obstacle notes. There is also a DER crossing altitude included in the notes section, providing the pilot with a DER crossing height that clears all obstacles that penetrate the 40:1 OCS.

e) The obstacles are described with an inner limit from the DER, using the word "beginning," expressed in 1/4 SM increments rounded down and an outer limit, using the words "extending to" expressed in 1/4 SM increments rounded up. They will also be described in relation to the extended runway centerline as "left, right, or crossing." Crossing means they are within 100ft of the centerline. Left or right means they are greater than 100 ft from centerline. Both an MSL altitude and height above DER elevation will be provided for the obstacle that penetrates the 40:1 OCS the most. This allows the pilot to determine when the reported weather conditions are adequate to see and avoid the low, close−in obstacle(s), if aircraft performance does not permit the aircraft to climb over them. It also allows the pilot to correlate the position of the obstacles and the MSL elevation and height above DER for the controlling obstacle for the published higher than standard takeoff minimums.

f) A DER crossing height using standard ceiling/visibility is provided as a new takeoff minimums option for pilots in addition to the current options (higher than standard ceiling/visibility or standard ceiling/visibility with a higher than standard climb gradient, or a reduced takeoff runway length with a standard climb gradient and standard ceiling/visibility).

EXAMPLE−
Legacy takeoff minimums and obstacle notes

TAKEOFF MINIMUMS:
Rwy12 L/R*, 400-2 1/2 or std. w/min. climb of 261' per NM to 500.*

TAKEOFF OBSTACLE NOTES:
Rwy 14*, trees 2011' from DER, 29' left of centerline, 100' AGL/3829' MSL.*

Rwy 32*, trees 1009' from DER, 697' left of centerline, 100' AGL/3839' MSL. Tower 4448' from DER, 1036' left of centerline, 165' AGL/3886' MSL.*

EXAMPLE−
New takeoff minimums and obstacle notes

TAKEOFF MINIMUMS:
Rwy12 L/R: *400−2 1/2 or std. w/min. climb of 261' per NM to 500 or standard and crossing DER 66' above DER Elev clears takeoff minimums obstacles.*

TAKEOFF OBSTACLE NOTES:
Rwy 12L LOW, CLOSE−IN OBSTACLES: *trees beginning 600' from DER, extending to 1/2 SM, crossing centerline, up to 156' MSL, 86' above DER, crossing DER 49' above DER Elev clears low, close−in obstacles.*

Rwy 12L TAKEOFF MINIMUMS OBSTACLES: *buildings, crane, tower beginning 1 1/2 SM from DER, extending to 1 3/4 SM, left, right, and crossing centerline, up to 373' MSL, 284' above DER, crossing DER at 66' above DER Elev clears takeoff minimums obstacles.*

Rwy 12R LOW, CLOSE−IN OBSTACLES: *obstacles 35' and below.*

Rwy 12R TAKEOFF MINIMUMS OBSTACLES: *buildings, crane, tower beginning 1 1/2 SM from DER, extending to 1 3/4 SM, left, right, and crossing centerline, up to 373' MSL, 284' above DER, crossing DER at 66' above DER Elev clears take−off minimums obstacles.*

Rwy 30L/R LOW, CLOSE−IN OBSTACLES: *obstacles 35' and below.*

37.5.4.4 Compliance with 14 CFR part 121 or 135 one−engine−inoperative (OEI) departure performance requirements, or similar ICAO/State rules, cannot be assured by the sole use of takeoff obstacle note data as published in the TPP. Operators conducting these operations should refer to precise data sources (i.e., GIS database, etc.) specifically intended for OEI departure planning (see AC 120−91).

37.5.5 Climb gradients greater than 200 FPNM are specified when required to support procedure design constraints, obstacle clearance, and/or airspace restrictions. Compliance with a climb gradient for these purposes is mandatory when the procedure is part of the ATC clearance, unless increased takeoff minimums are provided and weather conditions allow compliance with these minimums.

NOTE−
Climb gradients for ATC purposes are being phased out on SIDs.

EXAMPLE−
"Cross ALPHA intersection at or below 4000; maintain 6000." The pilot climbs at least 200 FPNM to 6000. If 4000 is reached before ALPHA, the pilot levels off at 4000 until passing ALPHA; then immediately resumes at least 200 FPNM climb.

EXAMPLE−
"TAKEOFF MINIMUMS: RWY 27, Standard with a minimum climb of 280' per NM to 2500." A climb of at least 280 FPNM is required to 2500 and is mandatory when the departure procedure is included in the ATC clearance.

NOTE−
Some SIDs still retain labeled "ATC" climb gradients published or have climb gradients that are established to meet a published altitude restriction that is not required for obstacle clearance or procedure design criteria. These procedures will be revised in the course of the normal procedure amendment process.

37.5.6 Climb gradients may be specified only to an altitude/fix, above which the normal gradient applies.

An ATC−required altitude restriction published at a fix, will not have an associated climb gradient published with that restriction. Pilots are expected to determine if crossing altitudes can be met, based on the performance capability of the aircraft they are operating.

EXAMPLE−
"Minimum climb 340 FPNM to ALPHA." The pilot climbs at least 340 FPNM to ALPHA, then at least 200 FPNM to MIA.

37.5.7 A Visual Climb Over Airport (VCOA) procedure is a departure option for an IFR aircraft, operating in visual meteorological conditions equal to or greater than the specified visibility and ceiling, to visually conduct climbing turns over the airport to the published "at or above" altitude. At this point, the pilot may proceed in instrument meteorological conditions to the first en route fix using a diverse departure, or to proceed via a published routing to a fix from where the aircraft may join the IFR en route structure, while maintaining a climb gradient of at least 200 feet per nautical mile. VCOA procedures are developed to avoid obstacles greater than 3 statute miles from the departure end of the runway as an alternative to complying with climb gradients greater than 200 feet per nautical mile. Pilots are responsible to advise ATC as early as possible of the intent to fly the VCOA option prior to departure. Pilots are expected to remain within the distance prescribed by the published visibility minimums during the climb over the airport until reaching the "at or above" altitude for the VCOA procedure. If no additional routing is published, then the pilot may proceed in accordance with their IFR clearance. If additional routing is published after the "at−or−above" altitude, the pilot must comply with the route to a fix that may include a climb−in−holding pattern to reach the MEA/MIA for the en route portion of their IFR flight. These textual procedures are published in the Take−Off Minimums and (Obstacle) Departure Procedures section of the Terminal Procedures Publications and/or appear as an option on a Graphic ODP.

EXAMPLE−
TAKEOFF MINIMUMS: Rwy 32, standard with minimum climb of 410' per NM to 3000' or 1100−3 for VCOA.

VCOA: Rwy 32, obtain ATC approval for VCOA when requesting IFR clearance. Climb in visual conditions to cross Broken Bow Muni/Keith Glaze Field at or above 3500' before proceeding on course.

37.6 Obstacle Clearance Responsibilities. DPs are designed so that the pilot's adherence to the procedure's lateral path and vertical climb requirements will ensure obstacle protection.

37.6.1 Obstacle clearance responsibility rests with the pilot when he/she chooses to depart IFR under 14 CFR part 91 and has not filed or been cleared for an ODP or an ATC−assigned SID or assigned headings for a DVA from the departure runway. Standard takeoff minimums are one statute mile for aircraft having two engines or less and one−half statute mile for aircraft having more than two engines. Higher than standard ceiling and visibility minimums will allow visual avoidance of the obstacles during the initial climb at the standard climb gradient.

37.6.2 When cleared to depart IFR using the ODP, SID, VCOA, or assigned headings for DVA, pilots must reference the published takeoff minimums and takeoff obstacle notes.

37.6.2.1 Since the presence of low, close−in obstacles do not require publishing increased takeoff minimums the pilot should consider, if necessary to see and avoid these obstacles, the weather at time of takeoff. Based on the position of low, close−in obstacles, weather no less than 300 ft and 1 NM may be necessary to visually avoid obstacles.

37.6.2.2 Takeoff minimums obstacles are especially critical to aircraft that do not lift off until close to the departure end of the runway or which climb at the minimum rate. When departing IFR using the higher than standard takeoff minimums option, pilots are responsible for visually avoiding takeoff minimums obstacles. Pilots should also consider drift following lift−off to ensure sufficient clearance from these obstacles. The segment of the procedure that requires the pilot to see and avoid obstacles ends when the aircraft is beyond or above the ceiling and visibility published to avoid these obstacles.

37.6.3 When departing using the VCOA, obstacle avoidance is not guaranteed if the pilot maneuvers farther from the airport than the published visibility minimum for the VCOA prior to reaching the published VCOA altitude. Pilots are responsible for maintaining clearance from low, close−in obstacles.

37.6.4 When departing using a DVA, pilots are responsible for maintaining clearance from low, close−in obstacles. DVAs may also require a higher than standard climb gradient. Standard takeoff minimums apply when departing a runway under IFR when using the DVA. The existence of a DVA will be noted in the Takeoff Minimums and (Obstacle) Departure Procedure section of the TPP.

EXAMPLE−
DIVERSE VECTOR AREA (RADAR VECTORS) AMDT 1 14289 (FAA)

Rwy 6R*, headings as assigned by ATC; requires minimum climb of 290' per NM to 400.*

Rwys 6L*, 7L, 7R, 24R, 25R, headings as assigned by ATC.*

37.6.5 In all cases, continued obstacle clearance is based on having climbed a minimum of 200 feet per nautical mile to the specified point and then continuing to climb at least 200 feet per nautical mile during the departure until reaching the minimum en route altitude, unless higher than standard climb gradient is published. When a higher than standard climb gradient is published and used, that climb gradient is maintained, until reaching the climb gradient termination altitude, after which the standard 200 feet per nautical mile is maintained until reaching the minimum en route altitude.

NOTE−
As is always the case, when used by the controller during departure, the term "radar contact" should not be interpreted as relieving pilots of their responsibility to maintain appropriate terrain and obstruction clearance, which may include flying the obstacle DP.

37.7 Where are DPs located? DPs and DVAs will be listed by airport in the IFR Takeoff Minimums and (Obstacle) Departure Procedures Section, Section L, of the TPP. If the DP is textual, it will be described in TPP Section L. SIDs and complex ODPs will be published graphically and named. The name will be listed by airport name and runway in Section L. Graphic ODPs will also have the term "(OBSTACLE)" printed in the charted procedure title, differentiating them from SIDs.

37.7.1 An ODP that has been developed solely for obstacle avoidance will be indicated with the symbol "T" on appropriate Instrument Approach Procedure (IAP) charts and DP charts for that airport. The "T" symbol will continue to refer users to TPP Section C. In the case of a graphic ODP, the TPP Section C will only contain the name of the ODP. Since there may be both a textual and a graphic DP, Section C should still be checked for additional information. The nonstandard minimums and minimum climb gradients found in TPP Section C also apply to charted DPs and radar vector departures unless different minimums are specified on the charted DP. Takeoff minimums and departure procedures apply to all runways unless otherwise specified. New graphic DPs will have all the information printed on the graphic depiction. As a general rule, ATC will only assign an ODP from a nontowered airport when compliance with the ODP is necessary for aircraft to aircraft separation. Pilots may use the ODP to help ensure separation from terrain and obstacles.

37.8 Responsibilities

37.8.1 Each pilot, prior to departing an airport on an IFR flight should:

37.8.1.1 Consider the type of terrain and other obstacles on or in the vicinity of the departure airport;

37.8.1.2 Determine whether an ODP is available;

37.8.1.3 Determine if obstacle avoidance can be maintained visually or if the ODP should be flown; and

37.8.1.4 Consider the effect of degraded climb performance and the actions to take in the event of an engine loss during the departure. Pilots should notify ATC as soon as possible of reduced climb capability in that circumstance.

NOTE−
Guidance concerning contingency procedures that address an engine failure on takeoff after V_1 speed on a large or turbine−powered transport category airplane may be found in AC 120−91, Airport Obstacle Analysis.

37.8.1.5 Determine if a DVA is published and whether the aircraft is capable of meeting the published climb gradient. Advise ATC when requesting the IFR clearance, or as soon as possible, if unable to meet the DVA climb gradient.

37.8.1.6 Check for Takeoff Obstacle Notes published in the TPP for the takeoff runway.

37.8.2 Pilots should not exceed a published speed restriction associated with a SID waypoint until passing that waypoint.

37.8.3 After an aircraft is established on a SID and subsequently vectored or cleared to deviate off of the SID or SID transition, pilots must consider the SID canceled, unless the controller adds "expect to resume SID;" pilots should then be prepared to rejoin the SID at a subsequent fix or procedure leg. If the SID contains published altitude and/or speed restrictions, those restrictions are canceled and pilots will receive an altitude to maintain and, if necessary, a speed. ATC may also interrupt the vertical navigation of a SID and provide alternate altitude instructions while the aircraft remains established on the published lateral path. Aircraft may be vectored off of an ODP, or issued an altitude lower than a published altitude on an ODP, at which time the ODP is canceled. In these cases, ATC assumes responsibility for terrain and obstacle clearance. In all cases, the minimum 200 FPNM climb gradient is assumed.

37.8.4 Aircraft instructed to resume a SID procedure such as a DP or SID which contains speed and/or altitude restrictions, must be:

37.8.4.1 Issued/reissued all applicable restrictions, or

37.8.4.2 Advised to "Climb via SID" or resume published speed.

EXAMPLE−
"Resume the Solar One departure, Climb via SID."
"Proceed direct CIROS, resume the Solar One departure, Climb via SID."

37.8.5 A clearance for a SID which does not contain published crossing restrictions, and/or is a SID with a Radar Vector segment or a Radar Vector SID, will be issued using the phraseology "Maintain (*altitude).*"

37.8.6 A clearance for a SID which contains published altitude restrictions may be issued using the phraseology "climb via." Climb via is an abbreviated clearance that requires compliance with the procedure lateral path, associated speed and altitude restrictions along the cleared route or procedure. Clearance to "climb via" authorizes the pilot to:

37.8.6.1 When used in the IFR departure clearance, in a PDC, DCL or when cleared to a waypoint depicted on a SID, to join the procedure after departure or to resume the procedure.

37.8.6.2 When vertical navigation is interrupted and an altitude is assigned to maintain which is not contained on the published procedure, to climb from that previously-assigned altitude at pilot's discretion to the altitude depicted for the next waypoint.

37.8.6.3 Once established on the depicted departure, to navigate laterally and climb to meet all published or assigned altitude and speed restrictions.

NOTE−

1. *When otherwise cleared along a route or procedure that contains published speed restrictions, the pilot must comply with those speed restrictions independent of a climb via clearance.*

2. *ATC anticipates pilots will begin adjusting speed the minimum distance necessary prior to a published speed restriction so as to cross the waypoint/fix at the published speed. Once at the published speed ATC expects pilots will maintain the published speed until additional adjustment is required to comply with further published or ATC assigned speed restrictions or as required to ensure compliance with 14 CFR Section 91.117.*

3. *If ATC interrupts lateral/vertical navigation while an aircraft is flying a SID, ATC must ensure obstacle clearance. When issuing a "climb via" clearance to join or resume a procedure ATC must ensure obstacle clearance until the aircraft is established on the lateral and vertical path of the SID.*

4. *ATC will assign an altitude to cross if no altitude is depicted at a waypoint/fix or when otherwise necessary/ required, for an aircraft on a direct route to a waypoint/fix where the SID will be joined or resumed.*

5. *SIDs will have a "top altitude;" the "top altitude" is the charted "maintain" altitude contained in the procedure description or assigned by ATC.*

EXAMPLE−

1. ***Lateral route clearance:***

"Cleared Loop Six departure."

NOTE−

The aircraft must comply with the SID lateral path, and any published speed restrictions.

2. ***Routing with assigned altitude:***

"Cleared Loop Six departure, climb and maintain four thousand."

NOTE−

The aircraft must comply with the SID lateral path, and any published speed restriction while climbing unrestricted to four thousand.

3. *(A pilot filed a flight plan to the Johnston Airport using the Scott One departure, Jonez transition, then Q-145. The pilot filed for FL350. The Scott One includes altitude restrictions, a top altitude and instructions to expect the filed altitude ten minutes after departure). Before departure ATC uses PDC, DCL or clearance delivery to issue the clearance:*

"Cleared to Johnston Airport, Scott One departure, Jonez transition, Q-OneForty-five. Climb via SID."

NOTE−

In Example 3, the aircraft must comply with the Scott One departure lateral path and any published speed and altitude restrictions while climbing to the SID top altitude.

4. *(Using the Example 3 flight plan, ATC determines the top altitude must be changed to FL180). The clearance will read:*

"Cleared to Johnston Airport, Scott One departure, Jonez transition, Q-One Forty-five, Climb via SID except maintain flight level one eight zero."

NOTE−

In Example 4, the aircraft must comply with the Scott One departure lateral path and any published speed and altitude restrictions while climbing to FL180. The aircraft must stop climb at FL180 until issued further clearance by ATC.

5. *(An aircraft was issued the Suzan Two departure, "climb via SID" in the IFR departure clearance. After departure ATC must change a waypoint crossing restriction). The clearance will be:*

"Climb via SID except cross Mkala at or above seven thousand."

NOTE−
In Example 5, the aircraft will comply with the Suzan Two departure lateral path and any published speed and altitude restrictions and climb so as to cross Mkala at or above 7,000; remainder of the departure must be flown as published.

6. *(An aircraft was issued the Teddd One departure, "climb via SID" in the IFR departure clearance. An interim altitude of 10,000 was issued instead of the published top altitude of FL 230). After departure ATC is able to issue the published top altitude. The clearance will be:*

"Climb via SID."

NOTE−
In Example 6, the aircraft will track laterally and vertically on the Teddd One departure and initially climb to 10,000; Once re-issued the "climb via" clearance the interim altitude is canceled aircraft will continue climb to FL230 while complying with published restrictions.

7. *(An aircraft was issued the Bbear Two departure, "climb via SID" in the IFR departure clearance. An interim altitude of 16,000 was issued instead of the published top altitude of FL 190). After departure, ATC is able to issue a top altitude of FL300 and still requires compliance with the published SID restrictions. The clearance will be:*

"Climb via SID except maintain flight level three zero zero."

NOTE−
In Example 7, the aircraft will track laterally and vertically on the Bbear Two departure and initially climb to 16,000; Once re-issued the "climb via" clearance the interim altitude is canceled and the aircraft will continue climb to FL300 while complying with published restrictions.

8. *(An aircraft was issued the Bizee Two departure, "climb via SID." After departure, ATC vectors the aircraft off of the SID, and then issues a direct routing to rejoin the SID at Rockr waypoint which does not have a published altitude restriction. ATC wants the aircraft to cross at or above 10,000). The clearance will read:*

"Proceed direct Rockr, cross Rockr at or above one-zero thousand, climb via the Bizee Two departure."

NOTE−
In Example 8, the aircraft will join the Bizee Two SID at Rockr at or above 10,000 and then comply with the published lateral path and any published speed or altitude restrictions while climbing to the SID top altitude.

9. *(An aircraft was issued the Suzan Two departure, "climb via SID" in the IFR departure clearance. After departure ATC vectors the aircraft off of the SID, and then clears the aircraft to rejoin the SID at Dvine waypoint, which has a published crossing restriction). The clearance will read:*

"Proceed direct Dvine, Climb via the Suzan Two departure."

NOTE−
In Example 9, the aircraft will join the Suzan Two departure at Dvine, at the published altitude, and then comply with the published lateral path and any published speed or altitude restrictions.

37.8.7 Pilots cleared for vertical navigation using the phraseology "climb via" must inform ATC, upon initial contact, of the altitude leaving and any assigned restrictions not published on the procedure.

EXAMPLE−
1. *(Cactus 711 is cleared to climb via the Laura Two departure. The Laura Two has a top altitude of FL190):*
"Cactus Seven Eleven leaving two thousand, climbing via the Laura Two departure."

2. *(Cactus 711 is cleared to climb via the Laura Two departure, but ATC changed the top altitude to16,000):*
"Cactus Seven Eleven leaving two thousand for one-six thousand, climbing via the Laura Two departure."

37.8.8 If prior to or after takeoff an altitude restriction is issued by ATC, all previously issued "ATC" altitude restrictions are canceled including those published on a SID. Pilots must still comply with all speed restrictions and lateral path requirements published on the SID unless canceled by ATC.

EXAMPLE−
Prior to takeoff or after departure ATC issues an altitude change clearance to an aircraft cleared to climb via a SID but ATC no longer requires compliance with published altitude restrictions:

"Climb and maintain flight level two four zero."

NOTE−
The published SID altitude restrictions are canceled; The aircraft should comply with the SID lateral path and begin an unrestricted climb to FL240. Compliance with published speed restrictions is still required unless specifically deleted by ATC.

37.8.9 Altitude restrictions published on an ODP are necessary for obstacle clearance and/or design constraints. Crossing altitudes and speed restrictions on ODPs cannot be canceled or amended by ATC.

37.9 PBN Departure Procedures

37.9.1 All public PBN SIDs and graphic ODPs are normally designed using RNAV 1, RNP 1, or A−RNP NavSpecs. These procedures generally start with an initial track or heading leg near the departure end of runway (DER). In addition, these procedures require system performance currently met by GPS or DME/DME/IRU PBN systems that satisfy the criteria discussed in the latest AC 90−100, U.S. Terminal and En Route Area Navigation (RNAV) Operations. RNAV 1 and RNP 1 procedures must maintain a total system error of not more than 1 NM for 95 percent of the total flight time. Minimum values for A−RNP procedures will be charted in the PBN box (for example, 1.00 or 0.30).

37.9.2 In the U.S., a specific procedure's PBN requirements will be prominently displayed in separate, standardized notes boxes. For procedures with PBN elements, the "PBN box" will contain the procedure's NavSpec(s); and, if required: specific sensors or infrastructure needed for the navigation solution, any additional or advanced functional requirements, the minimum RNP value, and any amplifying remarks. Items listed in this PBN box are REQUIRED for the procedure's PBN elements.

mile per 1/10 equates to a 3/4 statute mile increase for .30 "Hg. The destination weather requirement is determined by adding the 300−3/4 increase to 200−1/2. The destination weather requirement is now 500−1 1/4.

2) 31.00 "Hg. will remain set during the complete instrument approach. The aircraft has arrived at the DA or minimum descent altitude (MDA) when the published DA or MDA is displayed on the barometric altimeter.

NOTE−
The aircraft will be approximately 300 feet higher than the indicated barometric altitude using this method.

3) These restrictions do not apply to authorized Category II/III ILS operations and certificate holders using approved atmospheric pressure at aerodrome elevation (QFE) altimetry systems.

g) Air Traffic Organization (ATO) Service Center Directors, in their area of jurisdiction, may authorize temporary waivers to a high barometric pressure procedures in effect NOTAM to permit emergency supply, transport, or medical services, 14 CFR § 91.144(b). ATO Service Center contact information can be found at: https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/mission_support/sc

3.3.2 At or above 18,000 feet MSL. All operators will set 29.92 "Hg. (standard setting) in the barometric altimeter. The lowest usable flight level is determined by the atmospheric pressure in the area of operation as shown in TBL ENR 1.7−1. Air Traffic Control (ATC) will assign this flight level.

TBL ENR 1.7−1
Lowest Usable Flight Level

Altimeter Setting (Current Reported)	Lowest Usable Flight Level
29.92 or higher	180
29.91 to 28.92	190
28.91 to 27.92	200

3.3.3 When the minimum altitude per 14 CFR Section 91.159 and 14 CFR Section 91.177 is above 18,000 feet MSL, the lowest usable flight level must be the flight level equivalent of the minimum altitude plus the number of feet specified in TBL ENR 1.7−2. ATC will accomplish this calculation.

TBL ENR 1.7−2
Lowest Flight Level Correction Factor

Altimeter Setting	Correction Factor
29.92 or higher	None
29.91 to 29.42	500 feet
29.41 to 28.92	1000 feet
28.91 to 28.42	1500 feet
28.41 to 27.92	2000 feet
27.91 to 27.42	2500 feet

EXAMPLE−
The minimum safe altitude of a route is 19,000 feet MSL and the altimeter setting is reported between 29.92 and 29.43 "Hg, the lowest usable flight level will be 195, which is the flight level equivalent of 19,500 feet MSL (minimum altitude (TBL ENR 1.7−1) plus 500 feet).

3.3.4 Aircraft operating in an offshore CONTROL AREA should use altimeter−setting procedures as described above, unless directed otherwise by ATC.

NOTE−
Aircraft exiting the oceanic CTA/FIR destined for the U.S. or transitioning through U.S. offshore control areas should use the current reported altimeter of a station nearest to the route being flown. When entering an oceanic CTA/FIR from U.S. offshore control areas, pilots should change to the standard altimeter setting 29.92 "Hg.

ENR 1.9 Air Traffic Flow Management and Airspace Management

1. General

1.1 The Traffic Management System mission is to balance air traffic demand with system capacity, ensuring the maximum efficient utilization of the National Airspace System (NAS). A safe, orderly, and expeditious flow of traffic while minimizing delays is fostered through continued analysis, coordination, and dynamic utilization of traffic management initiatives and programs.

1.2 While this list is not all inclusive, below are just a few of the most common initiatives and programs:

1.2.1 Trajectory−based operations (TBO) is an air traffic management (ATM) method for strategically planning and managing flights throughout the operation by using time−based management (TBM), information exchanged between air and ground systems, and the aircraft's ability to fly trajectories in time and space. Aircraft trajectory is defined in four dimensions—latitude, longitude, altitude, and time. TBO will increase airspace and airport throughput, flight efficiency, flexibility and predictability through TBM, Performance−Based Navigation (PBN) procedures, and increased collaboration with NAS users regarding preferred trajectories and priorities. TBM operations include, but are not limited to, arrival metering, surface metering, terminal metering, and departure scheduling.

1.2.2 Time−Based Management is a methodology for managing the flow of air traffic through the assignment of crossing times at specific points along an aircraft's trajectory. TBM applies time to mitigate demand/capacity imbalances while enhancing efficiency and predictability of the NAS. TBM techniques/tools will be used even during periods when demand does not exceed capacity. This sustains operational predictability and regional/national strategic plan. TBM utilizes capabilities within TFMS, TBFM, and TFDM designed to achieve a specified interval between aircraft.

1.2.3 Traffic Management Initiatives (TMI) are techniques used to manage demand with capacity in the NAS.

1.2.3.1 Properly coordinated and implemented TMIs are an important tool in the air traffic system. These initiatives contribute to the safe and orderly movement of air traffic.

1.2.3.2 Any TMI creates an impact on customers. It is imperative to consider this impact and implement only those initiatives necessary to maintain system integrity.

1.2.4 A Ground Delay Program (GDP) is a traffic management process administered by the ATCSCC when aircraft are held on the ground in order to manage capacity and demand at a specific location, by assigning arrival slots. The purpose of the program is to support the TM mission and limit airborne holding. It is a flexible program and may be implemented in various forms depending upon the needs of the air traffic system. The Expect Departure Clearance Time (EDCT) is calculated based on the estimated time en route and the arrival slot. It is important for aircraft to depart as close as possible to the EDCT to ensure accurate delivery of aircraft to the impacted location. GDPs provide for equitable assignment of delays to all system users. GDPs must be applied to all aircraft departing airports in the contiguous U.S., as well as, from select Canadian airports. Aircraft that have been assigned an EDCT in a GDP should not be subject to additional delay. Exceptions to this policy are miles−in−trail and departure/en route spacing initiatives that have been approved by the ATCSCC. GDP procedures do not apply to facilities in Alaska.

1.2.5 Airspace Flow Programs (AFP) were developed to provide a dynamic method of implementing and managing ground delay programs. The creation and publication of Flow Evaluation Areas (FEA) and Flow Constrained Areas (FCA) serve to identify areas of limited capacity to system customers that require a reduction in demand through rerouting flights (voluntary or mandatory). An alternative to managing airspace congestion is to merge these two technologies and create AFPs. An AFP is a traffic management tool that assigns specific arrival slots and corresponding EDCTs to manage capacity and demand for a specific area identified by the FCA.

It is important for aircraft to depart as close as possible to the EDCT to ensure accurate delivery of aircraft to the impacted area. AFPs may be applied to all aircraft departing airports in the contiguous United States and from select Canadian airports. Aircraft that have been assigned an EDCT in an AFP should not be subject to additional delay. Exceptions to this policy are miles−in−trail and departure/en route spacing initiatives that have been approved by the ATCSCC. AFP procedures do not apply to facilities in Alaska.

1.2.6 Ground Stop(s) (GS) override all other traffic management initiatives. Aircraft must not be released from a GS without the approval of the originator of the GS. The GS is a process that requires aircraft, that meet a specific criteria, to remain on the ground. The criteria may be airport specific, airspace specific, or equipment specific; for example, all departures to San Francisco, or all departures entering Yorktown sector, or all Category I and II aircraft going to Charlotte. GSs normally occur with little or no warning. Since GSs are one of the most restrictive methods of traffic management, alternative initiatives must be explored and implemented if appropriate.

1.10.3 If the temperature is forecast to be at or below the published CTA temperature, pilots should calculate a correction for the appropriate segment/s or a correction for all the segments if using the "All Segments Method."

Pilots should review the operating procedures for the aircraft's temperature compensating system when planning to use the system for any cold temperature corrections. Any planned altitude correction for the intermediate and/or missed approach holding segments must be coordinated with ATC. Pilots do not have to advise ATC of a correction in the final segment.

NOTE−
The charted baro−VNAV temperature range limitation does not apply to pilots operating aircraft with an airworthiness approval to conduct an RNAV (GPS) approach to LNAV/VNAV minimums with the use of SBAS vertical guidance.

REFERENCE−
AIP, ENR 1.8, Cold Temperature Barometric Altimeter Errors, Setting Procedures and Cold Temperature Airports (CTA).

2. Follow IFR Procedures Even When Operating VFR

2.1 To maintain IFR proficiency, pilots are urged to practice IFR procedures whenever possible, even when operating VFR. Some suggested practices include:

2.1.1 Obtain a complete preflight briefing and check NOTAMs. Prior to every flight, pilots should gather all information vital to the nature of the flight. Pilots can receive a regulatory compliant briefing without contacting Flight Service. Pilots are encouraged to use automated resources and review AC 91−92, Pilot's Guide to a Preflight Briefing, for more information. NOTAMs are available online from the Federal NOTAM System (FNS) NOTAM Search website (https://notams.aim.faa.gov/notamSearch/), private vendors, or on request from Flight Service.

2.1.2 File a flight plan. This is an excellent low cost insurance policy. The cost is the time it takes to fill it out. The insurance includes the knowledge that someone will be looking for you if you become overdue at your destination. Pilots can file flight plans either by using a website or by calling Flight Service. Flight planning applications are also available to file, activate, and close VFR flight plans.

2.1.3 Use current charts.

2.1.4 Use the navigation aids. Practice maintaining a good course by keeping the needle centered.

2.1.5 Maintain a constant altitude appropriate for direction of flight.

2.1.6 Estimate en route position times.

2.1.7 Make accurate and frequent position reports to the FSSs along your route of flight.

2.2 Simulated IFR flight is recommended (under the hood); however, pilots are cautioned to review and adhere to the requirements specified in 14 CFR Section 91.109 before and during such flight.

2.3 When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain an altitude which is at or above the minimum en route altitude as shown on charts. This is especially true in mountainous terrain, where there is usually very little ground reference. Do not depend on your eyes alone to avoid rising unlighted terrain, or even lighted obstructions such as TV towers.

3. Notice to Airmen (NOTAM) System

3.1 The NOTAM System provides pilots with time critical aeronautical information that is temporary, or information to be published on aeronautical charts at a later date, or information from another operational publication. The NOTAM is cancelled when the information in the NOTAM is published on the chart or when the temporary condition is returned to normal status. NOTAMs may be disseminated up to 7 days before the start of activity. Pilots can access NOTAM information online via NOTAM Search at: https://notams.aim.faa.gov/notamSearch/ or from an FSS.

3.1.1 14 CFR § 91.103, Preflight Action directs pilots to become familiar with all available information concerning a planned flight prior to departure, including NOTAMs. Pilots may change their flight plan based on available information. Current NOTAM information may affect:

3.1.1.1 Aerodromes.

3.1.1.2 Runways, taxiways, and ramp restrictions.

3.1.1.3 Obstructions.

3.1.1.4 Communications.

3.1.1.5 Airspace.

3.1.1.6 Status of navigational aids or radar service availability.

3.1.1.7 Other information essential to planned en route, terminal, or landing operations.

3.1.2 Pilots should also review NOTAMs for the ARTCC area (for example, Washington Center (ZDC), Cleveland Center (ZOB), etc.) in which the flight will be operating. You can find the 3 letter code for each ARTCC on the FAA's NOTAM web page. These NOTAMs may affect the planned flight. Some of the operations include Central Altitude Reservation Function (CARF), Special Use Airspace (SUA), Temporary Flight Restrictions (TFR), Global Positioning System (GPS), Flight Data Center (FDC) changes to routes, wind turbine, and Unmanned Aircraft System (UAS).

NOTE−
NOTAM information is transmitted using ICAO contractions to reduce transmission time. See TBL ENR 1.10−2 for a listing of the most commonly used contractions, or go online to the following URL: https://www.notams.faa.gov/downloads/contractions.pdf. For a complete listing of approved NOTAM Contractions, see FAA JO Order 7340.2, Contractions.

3.1.3 Pilots should also contact ATC or FSS while en route to obtain updated airfield information for their destination. This is particularly important when flying to the airports without an operating control tower. Pilots should also ensure NOTAMs are updated for locations without an operating control tower. Snow removal, fire and rescue activities, construction, and wildlife encroachment, could provide hazards to pilots. This information may not be available to pilots prior to arrival/departure.

3.1.4 Pilots should check NOTAMs to ensure NAVAIDs required for the flight are in service. A NOTAM is published when a NAVAID is out of service or Unserviceable (U/S). Although a NAVAID is deemed U/S and planned for removal from service, it may be a long time before that NAVAID is officially decommissioned and removed from charts. A NOTAM is the primary method of alerting pilots to its unavailability. Pilots using VFR charts can also review the Aeronautical Information Services' (AIS) website concerning Safety Alerts, Charting Notices, and Digital Product Notices at https://www.faa.gov/air_traffic/flight_info/aeronav/safety_alerts/ for additional chart information.

3.2 The FAA issues information on the status of GPS through the NOTAM system. Operators may find information on GPS satellite outages, GPS testing, and GPS anomalies by specifically searching for GPS NOTAMS prior to flight.

3.2.1 The NOTAM system uses the terms UNRELIABLE (UNREL), MAY NOT BE AVAILABLE (AVBL), and NOT AVAILABLE (AVBL) when describing the status of GPS. UNREL indicates the expected level of service of the GPS and/or WAAS may not be available. Pilots must then determine the adequacy of the signal for desired use. Aircraft should have additional navigation equipment for their intended route.

NOTE−
Unless associated with a known testing NOTAM, pilots should report GPS anomalies, including degraded operation and/or loss of service, as soon as possible via radio or telephone, and via the GPS Anomaly Reporting Form. (See ENR 4.1−22.)

3.2.2 GPS operations may also be NOTAMed for testing. This is indicated in the NOTAM language with the name of the test in parenthesis. When GPS testing NOTAMS are published and testing is actually occurring, ATC will advise pilots requesting or cleared for a GPS or RNAV (GPS) approach that GPS may not be available and request intentions. TBL ENR 1.10−1 lists an example of a GPS testing NOTAM.

3.3 NOTAM information is classified as Domestic NOTAMs (NOTAM D), Flight Data Center (FDC) NOTAMs, International NOTAMs, or Military NOTAMs.

ENR 1.14 Air Traffic Incidents

1. Aviation Safety Reporting Program

1.1 The FAA has established a voluntary program designed to stimulate the free and unrestricted flow of information concerning deficiencies and discrepancies in the aviation system. This is a positive program intended to ensure the safest possible system by identifying and correcting unsafe conditions before they lead to accidents. The primary objective of the program is to obtain information to evaluate and enhance the safety and efficiency of the present system.

1.2 This cooperative safety reporting program invites pilots, controllers, flight attendants, maintenance personnel and other users of the airspace system, or any other person, to file written reports of actual or potential discrepancies and deficiencies involving the safety of aviation operations. The operations covered by the program include departure, en route, approach, and landing operations and procedures, air traffic control procedures and equipment, crew and air traffic control communications, aircraft cabin operations, aircraft movement on the airport, near midair collisions, aircraft maintenance and record keeping, and airport conditions or services.

1.3 The report should give the date, time, location, persons and aircraft involved (if applicable), nature of the event, and all pertinent details.

1.4 To ensure receipt of this information, the program provides for the waiver of certain disciplinary actions against persons, including pilots and air traffic controllers, who file timely written reports concerning potentially unsafe incidents. To be considered timely, reports must be delivered or postmarked within 10 days of the incident unless that period is extended for good cause. Reports should be submitted on NASA ARC Forms 277, which are available free of charge, postage prepaid, at FAA Flight Standards District Offices and Flight Service Stations, and from NASA, ASRS, P.O. Box 189, Moffet Field, CA 94035.

1.5 The FAA utilizes NASA to act as an independent third party to receive and analyze reports submitted under the program. This program is described in Advisory Circular 00−46.

2. Aircraft Accident and Incident Reporting

2.1 Occurrences Requiring Notification

2.1.1 The operator of an aircraft must immediately, and by the most expeditious means available, notify the nearest National Transportation Safety Board (NTSB) Field Office when:

2.1.1.1 An aircraft accident or any of the following listed incidents occur:

a) Flight control system malfunction or failure.

b) Inability of any required flight crewmember to perform normal flight duties as a result of injury or illness.

c) Failure of structural components of a turbine engine excluding compressor and turbine blades and vanes.

d) Inflight fire.

e) Aircraft collide in flight.

f) Damage to property, other than the aircraft, estimated to exceed $25,000 for repair (including materials and labor) or fair market value in the event of total loss, whichever is less.

g) For large multi−engine aircraft (more than 12,500 pounds maximum certificated takeoff weight):

1) Inflight failure of electrical systems which requires the sustained use of an emergency bus powered by a backup source such as a battery, auxiliary power unit, or air−driven generator to retain flight control or essential instruments.

2) Inflight failure of hydraulic systems that results in sustained reliance on the sole remaining hydraulic or mechanical system for movement of flight control surfaces.

3) Sustained loss of the power or thrust produced by two or more engines.

4) An evacuation of aircraft in which an emergency egress system is utilized.

2.1.1.2 An aircraft is overdue and is believed to have been involved in an accident.

2.2 Manner of Notification

2.2.1 The most expeditious method of notification to the NTSB by the operator will be determined by the circumstances existing at the time. The NTSB has advised that any of the following would be considered examples of the type of notification that would be acceptable:

2.2.1.1 Direct telephone notification.

2.2.1.2 Telegraphic notification.

2.2.1.3 Notification to the FAA who would in turn notify the NTSB by direct communication; i.e., dispatch or telephone.

2.3 Items to be Reported

2.3.1 The notification required above must contain the following information, if available:

2.3.1.1 Type, nationality, and registration marks of the aircraft.

2.3.1.2 Name of owner and operator of the aircraft.

2.3.1.3 Name of the pilot−in−command.

2.3.1.4 Date and time of the accident.

2.3.1.5 Last point of departure and point of intended landing of the aircraft.

2.3.1.6 Position of the aircraft with reference to some easily defined geographical point.

2.3.1.7 Number of persons aboard, number killed, and number seriously injured.

2.3.1.8 Nature of the accident or incident, the weather, and the extent of damage to the aircraft, so far as is known.

2.3.1.9 A description of any explosives, radioactive materials, or other dangerous articles carried.

2.4 Follow−up Reports

2.4.1 The operator must file a report on NTSB Form 6120.1 or 6120.2, available from the NTSB Field Offices, or the NTSB, Washington, D.C. 20594:

2.4.1.1 Within ten days after an accident.

2.4.1.2 When, after seven days, an overdue aircraft is still missing.

2.4.1.3 A report on an incident for which notification is required as described in paragraph 2.1 must be filed only as requested by an authorized representative of the NTSB.

2.4.2 Each crewmember, if physically able at the time the report is submitted, must attach a statement setting forth the facts, conditions and circumstances relating to the accident or occurrence as they appeared. If the crewmember is incapacitated, the statement must be submitted as soon as physically possible.

2.5 Where to File the Reports

2.5.1 The operator of an aircraft must file with the field office of the NTSB nearest the accident or incident any report required by this section.

2.5.2 The NTSB field offices are listed under U.S. Government in the telephone directories in the following cities: Anchorage, Alaska; Atlanta, Georgia; Chicago, Illinois; Denver, Colorado; Fort Worth, Texas; Los Angeles, California; Miami, Florida; Parsippany, New Jersey; and Seattle, Washington.

3. Near Midair Collision Reporting

3.1 Purpose and Data Uses. The primary purpose of the Near Midair Collision (NMAC) Reporting Program is to provide information for use in enhancing the safety and efficiency of the National Airspace System. Data obtained from NMAC reports are used by the FAA to improve the quality of FAA services to users and to develop programs, policies, and procedures aimed at the reduction of NMAC occurrences. All NMAC reports are thoroughly investigated by Flight Standards Facilities in coordination with Air Traffic Facilities. Data from these investigations are transmitted to FAA Headquarters in Washington, D.C., where they are compiled and analyzed, and where safety programs and recommendations are developed.

3.2 Definition. A near midair collision is defined as an incident associated with the operation of an aircraft in which a possibility of collision occurs as a result of proximity of less than 500 feet to another aircraft, or a report is received from a pilot or a flight crewmember stating that a collision hazard existed between two or more aircraft.

3.3 Reporting Responsibility. It is the responsibility of the pilot and/or flight crew to determine whether a near midair collision did actually occur and, if so, to initiate a NMAC report. Be specific, as ATC will not interpret a casual remark to mean that a NMAC is being reported. The pilot should state "I wish to report a near midair collision."

3.4 Where to File Reports. Pilots and/or flight crew members involved in NMAC occurrences are urged to report each incident immediately:

3.4.1 By radio or telephone to the nearest FAA ATC facility or FSS.

3.4.2 In writing, in lieu of the above, to the nearest Flight Standards District Office (FSDO).

3.5 Items to be Reported

3.5.1 Date and time (UTC) of incident.

3.5.2 Location of incident and altitude.

3.5.3 Identification and type of reporting aircraft, aircrew destination, name and home base of pilot.

3.5.4 Identification and type of other aircraft, aircrew destination, name and home base of pilot.

3.5.5 Type of flight plans; station altimeter setting used.

3.5.6 Detailed weather conditions at altitude or flight level.

3.5.7 Approximate courses of both aircraft: indicate if one or both aircraft were climbing or descending.

3.5.8 Reported separation in distance at first sighting, proximity at closest point horizontally and vertically, length of time in sight prior to evasive action.

3.5.9 Degree of evasive action taken, if any (from both aircraft, if possible).

3.5.10 Injuries, if any.

3.6 Investigation. The FSDO in whose area the incident occurred is responsible for the investigation and reporting of NMACs.

3.7 Existing radar, communication, and weather data will be examined in the conduct of the investigation. When possible, all cockpit crew members will be interviewed regarding factors involving the NMAC incident. Air traffic controllers will be interviewed in cases where one or more of the involved aircraft was provided ATC service. Both flight and ATC procedures will be evaluated. When the investigation reveals a violation of an FAA regulation, enforcement action will be pursued.

4. Unidentified Anomalous Phenomena (UAP) Reports

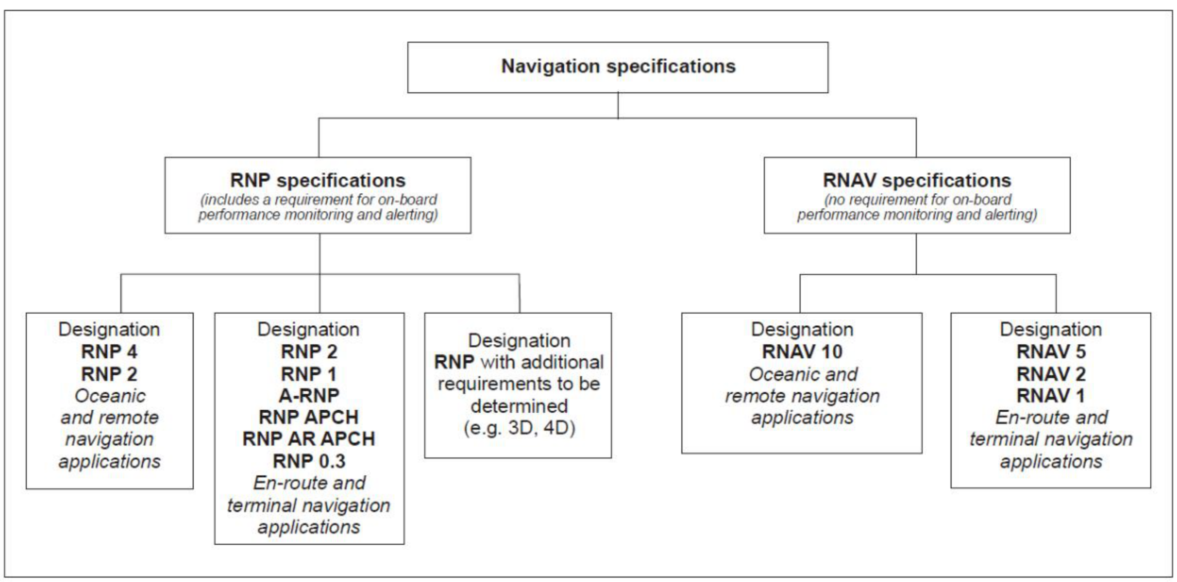
If concern is expressed that life or property might be endangered by unidentified anomalous phenomena (UAP) activity, report the activity to the local law enforcement department.

ENR 1.16 Performance−Based Navigation (PBN) and Area Navigation (RNAV)

1. General

1.1 Introduction to PBN. As air travel has evolved, methods of navigation have improved to give operators more flexibility. PBN exists under the umbrella of area navigation (RNAV). The term RNAV in this context, as in procedure titles, just means "area navigation," regardless of the equipment capability of the aircraft. (See FIG ENR 1.16−1.) Many operators have upgraded their systems to obtain the benefits of PBN. Within PBN there are two main categories of navigation methods or specifications: area navigation (RNAV) and required navigation performance (RNP). In this context, the term RNAV *x* means a specific navigation specification with a specified lateral accuracy value. For an aircraft to meet the requirements of PBN, a specified RNAV or RNP accuracy must be met 95 percent of the flight time. RNP is a PBN system that includes onboard performance monitoring and alerting capability (for example, Receiver Autonomous Integrity Monitoring (RAIM)). PBN also introduces the concept of navigation specifications (NavSpecs) which are a set of aircraft and aircrew requirements needed to support a navigation application within a defined airspace concept. For both RNP and RNAV NavSpecs, the numerical designation refers to the lateral navigation accuracy in nautical miles which is expected to be achieved at least 95 percent of the flight time by the population of aircraft operating within the airspace, route, or procedure. This information is detailed in International Civil Aviation Organization's (ICAO) Doc 9613, Performance−based Navigation (PBN) Manual and the latest FAA AC 90−105, Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System and in Remote and Oceanic Airspace.

FIG ENR 1.16−1
Navigation Specifications



1.2 Area Navigation (RNAV)

1.2.1 General. RNAV is a method of navigation that permits aircraft operation on any desired flight path within the coverage of ground− or space−based navigation aids or within the limits of the capability of self−contained aids, or a combination of these. In the future, there will be an increased dependence on the use of RNAV in lieu of routes defined by ground−based navigation aids. RNAV routes and terminal procedures, including departure procedures (DPs) and standard terminal arrivals (STAR), are designed with RNAV systems in mind. There are several potential advantages of RNAV routes and procedures:

1.2.1.1 Time and fuel savings;

1.2.1.2 Reduced dependence on radar vectoring, altitude, and speed assignments allowing a reduction in required ATC radio transmissions; and

1.2.1.3 More efficient use of airspace.

In addition to information found in this manual, guidance for domestic RNAV DPs, STARs, and routes may also be found in Advisory Circular 90−100, U.S. Terminal and En Route Area Navigation (RNAV) Operations.

1.2.2 RNAV Operations. RNAV procedures, such as DPs and STARs, demand strict pilot awareness and maintenance of the procedure centerline. Pilots should possess a working knowledge of their aircraft navigation system to ensure RNAV procedures are flown in an appropriate manner. In addition, pilots should have an understanding of the various waypoint and leg types used in RNAV procedures; these are discussed in more detail below.

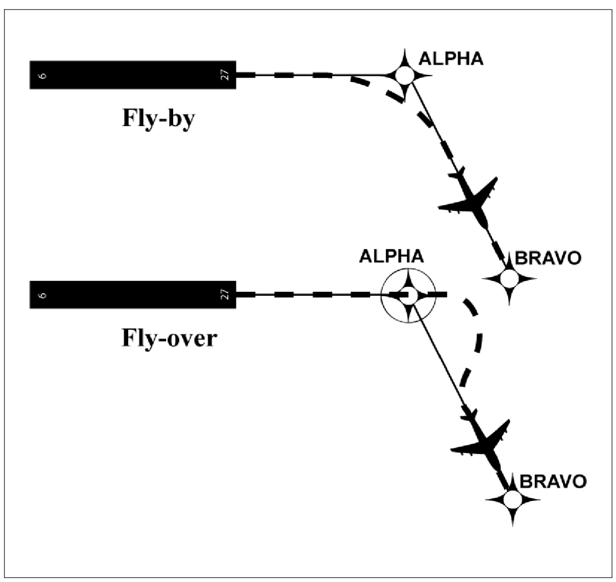
1.2.2.1 Waypoints. A waypoint is a predetermined geographical position that is defined in terms of latitude/longitude coordinates. Waypoints may be a simple named point in space or associated with existing navaids, intersections, or fixes. A waypoint is most often used to indicate a change in direction, speed, or altitude along the desired path. RNAV procedures make use of both fly−over and fly−by waypoints.

a) Fly−by waypoints. Fly−by 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.

b) Fly−over waypoints. Fly−over waypoints are used when the aircraft must fly over the point prior to starting a turn.

NOTE−
FIG ENR 1.16−2 illustrates several differences between a fly−by and a fly−over waypoint.

FIG ENR 1.16−2
Fly−by and Fly−over Waypoints



1.2.2.2 RNAV Leg Types. A leg type describes the desired path proceeding, following, or between waypoints on an RNAV procedure. Leg types are identified by a two−letter code that describes the path (e.g., heading, course, track, etc.) and the termination point (e.g., the path terminates at an altitude, distance, fix, etc.). Leg types used for procedure design are included in the aircraft navigation database, but not normally provided on the procedure chart. The narrative depiction of the RNAV chart describes how a procedure is flown. The "path and terminator concept" defines that every leg of a procedure has a termination point and some kind of path into that termination point. Some of the available leg types are described below.

a) Track to Fix. A Track to Fix (TF) leg is intercepted and acquired as the flight track to the following waypoint. Track to a Fix legs are sometimes called point−to−point legs for this reason. ***Narrative:*** *"direct ALPHA, then on course to BRAVO WP."* See FIG ENR 1.16−3.

b) Direct to Fix. A Direct to Fix (DF) leg is a path described by an aircraft's track from an initial area direct to the next waypoint. ***Narrative:*** *"turn right direct BRAVO WP."* See FIG ENR 1.16−4.

FIG ENR 1.16−3
Track to Fix Leg Type

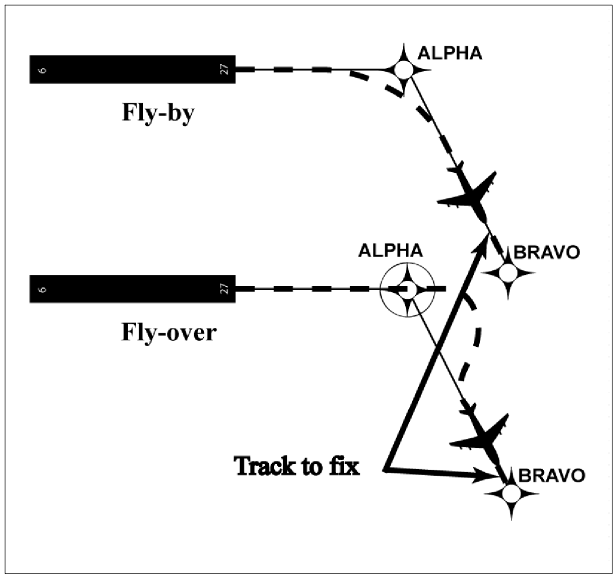
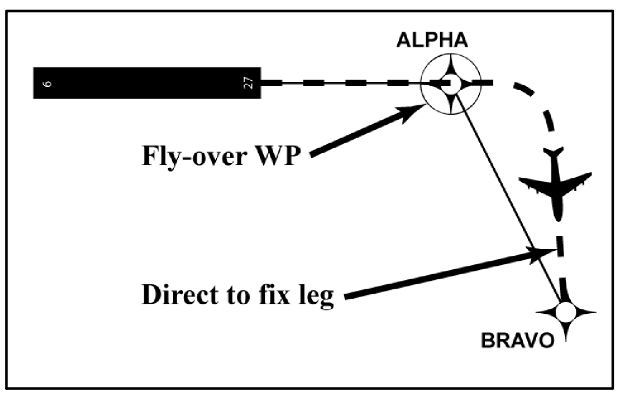
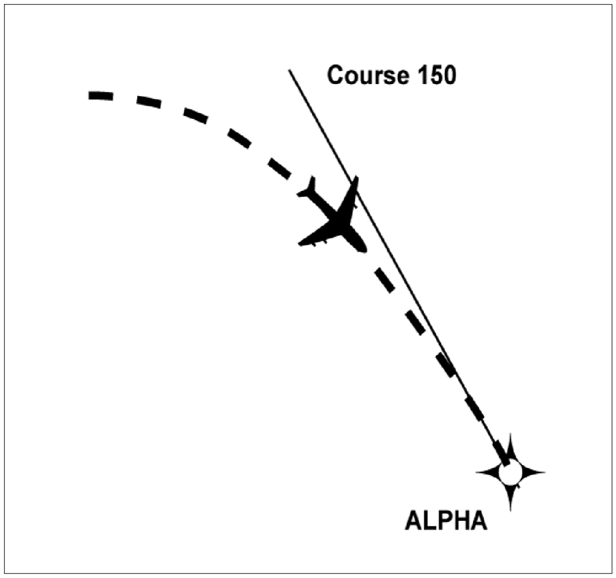


FIG ENR 1.16−4
Direct to Fix Leg Type



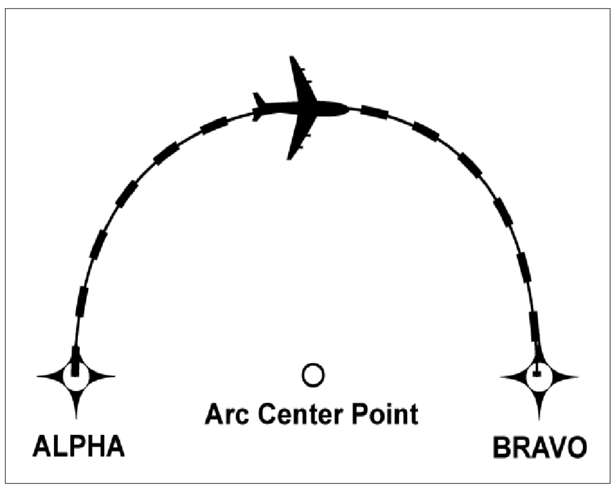
c) Course to Fix. A Course to Fix (CF) leg is a path that terminates at a fix with a specified course at that fix. ***Narrative:*** *"on course 150 to ALPHA WP."* See FIG ENR 1.16−5.

FIG ENR 1.16−5
Course to Fix Leg Type



d) Radius to Fix. A Radius to Fix (RF) leg is defined as a constant radius circular path around a defined turn center that terminates at a fix. See FIG ENR 1.16−6.

FIG ENR 1.16−6
Radius to Fix Leg Type



e) Heading. A Heading leg may be defined as, but not limited to, a Heading to Altitude (VA), Heading to DME range (VD), and Heading to Manual Termination, i.e., Vector (VM). ***Narrative:*** *"climb heading 350 to 1500", "heading 265, at 9 DME west of PXR VORTAC, right turn heading 360", "fly heading 090, expect radar vectors to DRYHT INT."*

1.2.2.3 Navigation Issues. Pilots should be aware of their navigation system inputs, alerts, and annunciations in order to make better−informed decisions. In addition, the availability and suitability of particular sensors/systems should be considered.

a) GPS/WAAS. Operators using TSO−C129(), TSO−C196(), TSO−C145() or TSO−C146() systems should ensure departure and arrival airports are entered to ensure proper RAIM availability and CDI sensitivity.

b) DME/DME. Operators should be aware that DME/DME position updating is dependent on navigation system logic and DME facility proximity, availability, geometry, and signal masking.

c) VOR/DME. Unique VOR characteristics may result in less accurate values from VOR/DME position updating than from GPS or DME/DME position updating.

d) Inertial Navigation. Inertial reference units and inertial navigation systems are often coupled with other types of navigation inputs, e.g., DME/DME or GPS, to improve overall navigation system performance.

NOTE−
Specific inertial position updating requirements may apply.

1.2.2.4 Flight Management System (FMS). An FMS is an integrated suite of sensors, receivers, and computers, coupled with a navigation database. These systems generally provide performance and RNAV guidance to displays and automatic flight control systems.

1.2.2.5 Inputs can be accepted from multiple sources such as GPS, DME, VOR, LOC and IRU. These inputs may be applied to a navigation solution one at a time or in combination. Some FMSs provide for the detection and isolation of faulty navigation information.

1.2.2.6 When appropriate navigation signals are available, FMSs will normally rely on GPS and/or DME/DME (that is, the use of distance information from two or more DME stations) for position updates. Other inputs may also be incorporated based on FMS system architecture and navigation source geometry.

NOTE−
DME/DME inputs coupled with one or more IRU(s) are often abbreviated as DME/DME/IRU or D/D/I.

1.2.2.7 RNAV Navigation Specifications (Nav Specs)

NavSpecs are a set of aircraft and aircrew requirements needed to support a navigation application within a defined airspace concept. For both RNP and RNAV designations, the numerical designation refers to the lateral navigation accuracy in nautical miles which is expected to be achieved at least 95 percent of the flight time by the population of aircraft operating within the airspace, route, or procedure. (See FIG ENR 1.16−1.)

a) RNAV 1. Typically RNAV 1 is used for DPs and STARs and appears on the charts. Aircraft must maintain a total system error of not more than 1 NM for 95 percent of the total flight time.

b) RNAV 2. Typically RNAV 2 is used for en route operations unless otherwise specified. T-routes and Q-routes are examples of this Nav Spec. Aircraft must maintain a total system error of not more than 2 NM for 95 percent of the total flight time.

c) RNAV 10. Typically RNAV 10 is used in oceanic operations. See paragraph ENR 7.4 for specifics and explanation of the relationship between RNP 10 and RNAV 10 terminology.

2. Required Navigation Performance (RNP)

2.1 General. While both RNAV navigation specifications (NavSpecs) and RNP NavSpecs contain specific performance requirements, RNP is RNAV with the added requirement for onboard performance monitoring and alerting (OBPMA). RNP is also a statement of navigation performance necessary for operation within a defined airspace. A critical component of RNP is the ability of the aircraft navigation system to monitor its achieved navigation performance, and to identify for the pilot whether the operational requirement is, or is not, being met during an operation. OBPMA capability therefore allows a lessened reliance on air traffic control intervention and/or procedural separation to achieve the overall safety of the operation. RNP capability of the aircraft is a major component in determining the separation criteria to ensure that the overall containment of the operation is met. The RNP capability of an aircraft will vary depending upon the aircraft equipment and the navigation infrastructure. For example, an aircraft may be eligible for RNP 1, but may not be capable of RNP 1 operations due to limited NAVAID coverage or avionics failure. The Aircraft Flight Manual (AFM) or avionics documents for your aircraft should specifically state the aircraft's RNP eligibilities. Contact the manufacturer of the avionics or the aircraft if this information is missing or incomplete. NavSpecs should be considered different from one another, not "better" or "worse" based on the described lateral navigation accuracy. It is this concept that requires each NavSpec eligbility to be listed separately in the avionics documents or AFM. For example, RNP 1 is different from RNAV 1, and an RNP 1 eligibility does NOT mean automatic RNP 2 or RNAV 1 eligibility. As a safeguard, the FAA requires that aircraft navigation databases hold only those procedures that the aircraft maintains eligibility for. If you look for a specific instrument procedure in your aircraft's navigation database and cannot find it, it's likely that procedure contains PBN elements your aircraft is ineligible for or cannot compute and fly. Further, optional capabilities such as Radius−to−fix (RF) turns or scalability should be described in the AFM or avionics documents. Use the capabilities of your avionics suite to verify the appropriate waypoint and track data after loading the procedure from your database.

2.2 PBN Operations

2.2.1 Lateral Accuracy Values. Lateral Accuracy values are applicable to a selected airspace, route, or procedure. The lateral accuracy value is a value typically expressed as a distance in nautical miles from the intended centerline of a procedure, route, or path. RNP applications also account for potential errors at some multiple of lateral accuracy value (for example, twice the RNP lateral accuracy values).

2.2.1.1 RNP NavSpecs. U.S. standard NavSpecs supporting typical RNP airspace uses are as specified below. Other NavSpecs may include different lateral accuracy values as identified by ICAO or other states. (See FIG ENR 1.16−1.)

a) RNP Approach (RNP APCH). In the U.S., RNP APCH procedures are titled RNAV (GPS) and offer several lines of minima to accommodate varying levels of aircraft equipage: either lateral navigation (LNAV), LNAV/vertical navigation (LNAV/VNAV), Localizer Performance with Vertical Guidance (LPV), and Localizer Performance (LP). GPS with or without Space−Based Augmentation System (SBAS) (for example, WAAS) can provide the lateral information to support LNAV minima. LNAV/VNAV incorporates LNAV lateral with vertical path guidance for systems and operators capable of either barometric or SBAS vertical. Pilots are required to use SBAS to fly to the LPV or LP minima. RF turn capability is optional in RNP APCH eligibility. This means that your aircraft may be eligible for RNP APCH operations, but you may not fly an RF turn unless RF turns are also specifically listed as a feature of your avionics suite. GBAS Landing System (GLS) procedures are also constructed using RNP APCH NavSpecs and provide precision approach capability. RNP APCH has a lateral accuracy value of 1 in the terminal and missed approach segments and essentially scales to RNP 0.3 (or 40 meters with SBAS) in the final approach. (See AIP ENR 1.5 Paragraph 9. RNP AR Instrument Approach Procedures.)

b) RNP Authorization Required Approach (RNP AR APCH). In the U.S., RNP AR APCH procedures are titled RNAV (RNP). These approaches have stringent equipage and pilot training standards and require special FAA authorization to fly. Scalability and RF turn capabilities are mandatory in RNP AR APCH eligibility. RNP AR APCH vertical navigation performance is based upon barometric VNAV or SBAS. RNP AR is intended to provide specific benefits at specific locations. It is not intended for every operator or aircraft. RNP AR capability requires specific aircraft performance, design, operational processes, training, and specific procedure design criteria to achieve the required target level of safety. RNP AR APCH has lateral accuracy values that can range below 1 in the terminal and missed approach segments and essentially scale to RNP 0.3 or lower in the final approach. Before conducting these procedures, operators should refer to the latest AC 90−101, Approval Guidance for RNP Procedures with AR. (See AIP ENR 1.5 Paragraph 9.)

c) RNP Authorization Required Departure (RNP AR DP). Similar to RNP AR approaches, RNP AR departure procedures have stringent equipage and pilot training standards and require special FAA authorization to fly. Scalability and RF turn capabilities is mandatory in RNP AR DP eligibility. RNP AR DP is intended to provide specific benefits at specific locations. It is not intended for every operator or aircraft. RNP AR DP capability requires specific aircraft performance, design, operational processes, training, and specific procedure design criteria to achieve the required target level of safety. RNP AR DP has lateral accuracy values that can scale to no lower than RNP 0.3 in the initial departure flight path. Before conducting these procedures, operators should refer to the latest AC 90−101, Approval Guidance for RNP Procedures with AR. (See AIP ENR 1.5 Paragraph 9.)

d) Advanced RNP (A−RNP). Advanced RNP is a NavSpec with a minimum set of mandatory functions enabled in the aircraft's avionics suite. In the U.S., these minimum functions include capability to calculate and perform RF turns, scalable RNP, and parallel offset flight path generation. Higher continuity (such as dual systems) may be required for certain oceanic and remote continental airspace. Other "advanced" options for use in the en route environment (such as fixed radius transitions and Time of Arrival Control) are optional in the U.S. Typically, an aircraft eligible for A−RNP will also be eligible for operations comprising: RNP APCH, RNP/RNAV 1, RNP/RNAV 2, RNP 4, and RNP/RNAV 10. A−RNP allows for scalable RNP lateral navigation values (either 1.0 or 0.3) in the terminal environment. Use of these reduced lateral accuracies will normally require use of the aircraft's autopilot and/or flight director. See the latest AC 90−105 for more information on A−RNP, including NavSpec bundling options, eligibility determinations, and operations approvals.

NOTE−
A−RNP eligible aircraft are NOT automatically eligible for RNP AR APCH or RNP AR DP operations, as RNP AR eligibility requires a separate determination process and special FAA authorization.

e) RNP 1. RNP 1 requires a lateral accuracy value of 1 for arrival and departure in the terminal area, and the initial and intermediate approach phase when used on conventional procedures with PBN segments (for example, an ILS with a PBN feeder, IAF, or missed approach). RF turn capability is optional in RNP 1 eligibility. This means that your aircraft may be eligible for RNP 1 operations, but you may not fly an RF turn unless RF turns are also specifically listed as a feature of your avionics suite.

f) RNP 2. RNP 2 will apply to both domestic and oceanic/remote operations with a lateral accuracy value of 2.

g) RNP 4. RNP 4 will apply to oceanic and remote operations only with a lateral accuracy value of 4. RNP 4 eligibility will automatically confer RNP 10 eligibility.

h) RNP 10. The RNP 10 NavSpec applies to certain oceanic and remote operations with a lateral accuracy of 10. In such airspace, the RNAV 10 NavSpec will be applied, so any aircraft eligible for RNP 10 will be deemed eligible for RNAV 10 operations. Further, any aircraft eligible for RNP 4 operations is automatically qualified for RNP 10/ RNAV 10 operations. (See also the latest AC 91−70, Oceanic and Remote Continental Airspace Operations, for more information on oceanic RNP/RNAV operations.)

i) RNP 0.3. The RNP 0.3 NavSpec requires a lateral accuracy value of 0.3 for all authorized phases of flight. RNP 0.3 is not authorized for oceanic, remote, or the final approach segment. Use of RNP 0.3 by slow−flying fixed−wing aircraft is under consideration, but the RNP 0.3 NavSpec initially will apply only to rotorcraft operations. RF turn capability is optional in RNP 0.3 eligibility. This means that your aircraft may be eligible for RNP 0.3 operations, but you may not fly an RF turn unless RF turns are also specifically listed as a feature of your avionics suite.

NOTE−
On terminal procedures or en route charts, do not confuse a charted RNP value of 0.30, or any standard final approach course segment width of 0.30, with the NavSpec title "RNP 0.3." Charted RNP values of 0.30 or below should contain two decimal places (for example, RNP 0.15, or 0.10, or 0.30) whereas the NavSpec title will only state "RNP 0.3."

2.2.1.2 Application of Standard Lateral Accuracy Values. U.S. standard lateral accuracy values typically used for various routes and procedures supporting RNAV operations may be based on use of a specific navigational system or sensor such as GPS, or on multi−sensor RNAV systems having suitable performance.

2.2.1.3 Depiction of PBN Requirements. In the U.S., PBN requirements like Lateral Accuracy Values or NavSpecs applicable to a procedure will be depicted on affected charts and procedures. In the U.S., a specific procedure's Performance−Based Navigation (PBN) requirements will be prominently displayed in separate, standardized notes boxes. For procedures with PBN elements, the "PBN box" will contain the procedure's NavSpec(s); and, if required: specific sensors or infrastructure needed for the navigation solution, any additional or advanced functional requirements, the minimum RNP value, and any amplifying remarks. Items listed in this PBN box are REQUIRED to fly the procedure's PBN elements. For example, an ILS with an RNAV missed approach would require a specific capability to fly the missed approach portion of the procedure. That required capability will be listed in the PBN box. The separate Equipment Requirements box will list ground−based equipment and/or airport specific requirements. On procedures with both PBN elements and ground−based equipment requirements, the PBN requirements box will be listed first. (See FIG ENR 1.5−17.)

2.3 Other RNP Applications Outside the U.S. The FAA and ICAO member states have led initiatives in implementing the RNP concept to oceanic operations. For example, RNP−10 routes have been established in the northern Pacific (NOPAC) which has increased capacity and efficiency by reducing the distance between tracks to 50 NM. (See AIP Section ENR 7.4.)

2.4 Aircraft and Airborne Equipment Eligibility for RNP Operations. Aircraft eligible for RNP operations will have an appropriate entry including special conditions and limitations in its AFM, avionics manual, or a supplement. Operators of aircraft not having specific RNP eligibility statements in the AFM or avionics documents may be issued operational approval including special conditions and limitations for specific RNP eligibilities.

NOTE−
Some airborne systems use Estimated Position Uncertainty (EPU) as a measure of the current estimated navigational performance. EPU may also be referred to as Actual Navigation Performance (ANP) or Estimated Position Error (EPE).

TBL ENR 1.16−1
U.S. Standard RNP Levels

RNP Level	Typical Application	Primary Route Width (NM) − Centerline to Boundary
0.1 to 1.0	RNP AR Approach Segments	0.1 to 1.0
0.3 to 1.0	RNP Approach Segments	0.3 to 1.0
1	Terminal and En Route	1.0
2	En Route	2.0
4	Oceanic/remote areas where performance−based horizontal separation is applied.	4.0
10	Oceanic/remote areas where performance−based horizontal separation is applied.	10.0

3. Use of Suitable Area Navigation (RNAV) Systems on Conventional Procedures and Routes

3.1 Discussion. This paragraph sets forth policy, while providing operational and airworthiness guidance regarding the suitability and use of RNAV systems when operating on, or transitioning to, conventional, non−RNAV routes and procedures within the U.S. National Airspace System (NAS):

3.1.1 Use of a suitable RNAV system as a Substitute Means of Navigation when a Very−High Frequency (VHF) Omni−directional Range (VOR), Distance Measuring Equipment (DME), Tactical Air Navigation (TACAN), VOR/TACAN (VORTAC), VOR/DME, Non−directional Beacon (NDB), or compass locator facility including locator outer marker and locator middle marker is out−of−service (that is, the navigation aid (NAVAID) information is not available); an aircraft is not equipped with an Automatic Direction Finder (ADF) or DME; or the installed ADF or DME on an aircraft is not operational. For example, if equipped with a suitable RNAV system, a pilot may hold over an out−of−service NDB.

3.1.2 Use of a suitable RNAV system as an Alternate Means of Navigation when a VOR, DME, VORTAC, VOR/DME, TACAN, NDB, or compass locator facility including locator outer marker and locator middle marker is operational and the respective aircraft is equipped with operational navigation equipment that is compatible with conventional navaids. For example, if equipped with a suitable RNAV system, a pilot may fly a procedure or route based on operational VOR using that RNAV system without monitoring the VOR.

NOTE−
1. *Additional information and associated requirements are available in Advisory Circular 90-108 titled "Use of Suitable RNAV Systems on Conventional Routes and Procedures."*

2. *Good planning and knowledge of your RNAV system are critical for safe and successful operations.*

3. *Pilots planning to use their RNAV system as a substitute means of navigation guidance in lieu of an out−of−service NAVAID may need to advise ATC of this intent and capability.*

4. *The navigation database should be current for the duration of the flight. If the AIRAC cycle will change during flight, operators and pilots should establish procedures to ensure the accuracy of navigation data, including suitability of navigation facilities used to define the routes and procedures for flight. To facilitate validating database currency, the FAA has developed procedures for publishing the amendment date that instrument approach procedures were last revised. The amendment date follows the amendment number; for example, Amdt 4 14Jan10. Currency of graphic departure procedures and STARs may be ascertained by the numerical designation in the procedure title. If an amended chart is published for the procedure, or the procedure amendment date shown on the chart is on or after the expiration date of the database, the operator must not use the database to conduct the operation.*

3.2 Types of RNAV Systems that Qualify as a Suitable RNAV System. When installed in accordance with appropriate airworthiness installation requirements and operated in accordance with applicable operational guidance (e.g., aircraft flight manual and Advisory Circular material), the following systems qualify as a suitable RNAV system:

3.2.1 An RNAV system with TSO−C129/ −C145/−C146 equipment, installed in accordance with AC 20−138, Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment for Use as a VFR and IFR Supplemental Navigation System, and authorized for instrument flight rules (IFR) en route and terminal operations (including those systems previously qualified for "GPS in lieu of ADF or DME" operations), or

3.2.2 An RNAV system with DME/DME/IRU inputs that is compliant with the equipment provisions of AC 90−100A, U.S. Terminal and En Route Area Navigation (RNAV) Operations, for RNAV routes. A table of compliant equipment is available at the following website:
https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/media/AC90−100compliance.pdf

NOTE−
Approved RNAV systems using DME/DME/IRU, without GPS/WAAS position input, may only be used as a substitute means of navigation when specifically authorized by a Notice to Airmen (NOTAM) or other FAA guidance for a specific procedure. The NOTAM or other FAA guidance authorizing the use of DME/DME/IRU systems will also identify any required DME facilities based on an FAA assessment of the DME navigation infrastructure.

3.3 Uses of Suitable RNAV Systems. Subject to the operating requirements, operators may use a suitable RNAV system in the following ways:

3.3.1 Determine aircraft position relative to, or distance from a VOR (see NOTE 6 below), TACAN, NDB, compass locator, DME fix; or a named fix defined by a VOR radial, TACAN course, NDB bearing, or compass locator bearing intersecting a VOR or localizer course.

3.3.2 Navigate to or from a VOR, TACAN, NDB, or compass locator.

3.3.3 Hold over a VOR, TACAN, NDB, compass locator, or DME fix.

3.3.4 Fly an arc based upon DME.

NOTE−
1. *The allowances described in this section apply even when a facility is identified as required on a procedure (for example, "Note ADF required").*

2. *These operations do not include lateral navigation on localizer−based courses (including localizer back−course guidance) without reference to raw localizer data.*

3. *Unless otherwise specified, a suitable RNAV system cannot be used for navigation on procedures that are identified as not authorized ("NA") without exception by a NOTAM. For example, an operator may not use a RNAV system to navigate on a procedure affected by an expired or unsatisfactory flight inspection, or a procedure that is based upon a recently decommissioned NAVAID.*

4. *Pilots may not substitute for the NAVAID (for example, a VOR or NDB) providing lateral guidance for the final approach segment. This restriction does not refer to instrument approach procedures with "or GPS" in the title when using GPS or*

WAAS. These allowances do not apply to procedures that are identified as not authorized (NA) without exception by a NOTAM, as other conditions may still exist and result in a procedure not being available. For example, these allowances do not apply to a procedure associated with an expired or unsatisfactory flight inspection, or is based upon a recently decommissioned NAVAID.

5. *Use of a suitable RNAV system as a means to navigate on the final approach segment of an instrument approach procedure based on a VOR, TACAN or NDB signal, is allowable. The underlying NAVAID must be operational and the NAVAID monitored for final segment course alignment.*

6. *For the purpose of paragraph 3.3.1, "VOR" includes VOR, VOR/DME, and VORTAC facilities and "compass locator" includes locator outer marker and locator middle marker.*

3.4 Alternate Airport Considerations. For the purposes of flight planning, any required alternate airport must have an available instrument approach procedure that does not require the use of GPS. This restriction includes conducting a conventional approach at the alternate airport using a substitute means of navigation that is based upon the use of GPS. For example, these restrictions would apply when planning to use GPS equipment as a substitute means of navigation for an out−of−service VOR that supports an ILS missed approach procedure at an alternate airport. In this case, some other approach not reliant upon the use of GPS must be available. This restriction does not apply to RNAV systems using TSO−C145/−C146 WAAS equipment. For further WAAS guidance see ENR 4.1 paragraph 17.

3.4.1 For flight planning purposes, TSO-C129() and TSO-C196() equipped users (GPS users) whose navigation systems have fault detection and exclusion (FDE) capability, who perform a preflight RAIM prediction at the airport where the RNAV (GPS) approach will be flown, and have proper knowledge and any required training and/or approval to conduct a GPS-based IAP, may file based on a GPS-based IAP at either the destination or the alternate airport, but not at both locations. At the alternate airport, pilots may plan for applicable alternate airport weather minimums using:

3.4.1.1 Lateral navigation (LNAV) or circling minimum descent altitude (MDA);

3.4.1.2 LNAV/vertical navigation (LNAV/VNAV) DA, if equipped with and using approved barometric vertical navigation (baro-VNAV) equipment;

3.4.1.3 RNP 0.3 DA on an RNAV (RNP) IAP, if they are specifically authorized users using approved baro-VNAV equipment and the pilot has verified required navigation performance (RNP) availability through an approved prediction program.

3.4.2 If the above conditions cannot be met, any required alternate airport must have an approved instrument approach procedure other than GPS that is anticipated to be operational and available at the estimated time of arrival, and which the aircraft is equipped to fly.

3.4.3 This restriction does not apply to TSO-C145() and TSO-C146() equipped users (WAAS users). For further WAAS guidance see ENR 4.1 paragraph 17.

3.5 General Operational Requirements

3.5.1 Pilots must comply with the guidelines contained in their AFM, AFM supplement, operating manual, or pilot's guide when operating their aircraft navigation system.

3.5.2 Pilots may not use their RNAV system as a substitute or alternate means of navigation guidance if their aircraft has an AFM or AFM supplement with a limitation to monitor the underlying navigation aids for the associated operation.

3.5.3 Pilots of aircraft with an AFM limitation that requires the aircraft to have other equipment appropriate to the route to be flown may only use their RNAV equipment as a substitute means of navigation in the contiguous U.S. In addition, pilots of these aircraft may not use their RNAV equipment as a substitute for inoperable or not−installed equipment.

3.5.4 Pilots must ensure their onboard navigation data is current, appropriate for the region of intended operation, and includes the navigation aids, waypoints, and relevant coded terminal airspace procedures for the departure, arrival, and alternate airfields.

NOTE−
The navigation database should be current for the duration of the flight. If the AIRAC cycle will change during flight, operators and pilots should establish procedures to ensure the accuracy of navigation data, including suitability of navigation facilities used to define the routes and procedures for flight. To facilitate validating database currency, the FAA has developed procedures for publishing the amendment date that instrument approach procedures were last revised. The amendment date follows the amendment number; for example, Amdt 4 14Jan10. Currency of graphic departure procedures and STARs may be ascertained by the numerical designation in the procedure title. If an amended chart is published for the procedure, or the procedure amendment date shown on the chart is on or after the expiration date of the database, the operator must not use the database to conduct the operation.

3.5.5 Pilots must extract procedures, waypoints, navaids, or fixes by name from the onboard navigation database and comply with the charted procedure or route.

3.5.6 For the purposes described in this paragraph, pilots may not manually enter published procedure or route waypoints via latitude/longitude, place/bearing, or place/bearing/distance into the aircraft system.

3.6 Operational Requirements for Departure and Arrival Procedures

3.6.1 Pilots of aircraft with standalone GPS receivers must ensure that CDI scaling (full−scale deflection) is either ±1.0 NM or 0.3 NM.

3.6.2 In order to use a substitute means of navigation guidance on departure procedures, pilots of aircraft with RNAV systems using DME/DME/IRU, without GPS input, must ensure their aircraft navigation system position is confirmed, within 1,000 feet, at the start point of take−off roll. The use of an automatic or manual runway update is an acceptable means of compliance with this requirement. A navigation map may also be used to confirm aircraft position, if pilot procedures and display resolution allow for compliance with the 1,000−foot tolerance requirement.

3.7 Operational Requirements for Instrument Approach Procedures

3.7.1 When the use of RNAV equipment using GPS input is planned as a substitute means of navigation guidance for part of an instrument approach procedure at a destination airport, any required alternate airport must have an available instrument approach procedure that does not require the use of GPS. This restriction includes conducting a conventional approach at the alternate airport using a substitute means of navigation guidance based upon the use of GPS. This restriction does not apply to RNAV systems using WAAS as an input.

3.7.2 Pilots of aircraft with standalone GPS receivers must ensure that CDI sensitivity is ±1 NM.

NOTE−
If using GPS distance as an alternate or substitute means of navigation guidance for DME distance on an instrument approach procedure, pilots must select a named waypoint from the onboard navigation database that is associated with the subject DME facility. Pilots should not rely on information from an RNAV instrument approach procedure, as distances on RNAV approaches may not match the distance to the facility.

3.8 Operational Requirements for Specific Inputs to RNAV Systems:

3.8.1 GPS

3.8.1.1 RNAV systems using GPS input may be used as an alternate means of navigation guidance without restriction if appropriate RAIM is available.

3.8.1.2 Operators of aircraft with RNAV systems that use GPS input but do not automatically alert the pilot of a loss of GPS, must develop procedures to verify correct GPS operation.

3.8.1.3 RNAV systems using GPS input may be used as a substitute means of navigation guidance provided RAIM availability for the operation is confirmed. During flight planning, the operator should confirm the availability of RAIM with the latest GPS NOTAMs. If no GPS satellites are scheduled to be out−of−service, then the aircraft can depart without further action. However, if any GPS satellites are scheduled to be out−of−service, then the operator must confirm the availability of GPS integrity (RAIM) for the intended operation. In the event of a predicted, continuous loss of RAIM of more than five (5) minutes for any part of the route or procedure, the operator should delay, cancel, or re−route the flight as appropriate. Use of GPS as a substitute is not authorized when the RAIM capability of the GPS equipment is lost.

NOTE−
The FAA is developing a RAIM prediction service for general use. Until this capability is operational, a RAIM prediction does not need to be done for a departure or arrival procedure with an associated "RADAR REQUIRED" note charted or for routes where the operator expects to be in radar coverage. Operators may check RAIM availability for departure or arrival procedures at any given airport by checking approach RAIM for that location. This information is available upon request from a U.S. Flight Service Station, but is no longer available through DUATS.

3.8.2 WAAS

3.8.2.1 RNAV systems using WAAS input may be used as an alternate means of navigation guidance without restriction.

3.8.2.2 RNAV systems using WAAS input may be used as a substitute means of navigation guidance provided WAAS availability for the operation is confirmed. Operators must check WAAS NOTAMs.

3.8.3 DME/DME/IRU

3.8.3.1 RNAV systems using DME/DME/IRU, without GPS input, may be used as an alternate means of navigation guidance whenever valid DME/DME position updating is available.

4. Recognizing, Mitigating and Adapting to GNSS Jamming and/or Spoofing

4.1 The low−strength data transmission signals from GNSS satellites are vulnerable to various anomalies that can significantly reduce the reliability of the navigation signal. The GPS signal is vulnerable and has many uses in aviation (e.g., communication, navigation, surveillance, safety systems and automation); therefore, pilots must place additional emphasis on closely monitoring aircraft equipment performance for any anomalies and promptly inform Air Traffic Control (ATC) of any apparent GPS degradation. Pilots should also be prepared to operate without GNSS navigation systems.

4.2 GNSS signals are vulnerable to intentional and unintentional interference from a wide variety of sources, including radars, microwave links, ionosphere effects, solar activity, multi-path error, satellite communications GNSS repeaters, and even some systems onboard the aircraft. In general, these types of unintentional interference are localized and intermittent. Of greater and growing concern is the intentional and unauthorized interference of GNSS signals by persons using "jammers" or "spoofers" to disrupt air navigation by interfering with the reception of valid satellite signals.

NOTE−
The U.S. government regularly conducts GNSS tests, training activities, and exercises that interfere with GNSS signals. These events are geographically limited, coordinated, scheduled, and advertised via GNSSS and/or WAAS NOTAMS. Operators of GNSSS aircraft should always check for GNSS and/or WAAS NOTAMS for their route of flight.

4.3 Manufacturers, operators, and air traffic controllers should be aware of the general impacts of GNSS jamming and/or spoofing which include, but are not limited to:

4.3.1 Inability to use GNSS for navigation.

4.3.2 Inability to use hybrid GNSS inertial systems for navigation.

4.3.3 Loss of, or degraded, performance−based navigation (PBN) capability (e.g., inability to fly required navigation performance (RNP) procedures).

4.3.4 Unreliable triggering of Terrain Awareness and Warning Systems (TAWS).

4.3.5 Inaccurate aircraft position on navigation display (e.g., moving map and electronic flight bag).

4.3.6 Loss of, or erroneous, Automatic Dependent Surveillance−Broadcast (ADS−B) outputs.

4.3.7 Unexpected effects when navigating with conventional NAVAIDS (e.g., if the aircraft is spoofed from the intended flight path, autotuning will not select the nearby NAVAID).

4.3.8 Unanticipated position−dependent flight management system effects (e.g., erroneous insufficient fuel indication).

4.3.9 Failure or degradation of Air Traffic Management (ATM) infrastructure and its associated systems reliant on GNSS, resulting in potential airspace infringements and/or route deviations.

4.3.10 Failure of, or erroneous aircraft clocks (resulting in inability to log on to Controller−Pilot Data Link Communications (CPDLC).

4.3.11 Erroneous wind and ground speed indications.

4.4 When flying IFR, pilots should have additional navigation equipment for their intended route to crosscheck their position. Routine checks of position against VOR or DME information, for example, could help detect a compromised GNSS signal. Pilots transitioning to VOR navigation in response to GNSS anomalies should refer to the Chart Supplement U.S. to identify airports with available conventional approaches associated with the VOR Minimum Operational Network (MON) program. (Reference Aeronautical Information Publication AIP ENR 4.1−2.6.3).

REFERENCE−
AIP, ENR 4.1, Subpara 2.6.3, Using the VOR MON.

4.5 Prior to departure, the FAA recommends operators to:

4.5.1 Be aware of potential risk locations.

4.5.2 Check for any relevant Notices to Airmen (NOTAMs).

4.5.3 Plan fuel contingencies.

4.5.4 Plan to use conventional NAVAIDs and appropriate arrival/approach procedures at the destination.

4.5.5 Follow the detailed guidance from the respective Original Equipment Manufacturer (OEM).

4.6 During flight, the FAA recommends operators do the following:

4.6.1 Be vigilant for any indication that the aircraft's GNSS is disrupted by reviewing the manufacturer's guidance for that specific aircraft type and avionics equipage. Verify the aircraft position by means of conventional NAVAIDs, when available. Indications of jamming and/or spoofing may include:

4.6.1.1 Changes in actual navigation performance.

4.6.1.2 Aircraft clock changes (e.g., incorrect time).

4.6.1.3 Incorrect Flight Management System (FMS) position.

4.6.1.4 Large shift in displayed GNSS position.

4.6.1.5 Primary Flight Display (PFD)/Navigation Display (ND) warnings about position error.

4.6.1.6 Other aircraft reporting clock issues, position errors, or requesting vectors.

4.6.2 Assess operational risks and limitations linked to the loss of GNSS capability, including any on−board systems requiring inputs from a GNSS signal.

4.6.3 Ensure NAVAIDs critical to the operation for the intended route/approach are available.

4.6.4 Remain prepared to revert to conventional instrument flight procedures.

4.6.5 Promptly notify ATC if they experience GNSS anomalies. Pilots should NOT normally inform ATC of GNSS jamming and/or spoofing when flying through a known NOTAMed testing area, unless they require ATC assistance. (See AIP ENR 4.1−22.)

4.7 Post flight, the FAA recommends operators to:

4.7.1 Document any GNSS jamming and/or spoofing in the maintenance log to ensure all faults are cleared.

4.7.2 File a detailed report at the reporting site: *Report a GPS Anomaly Federal Aviation Administration,* www.faa.gov/air_traffic/nas/gps_reports.

ENR 3.3 Area Navigation (RNAV) Routes

These routes are available at the following website: https://www.faa.gov/air_traffic/flight_info/aeronav/aero_data/Part_95_Consolidation/.

1. Area Navigation (RNAV) Routes

1.1 Published RNAV routes, including Q−routes, T−routes, and Y−routes, can be flight planned for use by aircraft with RNAV capability, subject to any limitations or requirements noted on en route charts, in applicable Advisory Circulars, NOTAMs, etc. RNAV routes are normally depicted in blue on aeronautical charts and are identified by the letter "Q," "T," or "Y" followed by the airway number (for example, Q13, T205, and Y280). Published RNAV routes are RNAV 2 except when specifically charted as RNAV 1. Unless otherwise specified, these routes require system performance currently met by GPS, GPS/WAAS, or DME/DME/IRU RNAV systems that satisfy the criteria discussed in AC 90−100A, U.S. Terminal and En Route Area Navigation (RNAV) Operations.

1.1.1 Q−routes are available for use by RNAV equipped aircraft between 18,000 feet MSL and FL 450 inclusive. Q−routes are depicted on En Route High Altitude Charts.

NOTE−
Aircraft in Alaska may only operate on GNSS Q-routes with GPS (TSO-C129 (as revised) or TSO-C196 (as revised)) equipment while the aircraft remains in Air Traffic Control (ATC) radar surveillance or with GPS/WAAS which does not require ATC radar surveillance.

1.1.2 T−routes are available for use by GPS or GPS/WAAS equipped aircraft from 1,200 feet above the surface (or in some instances higher) up to but not including 18,000 feet MSL. T−routes are depicted on En Route Low Altitude Charts.

NOTE−
Aircraft in Alaska may only operate on GNSS T-routes with GPS/WAAS (TSO-C145 (as revised) or TSO-C146 (as revised)) equipment.

1.2 Unpublished RNAV routes are direct routes, based on area navigation capability, between waypoints defined in terms of latitude/longitude coordinates, degree−distance fixes, or offsets from established routes/airways at a specified distance and direction. Radar monitoring by ATC is required on all unpublished RNAV routes, except for GNSS−equipped aircraft cleared via filed published waypoints recallable from the aircraft's navigation database.

1.3 Y−routes generally run in U.S. offshore airspace, however operators can find some Y−routes over southern Florida. Pilots must use GPS for navigation and meet RNAV 2 performance requirements for all flights on Y−routes. Operators can find additional Y−route requirements in ENR 7.9.

ENR 3.4 Helicopter Routes

VFR Helicopter routes are available at the following website: https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/vfr/.

1. VFR Helicopter Routes

VFR Helicopter routes are available on Helicopter Route Charts for the following cities: Baltimore/Washington D.C., Boston, Chicago, Dallas/Fort Worth, Detroit, Houston, Los Angeles, New York, and U.S. Gulf Coast.

2. Helicopter Route Charts

Helicopter Route Charts are three−color charts that depict current aeronautical information useful to helicopter pilots navigating in areas with high concentrations of activity. Information depicted includes helicopter routes, maximum route altitudes at specific points, multiple classes of heliports with associated frequency and lighting capabilities, NAVAIDS, and obstructions. In addition, pictorial symbols, roads, and easily identified geographical features are portrayed. (See FIG GEN 3.2−4.)

ENR 3.6 En Route Holding

The United States of America does not delineate a difference between "Holding" and "En Route Holding." Holding information can be found in Holding Procedures (see ENR 1.5, paragraph 1, Holding Procedures).

16.1.2.1 The status of GPS satellites is broadcast as part of the data message transmitted by the GPS satellites. GPS status information is also available by means of the U.S. Coast Guard navigation information service: (703) 313−5907, Internet: http://www.navcen.uscg.gov/. Additionally, satellite status is available through the Notice to Airmen (NOTAM) system.

16.1.2.2 GNSS operational status depends on the type of equipment being used. For GPS−only equipment TSO−C129 or TSO-C196(), the operational status of non−precision approach capability for flight planning purposes is provided through a prediction program that is embedded in the receiver or provided separately.

16.1.3 Receiver Autonomous Integrity Monitoring (RAIM). RAIM is the capability of a GPS receiver to perform integrity monitoring on itself by ensuring available satellite signals meet the integrity requirements for a given phase of flight. Without RAIM, the pilot has no assurance of the GPS position integrity. RAIM provides immediate feedback to the pilot. This fault detection is critical for performance-based navigation (PBN)(see ENR 1.16, Performance−Based Navigation (PBN) and Area Navigation (RNAV), for an introduction to PBN), because delays of up to two hours can occur before an erroneous satellite transmission is detected and corrected by the satellite control segment.

16.1.3.1 In order for RAIM to determine if a satellite is providing corrupted information, at least one satellite, in addition to those required for navigation, must be in view for the receiver to perform the RAIM function. RAIM requires a minimum of 5 satellites, or 4 satellites and barometric altimeter input (baro−aiding), to detect an integrity anomaly. Baro−aiding is a method of augmenting the GPS integrity solution by using a non-satellite input source in lieu of the fifth satellite. Some GPS receivers also have a RAIM capability, called fault detection and exclusion (FDE), that excludes a failed satellite from the position solution; GPS receivers capable of FDE require 6 satellites or 5 satellites with baro−aiding. This allows the GPS receiver to isolate the corrupt satellite signal, remove it from the position solution, and still provide an integrity-assured position. To ensure that baro−aiding is available, enter the current altimeter setting into the receiver as described in the operating manual. Do not use the GPS derived altitude due to the large GPS vertical errors that will make the integrity monitoring function invalid.

16.1.3.2 There are generally two types of RAIM fault messages. The first type of message indicates that there are not enough satellites available to provide RAIM integrity monitoring. The GPS navigation solution may be acceptable, but the integrity of the solution cannot be determined. The second type indicates that the RAIM integrity monitor has detected a potential error and that there is an inconsistency in the navigation solution for the given phase of flight. Without RAIM capability, the pilot has no assurance of the accuracy of the GPS position.

16.1.4 Selective Availability. Selective Availability (SA) is a method by which the accuracy of GPS is intentionally degraded. This feature was designed to deny hostile use of precise GPS positioning data. SA was discontinued on May 1, 2000, but many GPS receivers are designed to assume that SA is still active. New receivers may take advantage of the discontinuance of SA based on the performance values in ICAO Annex 10.

16.2 Operational Use of GPS. U.S. civil operators may use approved GPS equipment in oceanic airspace, certain remote areas, the National Airspace System and other States as authorized (please consult the applicable Aeronautical Information Publication). Equipage other than GPS may be required for the desired operation. GPS navigation is used for both Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) operations.

16.2.1 VFR Operations

16.2.1.1 GPS navigation has become an asset to VFR pilots by providing increased navigational capabilities and enhanced situational awareness. Although GPS has provided many benefits to the VFR pilot, care must be exercised to ensure that system capabilities are not exceeded. VFR pilots should integrate GPS navigation with electronic navigation (when possible), as well as pilotage and dead reckoning.

16.2.1.2 GPS receivers used for VFR navigation vary from fully integrated IFR/VFR installation used to support VFR operations to hand−held devices. Pilots must understand the limitations of the receivers prior to using in flight to avoid misusing navigation information. (See TBL ENR 4.1−5.) Most receivers are not intuitive. The pilot must learn the various keystrokes, knob functions, and displays that are used in the operation of the receiver. Some manufacturers provide computer−based tutorials or simulations of their receivers that pilots can use to become familiar with operating the equipment.

16.2.1.3 When using GPS for VFR operations, RAIM capability, database currency, and antenna location are critical areas of concern.

a) RAIM Capability. VFR GPS panel mount receivers and hand−held units have no RAIM alerting capability. This prevents the pilot from being alerted to the loss of the required number of satellites in view, or the detection of a position error. Pilots should use a systematic cross−check with other navigation techniques to verify position. Be suspicious of the GPS position if a disagreement exists between the two positions.

b) Database Currency. Check the currency of the database. Databases must be updated for IFR operations and should be updated for all other operations. However, there is no requirement for databases to be updated for VFR navigation. It is not recommended to use a moving map with an outdated database in and around critical airspace. Pilots using an outdated database should verify waypoints using current aeronautical products; for example, Chart Supplement, Sectional Chart, or En Route Chart.

c) Antenna Location. The antenna location for GPS receivers used for IFR and VFR operations may differ. VFR antennae are typically placed for convenience more than performance, while IFR installations ensure a clear view is provided with the satellites. Antennae not providing a clear view have a greater opportunity to lose the satellite navigational signal. This is especially true in the case of hand−held GPS receivers. Typically, suction cups are used to place the GPS antennas on the inside of cockpit windows. While this method has great utility, the antenna location is limited to the cockpit or cabin which rarely provides a clear view of all available satellites. Consequently, signal losses may occur due to aircraft structure blocking satellite signals, causing a loss of navigation capability. These losses, coupled with a lack of RAIM capability, could present erroneous position and navigation information with no warning to the pilot. While the use of a hand−held GPS for VFR operations is not limited by regulation, modification of the aircraft, such as installing a panel− or yoke−mounted holder, is governed by 14 CFR Part 43. Consult with your mechanic to ensure compliance with the regulation and safe installation.

16.2.1.4 Do not solely rely on GPS for VFR navigation. No design standard of accuracy or integrity is used for a VFR GPS receiver. VFR GPS receivers should be used in conjunction with other forms of navigation during VFR operations to ensure a correct route of flight is maintained. Minimize head−down time in the aircraft by being familiar with your GPS receiver's operation and by keeping eyes outside scanning for traffic, terrain, and obstacles.

16.2.1.5 VFR Waypoints

a) VFR waypoints provide VFR pilots with a supplementary tool to assist with position awareness while navigating visually in aircraft equipped with area navigation receivers. VFR waypoints should be used as a tool to supplement current navigation procedures. The uses of VFR waypoints include providing navigational aids for pilots unfamiliar with an area, waypoint definition of existing reporting points, enhanced navigation in and around Class B and Class C airspace, enhanced navigation around Special Use Airspace, and entry points for commonly flown mountain passes. VFR pilots should rely on appropriate and current aeronautical charts published specifically for visual navigation. If operating in a terminal area, pilots should take advantage of the Terminal Area Chart available for that area, if published. The use of VFR waypoints does not relieve the pilot of any responsibility to comply with the operational requirements of 14 CFR Part 91.

b) VFR waypoint names (for computer entry and flight plans) consist of five letters beginning with the letters "VP" and are retrievable from navigation databases. The VFR waypoint names are not intended to be pronounceable, and they are not for use in ATC communications. On VFR charts, stand−alone VFR waypoints will be portrayed using the same four−point star symbol used for IFR waypoints. VFR waypoints collocated with visual check−points on the chart will be identified by small magenta flag symbols. VFR waypoints collocated with visual check−points will be pronounceable based on the name of the visual check−point and may be used for ATC communications. Each VFR waypoint name will appear in parentheses adjacent to the geographic

17. Wide Area Augmentation System (WAAS)

17.1 General

17.1.1 The FAA developed the WAAS to improve the accuracy, integrity and availability of GPS signals. WAAS will allow GPS to be used, as the aviation navigation system, from takeoff through approach when it is complete. WAAS is a critical component of the FAA's strategic objective for a seamless satellite navigation system for civil aviation, improving capacity and safety.

17.1.2 The International Civil Aviation Organization (ICAO) has defined Standards and Recommended Practices (SARPs) for satellite−based augmentation systems (SBAS) such as WAAS. India and Europe are building similar systems: EGNOS, the European Geostationary Navigation Overlay System; and India's GPS and Geo−Augmented Navigation (GAGAN) system. The merging of these systems will create an expansive navigation capability similar to GPS, but with greater accuracy, availability, and integrity.

17.1.3 Unlike traditional ground−based navigation aids, WAAS will cover a more extensive service area. Precisely surveyed wide−area reference stations (WRS) are linked to form the U.S. WAAS network. Signals from the GPS satellites are monitored by these WRSs to determine satellite clock and ephemeris corrections and to model the propagation effects of the ionosphere. Each station in the network relays the data to a wide−area master station (WMS) where the correction information is computed. A correction message is prepared and uplinked to a geostationary earth orbit satellite (GEO) via a GEO uplink subsystem (GUS) which is located at the ground earth station (GES). The message is then broadcast on the same frequency as GPS (L1, 1575.42 MHz) to WAAS receivers within the broadcast coverage area of the WAAS GEO.

17.1.4 In addition to providing the correction signal, the WAAS GEO provides an additional pseudorange measurement to the aircraft receiver, improving the availability of GPS by providing, in effect, an additional GPS satellite in view. The integrity of GPS is improved through real−time monitoring, and the accuracy is improved by providing differential corrections to reduce errors. The performance improvement is sufficient to enable approach procedures with GPS/WAAS glide paths (vertical guidance).

17.1.5 The FAA has completed installation of 3 GEO satellite links, 38 WRSs, 3 WMSs, 6 GES, and the required terrestrial communications to support the WAAS network including 2 operational control centers. Prior to the commissioning of the WAAS for public use, the FAA conducted a series of test and validation activities. Future dual frequency operations are planned.

17.1.6 GNSS navigation, including GPS and WAAS, is referenced to the WGS−84 coordinate system. It should only be used where the Aeronautical Information Publications (including electronic data and aeronautical charts) conform to WGS−84 or equivalent. Other countries civil aviation authorities may impose additional limitations on the use of their SBAS systems.

17.2 Instrument Approach Capabilities

17.2.1 A class of approach procedures which provide vertical guidance, but which do not meet the ICAO Annex 10 requirements for precision approaches has been developed to support satellite navigation use for aviation applications worldwide. These procedures are not precision and are referred to as Approach with Vertical Guidance (APV), are defined in ICAO Annex 6, and include approaches such as the LNAV/VNAV and localizer performance with vertical guidance (LPV). These approaches provide vertical guidance, but do not meet the more stringent standards of a precision approach. Properly certified WAAS receivers will be able to fly to LPV minima and LNAV/VNAV minima, using a WAAS electronic glide path, which eliminates the errors that can be introduced by using Barometric altimetry.

17.2.2 LPV minima takes advantage of the high accuracy guidance and increased integrity provided by WAAS. This WAAS generated angular guidance allows the use of the same TERPS approach criteria used for ILS approaches. LPV minima may have a decision altitude as low as 200 feet height above touchdown with visibility minimums as low as $^1/_2$ mile, when the terrain and airport infrastructure support the lowest minima. LPV minima is published on the RNAV (GPS) approach charts (see paragraph 12., Instrument Approach Procedure Charts).

17.2.3 A different WAAS-based line of minima, called Localizer Performance (LP) is being added in locations where the terrain or obstructions do not allow publication of vertically guided LPV minima. LP takes advantage of the angular lateral guidance and smaller position errors provided by WAAS to provide a lateral only procedure similar to an ILS Localizer. LP procedures may provide lower minima than a LNAV procedure due to the narrower obstacle clearance surface.

NOTE−
WAAS receivers certified prior to TSO−C145b and TSO−C146b, even if they have LPV capability, do not contain LP capability unless the receiver has been upgraded. Receivers capable of flying LP procedures must contain a statement in the Aircraft Flight Manual (AFM), AFM Supplement, or Approved Supplemental Flight Manual stating that the receiver has LP capability, as well as the capability for the other WAAS and GPS approach procedure types.

17.2.4 WAAS provides a level of service that supports all phases of flight, including RNAV (GPS) approaches to LNAV, LP, LNAV/VNAV and LPV lines of minima, within system coverage. Some locations close to the edge of the coverage may have a lower availability of vertical guidance.

17.3 General Requirements

17.3.1 WAAS avionics must be certified in accordance with Technical Standard Order (TSO) TSO−C145, Airborne Navigation Sensors Using the (GPS) Augmented by the Wide Area Augmentation System (WAAS); or TSO−C146, Stand−Alone Airborne Navigation Equipment Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS), and installed in accordance with Advisory Circular (AC) 20−138, *Airworthiness Approval of Positioning and Navigation Systems*.

17.3.2 GPS/WAAS operation must be conducted in accordance with the FAA−approved aircraft flight manual (AFM) and flight manual supplements. Flight manual supplements will state the level of approach procedure that the receiver supports. IFR approved WAAS receivers support all GPS only operations as long as lateral capability at the appropriate level is functional. WAAS monitors both GPS and WAAS satellites and provides integrity.

17.3.3 GPS/WAAS equipment is inherently capable of supporting oceanic and remote operations if the operator obtains a fault detection and exclusion (FDE) prediction program.

17.3.4 Air carrier and commercial operators must meet the appropriate provisions of their approved operations specifications.

17.3.5 Prior to GPS/WAAS IFR operation, the pilot must review appropriate Notices to Airmen (NOTAMs) and aeronautical information. This information is available on request from an Automated Flight Service Station. The FAA will provide NOTAMs to advise pilots of the status of the WAAS and level of service available.

17.3.5.1 The term MAY NOT BE AVBL is used in conjunction with WAAS NOTAMs and indicates that due to ionospheric conditions, lateral guidance may still be available when vertical guidance is unavailable. Under certain conditions, both lateral and vertical guidance may be unavailable. This NOTAM language is an advisory to pilots indicating the expected level of WAAS service (LNAV/VNAV, LPV, LP) may not be available.

EXAMPLE−
!FDC FDC NAV WAAS VNAV/LPV/LP MINIMA MAY NOT BE AVBL 1306111330-1306141930EST
or
!FDC FDC NAV WAAS VNAV/LPV MINIMA NOT AVBL, WAAS LP MINIMA MAY NOT BE AVBL 1306021200-1306031200EST

WAAS MAY NOT BE AVBL NOTAMs are predictive in nature and published for flight planning purposes. Upon commencing an approach at locations NOTAMed WAAS MAY NOT BE AVBL, if the WAAS avionics indicate LNAV/VNAV or LPV service is available, then vertical guidance may be used to complete the approach using the displayed level of service. Should an outage occur during the approach, reversion to LNAV minima or an alternate instrument approach procedure may be required. When GPS testing NOTAMS are published and testing is actually occurring, Air Traffic Control will advise pilots requesting or cleared for a GPS or RNAV (GPS) approach that GPS may not be available and request intentions. If pilots have reported GPS anomalies, Air Traffic Control will request the pilot's intentions and/or clear the pilot for an alternate approach, if available and operational.

17.3.5.2 WAAS area-wide NOTAMs are originated when WAAS assets are out of service and impact the service area. Area−wide WAAS NOT AVAILABLE (AVBL) NOTAMs indicate loss or malfunction of the WAAS system. In flight, Air Traffic Control will advise pilots requesting a GPS or RNAV (GPS) approach of WAAS NOT AVBL NOTAMs if not contained in the ATIS broadcast.

EXAMPLE−
For unscheduled loss of signal or service, an example NOTAM is: !FDC FDC NAV WAAS NOT AVBL 1311160600−1311191200EST.
For scheduled loss of signal or service, an example NOTAM is: !FDC FDC NAV WAAS NOT AVBL 1312041015-1312082000EST

17.3.5.3 Site−specific WAAS MAY NOT BE AVBL NOTAMs indicate an expected level of service; for example, LNAV/VNAV, LP, or LPV may not be available. Pilots must request site−specific WAAS NOTAMs during flight planning. In flight, Air Traffic Control will not advise pilots of WAAS MAY NOT BE AVBL NOTAMs.

NOTE−
Though currently unavailable, the FAA is updating its prediction tool software to provide this site-service in the future.

17.3.5.4 Most of North America has redundant coverage by two or more geostationary satellites. One exception is the northern slope of Alaska. If there is a problem with the satellite providing coverage to this area, a NOTAM similar to the following example will be issued:

EXAMPLE−
*!FDC **4/3406** (PAZA A0173/14) ZAN NAV WAAS SIGNAL MAY NOT BE AVBL NORTH OF LINE FROM 7000N150000W TO 6400N16400W. RMK WAAS USERS SHOULD CONFIRM RAIM AVAILABILITY FOR IFR OPERATIONS IN THIS AREA. T-ROUTES IN THIS SECTOR NOT AVBL. ANY REQUIRED ALTERNATE AIRPORT IN THIS AREA MUST HAVE AN APPROVED INSTRUMENT APPROACH PROCEDURE OTHER THAN GPS THAT IS ANTICIPATED TO BE OPERATIONAL AND AVAILABLE AT THE ESTIMATED TIME OF ARRIVAL AND WHICH THE AIRCRAFT IS EQUIPPED TO FLY. 1406030812-1406050812EST .*

17.3.6 When GPS−testing NOTAMS are published and testing is actually occurring, Air Traffic Control will advise pilots requesting or cleared for a GPS or RNAV (GPS) approach that GPS may not be available and request intentions. If pilots have reported GPS anomalies, Air Traffic Control will request the pilot's intentions and/or clear the pilot for an alternate approach, if available and operational.

EXAMPLE−
Here is an example of a GPS testing NOTAM:
*!GPS **06/001** ZAB NAV GPS (INCLUDING WAAS, GBAS, AND ADS-B) MAY NOT BE AVAILABLE WITHIN A 468NM RADIUS CENTERED AT 330702N1062540W (TCS 093044) FL400-UNL DECREASING IN AREA WITH A DECREASE IN ALTITUDE DEFINED AS: 425NM RADIUS AT FL250, 360NM RADIUS AT 10000FT, 354NM RADIUS AT 4000FT AGL, 327NM RADIUS AT 50FT AGL. 1406070300-1406071200.*

17.3.7 When the approach chart is annotated with the W symbol, site−specific WAAS MAY NOT BE AVBL NOTAMs or Air Traffic advisories are not provided for outages in WAAS LNAV/VNAV and LPV vertical service. Vertical outages may occur daily at these locations due to being close to the edge of WAAS system coverage. Use LNAV or circling minima for flight planning at these locations, whether as a destination or alternate. For flight operations at these locations, when the WAAS avionics indicate that LNAV/VNAV or LPV service is available, then the vertical guidance may be used to complete the approach using the displayed level of service. Should an outage occur during the procedure, reversion to LNAV minima may be required.

NOTE−
Area−wide WAAS NOT AVBL NOTAMs apply to all airports in the WAAS NOT AVBL area designated in the NOTAM, including approaches at airports where an approach chart is annotated with the W symbol.

17.3.8 GPS/WAAS was developed to be used within GEO coverage over North America without the need for other radio navigation equipment appropriate to the route of flight to be flown. Outside the WAAS coverage or in the event of a WAAS failure, GPS/WAAS equipment reverts to GPS−only operation and satisfies the requirements for basic GPS equipment. (See ENR 4.1 paragraph 17. for these requirements).

17.3.9 Unlike TSO−C129 avionics, which were certified as a supplement to other means of navigation, WAAS avionics are evaluated without reliance on other navigation systems. As such, installation of WAAS avionics does not require the aircraft to have other equipment appropriate to the route to be flown. (See ENR 4.1 paragraph 17. for more information on equipment requirements.)

17.3.9.1 Pilots with WAAS receivers may flight plan to use any instrument approach procedure authorized for use with their WAAS avionics as the planned approach at a required alternate, with the following restrictions. When using WAAS at an alternate airport, flight planning must be based on flying the RNAV (GPS) LNAV or circling minima line, or minima on a GPS approach procedure, or conventional approach procedure with "or GPS" in the title. Code of Federal Regulation (CFR) Part 91 nonprecision weather requirements must be used for planning. Upon arrival at an alternate, when the WAAS navigation system indicates that LNAV/VNAV or LPV service is available, then vertical guidance may be used to complete the approach using the displayed level of service. The FAA has begun removing the ▲ **NA** (Alternate Minimums Not Authorized) symbol from select RNAV (GPS) and GPS approach procedures so they may be used by approach approved WAAS receivers at alternate airports. Some approach procedures will still require the ▲ **NA** for other reasons, such as no weather reporting, so it cannot be removed from all procedures. Since every procedure must be individually evaluated, removal of the ▲ **NA** from RNAV (GPS) and GPS procedures will take some time.

NOTE−
Properly trained and approved, as required, TSO-C145 and TSO-C146 equipped users (WAAS users) with and using approved baro-VNAV equipment may plan for LNAV/VNAV DA at an alternate airport. Specifically authorized WAAS users with and using approved baro-VNAV equipment may also plan for RNP 0.3 DA at the alternate airport as long as the pilot has verified RNP availability through an approved prediction program.

17.4 Flying procedures with WAAS

17.4.1 WAAS receivers support all basic GPS approach functions and provide additional capabilities. One of the major improvements is the ability to generate glide path guidance, independent of ground equipment or barometric aiding. This eliminates several problems such as hot and cold temperature effects, incorrect altimeter setting or lack of a local altimeter source. It also allows approach procedures to be built without the cost of installing ground stations at each airport or runway. Some approach certified receivers may only generate a glide path with performance similar to Baro−VNAV and are only approved to fly the LNAV/VNAV line of minima on the RNAV (GPS) approach charts. Receivers with additional capability (including faster update rates and smaller integrity limits) are approved to fly the LPV line of minima. The lateral integrity changes dramatically from the 0.3 NM (556 meter) limit for GPS, LNAV and LNAV/VNAV approach mode, to 40 meters for LPV. It also provides vertical integrity monitoring, which bounds the vertical error to 50 meters for LNAV/VNAV and LPVs with minima of 250' or above, and bounds the vertical error to 35 meters for LPVs with minima below 250'.

17.4.2 When an approach procedure is selected and active, the receiver will notify the pilot of the most accurate level of service supported by the combination of the WAAS signal, the receiver, and the selected approach, using the naming conventions on the minima lines of the selected approach procedure. For example, if an approach is published with LPV minima and the receiver is only certified for LNAV/VNAV, the equipment would indicate "LNAV/VNAV available," even though the WAAS signal would support LPV. If flying an existing LNAV/VNAV procedure with no LPV minima, the receiver will notify the pilot "LNAV/VNAV available," even if the receiver is certified for LPV and the signal supports LPV. If the signal does not support vertical guidance on procedures with LPV and/or LNAV/VNAV minima, the receiver annunciation will read "LNAV available." On lateral only procedures with LP and LNAV minima the receiver will indicate "LP available" or "LNAV available" based on the level of lateral service available. Once the level of service notification has been given, the receiver will operate in this mode for the duration of the approach procedure, unless that level of service becomes unavailable. The receiver cannot change back to a more accurate level of service until the next time an approach is activated.

NOTE−
Receivers do not "fail down" to lower levels of service once the approach has been activated. If only the vertical off flag appears, the pilot may elect to use the LNAV minima if the rules under which the flight is operating allow changing the type of approach being flown after commencing the procedure. If the lateral integrity limit is exceeded on an LP approach, a missed approach will be necessary since there is no way to reset the lateral alarm limit while the approach is active.

17.4.3 Another additional feature of WAAS receivers is the ability to exclude a bad GPS signal and continue operating normally. This is normally accomplished by the WAAS correction information. Outside WAAS coverage or when WAAS is not available, it is accomplished through a receiver algorithm called FDE. In most cases this operation will be invisible to the pilot since the receiver will continue to operate with other available satellites after excluding the "bad" signal. This capability increases the reliability of navigation.

17.4.4 Both lateral and vertical scaling for the LNAV/VNAV and LPV approach procedures are different than the linear scaling of basic GPS. When the complete published procedure is flown, ±1 NM linear scaling is provided until two (2) NM prior to the FAF, where the sensitivity increases to be similar to the angular scaling of an ILS. There are two differences in the WAAS scaling and ILS: 1) on long final approach segments, the initial scaling will be ±0.3 NM to achieve equivalent performance to GPS (and better than ILS, which is less sensitive far from the runway); 2) close to the runway threshold, the scaling changes to linear instead of continuing to become more sensitive. The width of the final approach course is tailored so that the total width is usually 700 feet at the runway threshold. Since the origin point of the lateral splay for the angular portion of the final is not fixed due to antenna placement like localizer, the splay angle can remain fixed, making a consistent width of final for aircraft being vectored onto the final approach course on different length runways. When the complete published procedure is not flown, and instead the aircraft needs to capture the extended final approach course similar to ILS, the vector to final (VTF) mode is used. Under VTF, the scaling is linear at ±1 NM until the point where the ILS angular splay reaches a width of ±1 NM regardless of the distance from the FAWP.

17.4.5 The WAAS scaling is also different than GPS TSO−C129 in the initial portion of the missed approach. Two differences occur here. First, the scaling abruptly changes from the approach scaling to the missed approach scaling, at approximately the departure end of the runway or when the pilot selects missed approach guidance rather than ramping as GPS does. Second, when the first leg of the missed approach is a Track to Fix (TF) leg aligned within 3 degrees of the inbound course, the receiver will change to 0.3 NM linear sensitivity until the turn initiation point for the first waypoint in the missed approach procedure, at which time it will abruptly change to terminal (±1 NM) sensitivity. This allows the elimination of close in obstacles in the early part of the missed approach that may otherwise cause the DA to be raised.

17.4.6 There are two ways to select the final approach segment of an instrument approach. Most receivers use menus where the pilot selects the airport, the runway, the specific approach procedure and finally the IAF, there is also a channel number selection method. The pilot enters a unique 5−digit number provided on the approach chart, and the receiver recalls the matching final approach segment from the aircraft database. A list of information including the available IAFs is displayed and the pilot selects the appropriate IAF. The pilot should confirm that the correct final approach segment was loaded by cross checking the Approach ID, which is also provided on the approach chart.

17.4.7 The Along−Track Distance (ATD) during the final approach segment of an LNAV procedure (with a minimum descent altitude) will be to the MAWP. On LNAV/VNAV and LPV approaches to a decision altitude, there is no missed approach waypoint so the along−track distance is displayed to a point normally located at the runway threshold. In most cases, the MAWP for the LNAV approach is located on the runway threshold at the centerline, so these distances will be the same. This distance will always vary slightly from any ILS DME that may be present, since the ILS DME is located further down the runway. Initiation of the missed approach on the LNAV/VNAV and LPV approaches is still based on reaching the decision altitude without any of the items listed in 14 CFR Section 91.175 being visible, and must not be delayed while waiting for the ATD to reach zero. The WAAS receiver, unlike a GPS receiver, will automatically sequence past the MAWP if the missed approach procedure has been designed for RNAV. The pilot may also select missed approach prior to the MAWP; however, navigation will continue to the MAWP prior to waypoint sequencing taking place.

18. Ground Based Augmentation System (GBAS) Landing System (GLS)

18.1 A GBAS ground installation at an airport can provide localized, differential augmentation to the Global Positioning System (GPS) signal−in−space enabling an aircraft's GLS precision approach capability. Through the GBAS service and the aircraft's GLS installation a pilot may complete an instrument approach offering three−dimensional angular lateral, and vertical guidance for exact alignment and descent to a runway. The operational benefits of a GLS approach are similar to the benefits of an ILS or LPV approach operation.

NOTE−
To remain consistent with international terminology, the FAA will use the term GBAS in place of the former term Local Area Augmentation System (LAAS).

18.2 An aircraft's GLS approach capability relies on the broadcast from a GBAS Ground Facility (GGF) installation. The GGF installation includes at least four ground reference stations near the airport's runway(s), a corrections processor, and a VHF Data Broadcast (VDB) uplink antenna. To use the GBAS GGF output and be eligible to conduct a GLS approach, the aircraft requires eligibility to conduct RNP approach (RNP APCH) operations and must meet the additional, specific airworthiness requirements for installation of a GBAS receiver intended to support GLS approach operations. When the aircraft achieves GLS approach eligibility, the aircraft's onboard navigation database may then contain published GLS instrument approach procedures.

18.3 During a GLS instrument approach procedure, the installation of an aircraft's GLS capability provides the pilot three−dimensional (3D) lateral and vertical navigation guidance much like an ILS instrument approach. GBAS corrections augment the GPS signal−in−space by offering position corrections, ensures the availability of enhanced integrity parameters, and then transmits the actual approach path definition over the VDB uplink antenna. A single GBAS ground station can support multiple GLS approaches to one or more runways.

18.4 Through the GBAS ground station, a GLS approach offers a unique operational service volume distinct from the traditional ILS approach service volume (see FIG ENR 4.1−4). However, despite the unique service volume, in the final approach segment, a GLS approach provides precise 3D angular lateral and vertical guidance mimicking the precision guidance of an ILS approach.

18.5 Transitions to and segments of the published GLS instrument approach procedures may rely on use of RNAV 1 or RNP 1 prior to an IAF. Then, during the approach procedure prior to the aircraft entering the GLS approach mode, a GLS approach procedure design uses the RNP APCH procedure design criteria to construct the procedural path (the criteria used to publish procedures titled "RNAV (GPS)" in the US). Thus, a GLS approach procedure may include paths requiring turns after the aircraft crosses the IAF, prior to the aircraft's flight guidance entering the GLS approach flight guidance mode. Likewise, the missed approach procedure for a GLS approach procedure relies exclusively on the same missed approach criteria supporting an RNP APCH.

18.6 When maneuvering the aircraft in compliance with an ATC clearance to intercept a GLS approach prior to the final approach segment (e.g. "being vectored"), the pilot should adhere to the clearance and ensure the aircraft intercepts the extended GLS final approach course within the specified service volume. Once on the GLS final approach course, the pilot should ensure the aircraft is in the GLS approach mode prior to reaching the procedure's glidepath intercept point. Once the aircraft is in the GLS flight guidance mode and captures the GLS glidepath, the pilot should fly the GLS final approach segment using the same pilot techniques they use to fly an ILS final approach or the final approach of an RNAV (GPS) approach flown to LPV minimums. See also the Instrument Procedures Handbook for more information on how to conduct a GLS instrument approach procedure.

UNLIMITED, WITHIN THE FOLLOWING AREA 30−NAUTICAL−MILE RADIUS OF THE MELBOURNE /MLB/ VORTAC 010 DEGREE RADIAL 21−NAUTICAL−MILE FIX. ST. PETERSBURG, FLORIDA, /PIE/ FSS 813−545−1645 (122.2) IS THE FAA COORDINATION FACILITY AND SHOULD BE CONTACTED FOR THE CURRENT STATUS OF ANY AIRSPACE ASSOCIATED WITH THE SPACE SHUTTLE OPERATIONS. THIS AIRSPACE ENCOMPASSES R2933, R2932, R2931, R2934, R2935, W497A AND W158A. ADDITIONAL WARNING AND RESTRICTED AREAS WILL BE ACTIVE IN CONJUNCTION WITH THE OPERATIONS. PILOTS MUST CONSULT ALL NOTAMS REGARDING THIS OPERATION.

2.3 Parachute Jump Aircraft Operations

2.3.1 Procedures relating to parachute jump areas are contained in 14 CFR Part 105. Tabulations of parachute jump areas in the U.S. are contained in the Chart Supplement.

2.3.2 Pilots of aircraft engaged in parachute jump operations are reminded that all reported altitudes must be with reference to mean sea level, or flight level, as appropriate, to enable ATC to provide meaningful traffic information.

2.3.3 Parachute Operations in the Vicinity of an Airport Without an Operating Control Tower. There is no substitute for alertness while in the vicinity of an airport. It is essential that pilots conducting parachute operations be alert, look for other traffic, and exchange traffic information as recommended in GEN 3.3, paragraph 9.2, Traffic Advisory Practices at Airports Without Operating Control Towers. In addition, pilots should avoid releasing parachutes while in an airport traffic pattern when there are other aircraft in that pattern. Pilots should make appropriate broadcasts on the designated Common Traffic Advisory Frequency (CTAF), and monitor that CTAF until all parachute activity has terminated or the aircraft has left the area. Prior to commencing a jump operation, the pilot should broadcast the aircraft's altitude and position in relation to the airport, the approximate relative time when the jump will commence and terminate, and listen to the position reports of other aircraft in the area.

2.4 Special Air Traffic Rules (SATR) and Special Flight Rules Area (SFRA)

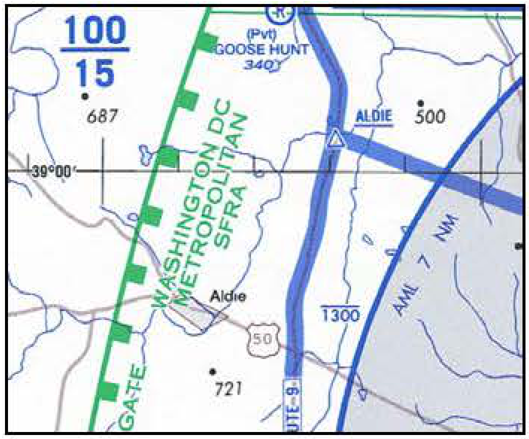
2.4.1 Background. The Code of Federal Regulations (CFR) prescribes special air traffic rules for aircraft operating within the boundaries of certain designated airspace. These areas are listed in 14 CFR Part 93 and can be found throughout the NAS. Procedures, nature of operations, configuration, size, and density of traffic vary among the identified areas.

2.4.2 SFRAs. Airspace of defined dimensions, above land areas or territorial waters, within which the flight of aircraft is subject to the rules set forth in 14 CFR Part 93, unless otherwise authorized by air traffic control. Not all areas listed in 14 CFR Part 93 are designated SFRA, but special air traffic rules apply to all areas described in 14 CFR Part 93.

2.4.3 Participation. Each person operating an aircraft to, from, or within airspace designated as a SATR area or SFRA must adhere to the special air traffic rules set forth in 14 CFR Part 93, as applicable, unless otherwise authorized or required by ATC.

2.4.4 Charts. SFRAs are depicted on VFR sectional, terminal area, and helicopter route charts. (See FIG ENR 5.1−1.)

FIG ENR 5.1−1
SFRA Boundary



2.4.5 Washington DC Special Flight Rules Area (SFRA) including the Flight Restricted Zone (FRZ). A pilot conducting any type of flight operation in the Washington DC SFRA/FRZ must comply with the requirements in:

2.4.5.1 14 CFR Section 93.339 Washington, DC Metropolitan Area Special Flight Rules Area including the FRZ.

2.4.5.2 14 CFR Section 91.161 Special Awareness Training for the DC SFRA/FRZ, also located on the FAA website at https://www.faasafety.gov/.

2.4.5.3 Any 14 CFR Section 99.7 special security instructions for the DC SFRA/FRZ published via NOTAM by FAA in the interest of national security.

2.5 Weather Reconnaissance Area (WRA)

2.5.1 General. Hurricane Hunters from the United States Air Force Reserve 53rd Weather Reconnaissance Squadron (WRS) and the National Oceanic and Atmospheric Administration (NOAA) Aircraft Operations Center (AOC) operate weather reconnaissance/research aircraft missions, in support of the National Hurricane Operations Plan (NHOP), to gather meteorological data on hurricanes and tropical cyclones. 53rd WRS and NOAA AOC aircraft normally conduct these missions in airspace identified in a published WRA Notice to Airmen (NOTAM).

2.5.2 WRAs. Airspace with defined dimensions and published by a NOTAM, which is established to support weather reconnaissance/research flights. ATC services are not provided within WRAs. Only participating weather reconnaissance/research aircraft from the 53rd WRS and NOAA AOC are permitted to operate within a WRA. A WRA may only be established in airspace within U. S. Flight Information Regions (FIR) outside of U. S. territorial airspace.

2.5.3 A published WRA NOTAM describes the airspace dimensions of the WRA and the expected activities within the WRA. WRAs may border adjacent foreign FIRs, but are wholly contained within U.S. FIRs. As ATC services are not provided within a WRA, non−participating aircraft should avoid WRAs, and IFR aircraft should expect to be rerouted to avoid WRAs.

below 500 feet AGL when over sparsely populated areas or open water, such operations involve increased safety risks. At and below 200 feet AGL there are numerous power lines, antenna towers, etc., that are not marked and lighted and/or charted as obstructions and, therefore, may not be seen in time to avoid a collision. Notices to Airmen (NOTAMs) are issued on those lighted structures experiencing temporary light outages. However, some time may pass before the FAA is notified of these outages, and the NOTAM issued, thus pilot vigilance is imperative. Additionally, new obstructions may not be on current charts because the information was not received prior to the FAA publishing the chart.

4.2 Antenna Towers

4.2.1 Extreme caution should be exercised when flying less that 2,000 feet above ground level (AGL) because of numerous skeletal structures, such as radio and television antenna towers, that exceed 1,000 feet AGL with some extending higher than 2,000 feet AGL. Most skeletal structures are supported by guy wires which are very difficult to see in good weather and can be invisible at dusk or during periods of reduced visibility. These wires can extend about 1,500 feet horizontally from a structure; therefore, all skeletal structures should be avoided horizontally by at least 2,000 feet.

4.3 Overhead Wires

4.3.1 Overhead transmission and utility lines often span approaches to runways, natural flyways such as lakes, rivers, gorges, and canyons, and cross other landmarks pilots frequently follow such as highways, railroad tracks, etc. As with antenna towers, these power transmission and/or utility lines and the supporting structures of these lines may not always be readily visible. The wires may be virtually impossible to see under certain conditions. Spherical markers may be used to identify overhead wires and catenary transmission lines and may be lighted. In some locations, the supporting structures of overhead transmission lines are equipped with unique sequence flashing white strobe light systems to indicate that there are wires between the structures. The flash sequence for the wire support structures will be middle, top, and bottom with all lights on the same level flashing simultaneously. However, not all power transmission and/or utility lines require notice to the FAA as they do not exceed 200 feet AGL or meet the obstruction standard of 14 CFR Part 77 and, therefore, are not marked and/or lighted. All pilots are cautioned to remain extremely vigilant for power transmission and/or utility lines and their supporting structures when following natural flyways or during the approach and landing phase. This is particularly important for seaplane and/or float equipped aircraft when landing on, or departing from, unfamiliar lakes or rivers.

4.4 Wind Turbines

4.4.1 The number, size, and height of individual wind turbines and wind turbine farms have increased over time. The locations of wind turbine farms have also expanded to more commonly flown areas by VFR pilots and to all regions of the United States. VFR pilots should be aware that many wind turbines are exceeding 499 feet AGL in height, which may affect minimum safe VFR altitudes in uncontrolled airspace. In addition, many wind turbines are encroaching on the 700 foot AGL floor of controlled airspace (Class E). Pilots are cautioned to maintain appropriate safe distance (laterally, vertically, or both). Wind turbines are typically charted on Visual Flight Rules (VFR) Sectional Charts and/or Terminal Area Charts. For a description of how wind turbines and wind turbine farms are charted, refer to the FAA Aeronautical Chart User's Guide. Wind turbines are normally painted white or light gray to improve daytime conspicuity. They are typically lit with medium−intensity, flashing red lights, placed as high as possible on the turbine nacelle (not the blade tips), that should be synchronized to flash together; however, not all wind turbine units within a farm need to be lighted, depending on their location and height. Sometimes, only the perimeter of the wind turbine farm and an arrangement of interior wind turbines are lit. Some wind turbine farms use Aircraft Detection Lighting Systems (ADLS), which are proximity sensor−based systems designed to detect aircraft as they approach the obstruction. This system automatically activates the appropriate obstruction lights until they are no longer needed based on the position of the transiting aircraft. This technology reduces the impact of nighttime lighting on nearby communities and migratory birds and extends the life expectancy of the obstruction lights. For more information on how obstructions such as wind turbines are marked and lighted, refer to FAA Advisory Circular 70/7460−1, Obstruction Marking and Lighting. Pilots should be aware that wind turbines in motion could result in limitations of air traffic services in the vicinity of the wind turbine farms.

REFERENCE−
AIP, ENR 1.1−38.1, Radar.

4.5 Meteorological (MET) Evaluation Towers

4.5.1 MET towers are used by wind energy companies to determine feasible sites for wind turbines. Some of these towers are less than 200 feet AGL. These structures are portable, erected in a matter of hours, installed with guyed wires, and constructed from a galvanized material often making them difficult to see in certain atmospheric conditions. Markings for these towers include alternating bands of aviation orange and white paint, and high-visibility sleeves installed on the outer guy wires. However, not all MET towers follow these guidelines, and pilots should be vigilant when flying at low altitude in remote or rural areas.

4.6 Other Objects/Structures

4.6.1 There are other objects or structures that could adversely affect your flight such as temporary construction cranes near an airport, newly constructed buildings, new towers, etc. Many of these structures do not meet charting requirements or may not yet be charted because of the charting cycle. Some structures do not require obstruction marking and/or lighting, and some may not be marked and lighted even though the FAA recommended it. VFR Pilots should carefully review NOTAMs for temporary or permanent obstructions along the planned route of flight during their preflight preparations. Particular emphasis should be given to obstructions in the vicinity of the approach and departure ends of the runway complex or any other areas where flight below 500 feet AGL is planned or likely to occur.

5. Avoid Flight Beneath Unmanned Balloons

5.1 The majority of unmanned free balloons currently being operated have, extended below them, either a suspension device to which the payload or instrument package is attached, or a trailing wire antenna, or both. In many instances these balloon subsystems may be invisible to the pilot until his/her aircraft is close to the balloon, thereby creating a potentially dangerous situation. Therefore, good judgment on the part of the pilot dictates that aircraft should remain well clear of all unmanned free balloons and flight below then should be avoided at all times.

5.2 Pilots are urged to report any unmanned free balloons sighted to the nearest FAA ground facility with which communication is established. Such information will assist FAA ATC facilities to identify and flight follow unmanned free balloons operating in the airspace.

6. Unmanned Aircraft Systems

6.1 Unmanned Aircraft Systems (UAS), formerly referred to as "Unmanned Aerial Vehicles" (UAVs) or "drones," are having an increasing operational presence in the NAS. Once the exclusive domain of the military, UAS are now being operated by various entities. Although these aircraft are "unmanned," UAS are flown by a remotely located pilot and crew. Physical and performance characteristics of unmanned aircraft (UA) vary greatly and unlike model aircraft that typically operate lower than 400 feet AGL, UA may be found operating at virtually any altitude and any speed. Sizes of UA can be as small as several pounds to as large as a commercial transport aircraft. UAS come in various categories including airplane, rotorcraft, powered−lift (tilt−rotor), and lighter−than−air. Propulsion systems of UAS include a broad range of alternatives from piston powered and turbojet engines to battery and solar−powered electric motors.

6.2 To ensure segregation of UAS operations from other aircraft, the military typically conducts UAS operations within restricted or other special use airspace. However, UAS operations are now being approved in the NAS outside of special use airspace through the use of FAA−issued Certificates of Waiver or Authorization (COA) or through the issuance of a special airworthiness certificate. COA and special airworthiness approvals authorize UAS flight operations to be contained within specific geographic boundaries and altitudes, usually require

13.7 Each manufacturer of static dischargers offers information concerning appropriate discharger location on specific airframes. Such locations emphasize the trailing outboard surfaces of wings and horizontal tail surfaces, plus the tip of the vertical stabilizer, where charge tends to accumulate on the airframe. Sufficient dischargers must be provided to allow for current carrying capacity which will maintain airframe potential below the corona threshold of the trailing edges.

13.8 In order to achieve full performance of avionic equipment, the static discharge system will require periodic maintenance. A pilot's knowledge of P−static causes and effects is an important element in assuring optimum performance by early recognition of these types of problems.

14. Light Amplification by Stimulated Emission of Radiation (Laser) Operations and Reporting Illumination of Aircraft

14.1 Lasers have many applications. Of concern to users of the National Airspace System are those laser events that may affect pilots; e.g., outdoor laser light shows or demonstrations for entertainment and advertisement at special events and theme parks. Generally, the beams from these events appear as bright blue−green in color; however, they may be red, yellow, or white. Some laser systems produce light which is invisible to the human eye.

14.2 FAA regulations prohibit the disruption of aviation activity by any person on the ground or in the air. The FAA and the Food and Drug Administration (the Federal agency that has the responsibility to enforce compliance with Federal requirements for laser systems and laser light show products) are working together to ensure that operators of these devices do not pose a hazard to aircraft operators.

14.3 Pilots should be aware that illuminations from these laser operations is able to create temporary vision impairment miles from the actual location. In addition, these operations can produce permanent eye damage. Pilots should make themselves aware of where laser activities are being conducted and avoid the areas if possible.

14.4 Recent and increasing incidents of unauthorized illumination of aircraft by lasers, as well as the proliferation and increasing sophistication of laser devices available to the general public, dictates that the FAA, in coordination with other government agencies, take action to safeguard flights from these unauthorized illuminations.

14.5 Pilots should report laser illumination activity to the controlling Air Traffic Control facilities, Federal Contract Towers or Flight Service Stations as soon as possible after the event. The following information should be included:

14.5.1 UTC Date and Time of Event.

14.5.2 Call Sign or Aircraft Registration Number.

14.5.3 Type Aircraft.

14.5.4 Nearest Major City.

14.5.5 Altitude.

14.5.6 Location of Event (Latitude/Longitude and/or Fixed Radial Distance (FRD)).

14.5.7 Brief Description of the Event and any other Pertinent Information.

14.6 Pilots are also encouraged to complete the Laser Beam Exposure Questionnaire located on the FAA Laser Safety Initiative website at http://www.faa.gov/about/initiatives/lasers/ and submit electronically per the directions on the questionnaire, as soon as possible after landing.

14.7 When a laser event is reported to an air traffic facility, a general caution warning will be broadcasted on all appropriate frequencies every five minutes for 20 minutes and broadcasted on the ATIS for one hour following the report.

PHRASEOLOGY−
UNAUTHORIZED LASER ILLUMINATION EVENT, (UTC time), (location), (altitude), (color), (direction).

EXAMPLE−
"Unauthorized laser illumination event, at 0100z, 8 mile final runway 18R at 3,000 feet, green laser from the southwest."

14.8 When laser activities become known to the FAA, Notices to Airmen (NOTAM) are issued to inform the aviation community of the events. Pilots should consult NOTAMs or the Special Notices Section of the Chart Supplement for information regarding laser activities.

15. Flying in Flat Light, Brown Out Conditions, and White Out Conditions

15.1 Flat Light. Flat light is an optical illusion, also known as "sector or partial white out." It is not as severe as "white out" but the condition causes pilots to lose their depth−of−field and contrast in vision. Flat light conditions are usually accompanied by overcast skies inhibiting any visual clues. Such conditions can occur anywhere in the world, primarily in snow covered areas but can occur in dust, sand, mud flats, or on glassy water. Flat light can completely obscure features of the terrain, creating an inability to distinguish distances and closure rates. As a result of this reflected light, it can give pilots the illusion that they are ascending or descending when they may actually be flying level. However, with good judgment and proper training and planning, it is possible to safely operate an aircraft in flat light conditions.

15.2 Brown Out. A brownout (or *brown−out*) is an in−flight visibility restriction due to dust or sand in the air. In a brownout, the pilot cannot see nearby objects which provide the outside visual references necessary to control the aircraft near the ground. This can cause spatial disorientation and loss of situational awareness leading to an accident.

15.2.1 The following factors will affect the probability and severity of brownout: rotor disk loading, rotor configuration, soil composition, wind, approach speed, and approach angle.

15.2.2 The brownout phenomenon causes accidents during helicopter landing and take−off operations in dust, fine dirt, sand, or arid desert terrain. Intense, blinding dust clouds stirred up by the helicopter rotor downwash during near−ground flight causes significant flight safety risks from aircraft and ground obstacle collisions, and dynamic rollover due to sloped and uneven terrain.

15.2.3 This is a dangerous phenomenon experienced by many helicopters when making landing approaches in dusty environments, whereby sand or dust particles become swept up in the rotor outwash and obscure the pilot's vision of the terrain. This is particularly dangerous because the pilot needs those visual cues from their surroundings in order to make a safe landing.

15.2.4 Blowing sand and dust can cause an illusion of a tilted horizon. A pilot not using the flight instruments for reference may instinctively try to level the aircraft with respect to the false horizon, resulting in an accident. Helicopter rotor wash also causes sand to blow around outside the cockpit windows, possibly leading the pilot to experience an illusion where the helicopter appears to be turning when it is actually in a level hover. This can also cause the pilot to make incorrect control inputs which can quickly lead to disaster when hovering near the ground. In night landings, aircraft lighting can enhance the visual illusions by illuminating the brownout cloud.

15.3 White Out. As defined in meteorological terms, white out occurs when a person becomes engulfed in a uniformly white glow. The glow is a result of being surrounded by blowing snow, dust, sand, mud or water. There are no shadows, no horizon or clouds and all depth−of−field and orientation are lost. A white out situation is severe in that there are no visual references. Flying is not recommended in any white out situation. Flat light conditions can lead to a white out environment quite rapidly, and both atmospheric conditions are insidious; they sneak up on you as your visual references slowly begin to disappear. White out has been the cause of several aviation accidents.

15.4 Self Induced White Out. This effect typically occurs when a helicopter takes off or lands on a snow−covered area. The rotor down wash picks up particles and re−circulates them through the rotor down wash. The effect can vary in intensity depending upon the amount of light on the surface. This can happen on the sunniest, brightest day with good contrast everywhere. However, when it happens, there can be a complete loss of visual clues. If the pilot has not prepared for this immediate loss of visibility, the results can be disastrous. Good planning does not prevent one from encountering flat light or white out conditions.

16.3.2 Concise and easy to understand guidance that outlines best operational practices;

16.3.3 A systematic procedure for recognizing, evaluating and addressing the associated icing risk, and offer clear guidance to mitigate this risk;

16.3.4 An aid (such as a checklist or reference cards) that is readily available during normal day−to−day aircraft operations.

16.4 There are several sources for guidance relating to airframe icing, including: http://aircrafticing.grc.nasa.gov/index.html.

16.4.1 Advisory Circular (AC) 91−74, Pilot Guide, Flight in Icing Conditions.

16.4.2 AC 135−17, Pilot Guide Small Aircraft Ground Deicing.

16.4.3 AC 135−9, FAR Part 135 Icing Limitations.

16.4.4 AC 120−60, Ground Deicing and Anti−icing Program.

16.4.5 AC 135−16, Ground Deicing and Anti−icing Training and Checking.

16.5 The FAA Approved Deicing Program Updates is published annually as a Flight Standards Information Bulletin for Air Transportation and contains detailed information on deicing and anti−icing procedures and holdover times. It may be accessed at the following website by selecting the current year's information bulletins: https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/deicing/.

17. Avoid Flight in the Vicinity of Exhaust Plumes (Smoke Stacks and Cooling Towers)

17.1 Flight Hazards Exist Around Exhaust Plumes. Exhaust plumes are defined as visible or invisible emissions from power plants, industrial production facilities, or other industrial systems that release large amounts of vertically directed unstable gases (effluent). High temperature exhaust plumes can cause significant air disturbances such as turbulence and vertical shear. Other identified potential hazards include, but are not necessarily limited to: reduced visibility, oxygen depletion, engine particulate contamination, exposure to gaseous oxides, and/or icing. Results of encountering a plume may include airframe damage, aircraft upset, and/or engine damage/failure. These hazards are most critical during low altitude flight in calm and cold air, especially in and around approach and departure corridors or airport traffic areas.

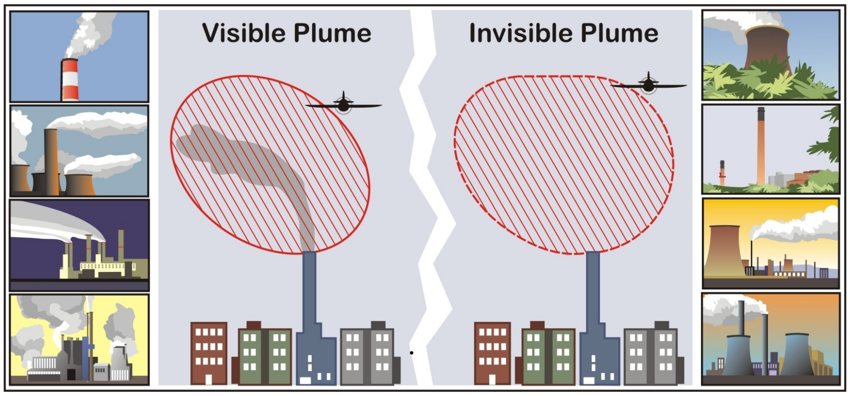
Whether plumes are visible or invisible, the total extent of their turbulent affect is difficult to predict. Some studies do predict that the significant turbulent effects of an exhaust plume can extend to heights of over 1,000 feet above the height of the top of the stack or cooling tower. Any effects will be more pronounced in calm stable air where the plume is very hot and the surrounding area is still and cold. Fortunately, studies also predict that any amount of crosswind will help to dissipate the effects. However, the size of the tower or stack is not a good indicator of the predicted effect the plume may produce. The major effects are related to the heat or size of the plume effluent, the ambient air temperature, and the wind speed affecting the plume. Smaller aircraft can expect to feel an effect at a higher altitude than heavier aircraft.

17.2 When able, a pilot should steer clear of exhaust plumes by flying on the upwind side of smokestacks or cooling towers. When a plume is visible via smoke or a condensation cloud, remain clear and realize a plume may have both visible and invisible characteristics. Exhaust stacks without visible plumes may still be in full operation, and airspace in the vicinity should be treated with caution. As with mountain wave turbulence or clear air turbulence, an invisible plume may be encountered unexpectedly. Cooling towers, power plant stacks, exhaust fans, and other similar structures are depicted in FIG ENR 5.7−2.

Pilots are encouraged to exercise caution when flying in the vicinity of exhaust plumes. Pilots are also encouraged to reference the Chart Supplement where amplifying notes may caution pilots and identify the location of structure(s) emitting exhaust plumes.

The best available information on this phenomenon must come from pilots via the PIREP reporting procedures. All pilots encountering hazardous plume conditions are urgently requested to report time, location, and intensity (light, moderate, severe, or extreme) of the element to the FAA facility with which they are maintaining radio contact. If time and conditions permit, elements should be reported according to the standards for other PIREPs and position reports see GEN 3.5, paragraph 22. PIREPS Relating to Turbulence).

FIG ENR 5.7−2
Plumes



18. Space Launch and Reentry Area

Locations where commercial space launch and/or reentry operations occur. Hazardous operations occur in space launch and reentry areas, and for pilot awareness, a rocket−shaped symbol is used to depict them on sectional aeronautical charts. These locations may have vertical launches from launch pads, horizontal launches from runways, and/or reentering vehicles coming back to land. Because of the wide range of hazards associated with space launch and reentry areas, pilots are expected to check NOTAMs for the specific area prior to flight to determine the location and lateral boundaries of the associated hazard area, and the active time. NOTAMs may include terms such as “rocket launch activity,” “space launch,” or “space reentry,” depending upon the type of operation. Space launch and reentry areas are not established for amateur rocket operations conducted per 14 CFR Part 101.

FIG ENR 5.7−3
Space Launch and Reentry Area Depicted on a Sectional Chart

19. Automatic Landing Operations

Prior to conducting automatic landing operations, pilots are expected to determine that the flight control and instrument approach guidance systems being used permit safe, automatically flown landings to be conducted to that runway. The analysis should include, but not be limited to, ILS classification code where applicable, suitable threshold crossing height, runway slope, and pre−threshold terrain. The FAA only evaluates runways and other ground infrastructure for suitability to support automatic landing operations for those facilities associated with published CAT II, SA CAT II, and CAT III instrument approach procedures. When conducting automatic landing operations, pilots must ensure that the runway, associated procedure, navigation source, and other infrastructure have no outstanding NOTAMs or chart notes that would preclude automatic landing operations (e.g., "Localizer unusable inside the threshold," or "Glide slope unusable below xxx feet"). Pilots must advise ATC of their intent to conduct an automatic landing, remain alert to any unsuitable system performance, and be prepared to disengage the automatic landing system when necessary. During automatic landing operations using an ILS facility, pilots should understand and observe the provisions of the AIP, ENR 4.1, paragraph 11, ILS Course and Glideslope Distortion.

3.1.1 An approach to a specific landing area. This type of approach is aligned to a missed approach point from which a landing can be accomplished with a maximum course change of 30 degrees. The visual segment from the MAP to the landing area is evaluated for obstacle hazards. These procedures are annotated: "PROCEED VISUALLY FROM (named MAP) OR CONDUCT THE SPECIFIED MISSED APPROACH."

3.1.1.1 "Proceed visually" requires the pilot to acquire and maintain visual contact with the landing area at or prior to the MAP, or execute a missed approach. The visibility minimum is based on the distance from the MAP to the landing area, among other factors.

3.1.1.2 The pilot is required to have the published minimum visibility throughout the visual segment flying the path described on the approach chart.

3.1.1.3 Similar to an approach to a runway, the pilot is responsible for obstacle or terrain avoidance from the MAP to the landing area.

3.1.1.4 Upon reaching the published MAP, or as soon as practicable thereafter, the pilot should advise ATC whether proceeding visually and canceling IFR or complying with the missed approach instructions. See Section ENR 1.10, paragraph 11.2, Canceling IFR Flight Plan.

3.1.1.5 Where any necessary visual reference requirements are specified by the FAA, at least one of the following visual references for the intended heliport is visible and identifiable before the pilot may proceed visually:

a) FATO or FATO lights.

b) TLOF or TLOF lights.

c) Heliport Instrument Lighting System (HILS).

d) Heliport Approach Lighting System (HALS).

e) Visual Glideslope Indicator (VGSI).

f) Windsock or windsock light.

g) Heliport beacon.

h) Other facilities or systems approved by the Flight Technologies and Procedures Division (AFS−400).

3.1.2 Approach to a Point−in−Space (PinS). At locations where the MAP is located more than 2 SM from the landing area, or the path from the MAP to the landing area is populated with obstructions which require avoidance actions or requires turn greater than 30 degrees, a PinS Proceed VFR procedure may be developed. These approaches are annotated "PROCEED VFR FROM (named MAP) OR CONDUCT THE SPECIFIED MISSED APPROACH."

3.1.2.1 These procedures require the pilot, at or prior to the MAP, to determine if the published minimum visibility, or the weather minimums required by the operating rule (e.g. Part 91, Part 135, etc.), or operations specifications (whichever is higher) is available to safely transition from IFR to VFR flight. If not, the pilot must execute a missed approach. For Part 135 operations, pilots may not begin the instrument approach unless the latest weather report indicates that the weather conditions are at or above the authorized IFR minimums or the VFR weather minimums (as required by the class of airspace, operating rule and/or Operations Specifications) whichever is higher.

3.1.2.2 Visual contact with the landing area is not required; however, the pilot must have the appropriate VFR weather minimums throughout the visual segment. The visibility is limited to no lower than that published in the procedure, until canceling IFR.

3.1.2.3 IFR obstruction clearance areas are not applied to the VFR segment between the MAP and the landing area. Pilots are responsible for obstacle or terrain avoidance from the MAP to the landing area.

3.1.2.4 Upon reaching the MAP defined on the approach procedure, or as soon as practicable thereafter, the pilot should advise ATC whether proceeding VFR and canceling IFR, or complying with the missed approach instructions. See Section ENR 1.10, paragraph 11.2, Canceling IFR Flight Plan.

3.1.2.5 If the visual segment penetrates Class B, C, or D airspace, pilots are responsible for obtaining a Special VFR clearance, when required.

4. The Gulf of America Grid System

4.1 On October 8, 1998, the Southwest Regional Office of the FAA, with assistance from the Helicopter Safety Advisory Conference (HSAC), implemented the world's first Instrument Flight Rules (IFR) Grid System in the Gulf of America. This navigational route structure is completely independent of ground−based navigation aids (NAVAID) and was designed to facilitate helicopter IFR operations to offshore destinations. The Grid System is defined by over 300 offshore waypoints located 20 minutes apart (latitude and longitude). Flight plan routes are routinely defined by just 4 segments: departure point (lat/long), first en route grid waypoint, last en route grid waypoint prior to approach procedure, and destination point (lat/long). There are over 4,000 possible offshore landing sites. Upon reaching the waypoint prior to the destination, the pilot may execute an Offshore Standard Approach Procedure (OSAP), a Helicopter En Route Descent Areas (HEDA) approach, or an Airborne Radar Approach (ARA). For more information on these helicopter instrument procedures, refer to FAA AC 90−80B, Approval of Offshore Standard Approach Procedures, Airborne Radar Approaches, and Helicopter En Route Descent Areas, on the FAA website http://www.faa.gov under Advisory Circulars. The return flight plan is just the reverse with the requested stand−alone GPS approach contained in the remarks section.

4.2 The large number (over 300) of waypoints in the grid system makes it difficult to assign phonetically pronounceable names to the waypoints that would be meaningful to pilots and controllers. A unique naming system was adopted that enables pilots and controllers to derive the fix position from the name. The five−letter names are derived as follows:

4.2.1 The waypoints are divided into sets of 3 columns each. A three−letter identifier, identifying a geographical area or a NAVAID to the north, represents each set.

4.2.2 Each column in a set is named after its position, i.e., left (L), center (C), and right (R).

4.2.3 The rows of the grid are named alphabetically from north to south, starting with A for the northern most row.

EXAMPLE−
LCHRC would be pronounced "Lake Charles Romeo Charlie." The waypoint is in the right−hand column of the Lake Charles VOR set, in row C (third south from the northern most row).

4.3 In December 2009, significant improvements to the Gulf of America grid system were realized with the introduction of ATC separation services using ADS−B. In cooperation with the oil and gas services industry, HSAC and Helicopter Association International (HAI), the FAA installed an infrastructure of ADS−B ground stations, weather stations (AWOS) and VHF remote communication outlets (RCO) throughout a large area of the Gulf of America. This infrastructure allows the FAA's Houston ARTCC to provide "domestic−like" air traffic control service in the offshore area beyond 12nm from the coastline to hundreds of miles offshore to aircraft equipped with ADS−B. Properly equipped aircraft can now be authorized to receive more direct routing, domestic en route separation minima and real time flight following. Operators who do not have authorization to receive ATC separation services using ADS−B, will continue to use the low altitude grid system and receive procedural separation from Houston ARTCC. Non−ADS−B equipped aircraft also benefit from improved VHF communication and expanded weather information coverage.

4.4 Three requirements must be met for operators to file IFR flight plans utilizing the grid:

4.4.1 The helicopter must be equipped for IFR operations and equipped with IFR approved GPS navigational units.

4.4.2 The operator must obtain prior written approval from the appropriate Flight Standards District Office through a Letter of Authorization or Operations Specification, as appropriate.

4.4.3 The operator must be a signatory to the Houston ARTCC Letter of Agreement.

4.5 Operators who wish to benefit from ADS−B based ATC separation services must meet the following additional requirements:

4.5.1 The Operator's installed ADS−B Out equipment must meet the performance requirements of one of the following FAA Technical Standard Orders (TSO), or later revisions: TSO−C154c, Universal Access Transceiver (UAT) Automatic Dependent Surveillance−Broadcast (ADS−B) Equipment, or TSO−C166b, Extended Squitter Automatic Dependent Surveillance−Broadcast (ADS−B) and Traffic Information.

4.5.2 Flight crews must comply with the procedures prescribed in the Houston ARTCC Letter of Agreement dated December 17, 2009, or later.

NOTE−
The unique ADS−B architecture in the Gulf of America upon reception of an aircraft's Mode C in addition to the other message elements described in 14 CFR 91.227. Flight crews must be made aware that loss of Mode C also means that ATC will not receive the aircraft's ADS−B signal.

4.6 FAA/AIS publishes the grid system waypoints on the IFR Gulf of America Vertical Flight Reference Chart. A commercial equivalent is also available. The chart is updated annually and is available from an FAA print provider or for free download on the AIS website: http://www.faa.gov/air_traffic/flight_info/aeronav.

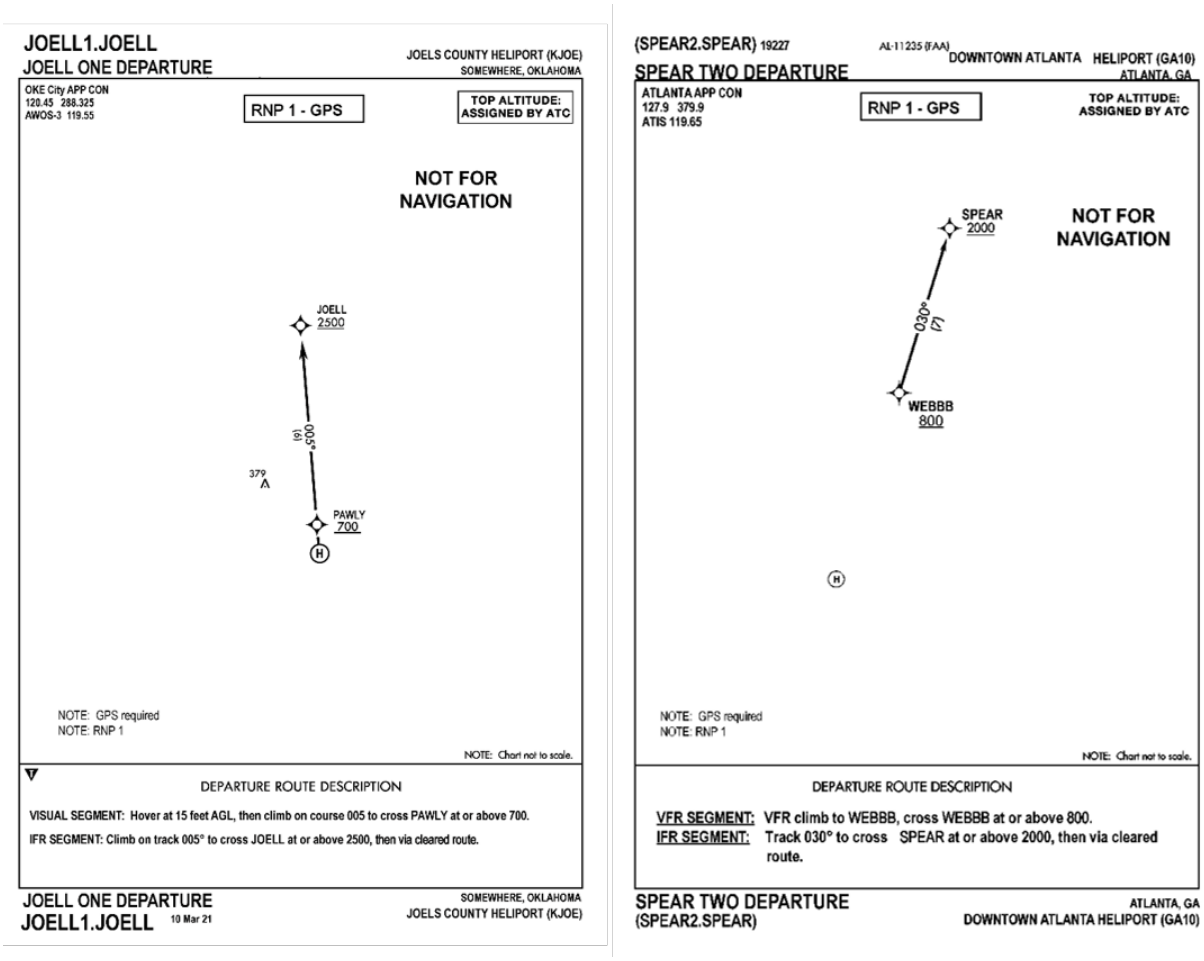
5. Departure Procedures

5.1 When departing from a location on a point−in−space (PinS) SID with a visual segment indicated and the departure instruction describes the visual segment the aircraft must cross the initial departure fix (IDF) outbound at−or−above the altitude depicted on the chart. The helicopter will initially establish a hover at or above the heliport crossing height (HCH) specified on the chart. The HCH specifies a minimum hover height to begin the climb to assist in avoiding obstacles. The helicopter will leave the departure location on the published outbound heading/course specified, climbing at least 400 ft/per NM (or as depicted on the chart), remaining clear of clouds, crossing at or above the IDF altitude specified, prior to proceeding outbound on the procedure. For example the chart may include these instructions: "Hover at 15 ft AGL, then climb on track 005, remaining clear of clouds, to cross PAWLY at or above 700."

5.2 When flying a PinS procedure containing a segment with instructions to "proceed VFR," the pilot must keep the aircraft clear of the clouds and cross the IDF outbound at or above the altitude depicted. Departure procedures that support multiple departure locations will have a proceed VFR segment leading to the IDF. The chart will provide a bearing and distance to the IDF from the heliport. That bearing and distance are for pilot orientation purposes only and are not a required procedure track. The helicopter will leave the departure location via pilot navigation in order to align with the departure route and comply with the altitude specified at the IDF. For example, the chart may include these instructions: "VFR Climb to WEBBB, Cross WEBBB at or above 800."

5.3 Once the aircraft reaches the IDF, the aircraft should proceed out the described route as specified on the chart, crossing each consecutive fix at or above the indicated altitude(s) until reaching the end of the departure or as directed by ATC.

FIG ENR 6.1−1
Departure Charts



ENR 6.2 Special Operations

1. Offshore Helicopter Operations

1.1 Introduction

1.1.1 The offshore environment offers unique applications and challenges for helicopter pilots. The mission demands, the nature of oil and gas exploration and production facilities, and the flight environment (weather, terrain, obstacles, traffic), demand special practices, techniques and procedures not found in other flight operations. Several industry organizations have risen to the task of reducing risks in offshore operations, including the Helicopter Safety Advisory Conference (HSAC) (http://www.hsac.org), and the Offshore Committee of the Helicopter Association International (HAI) (https://rotor.org/). The following recommended practices for offshore helicopter operations are based on guidance developed by HSAC for use in the Gulf of America, and provided here with their permission. While not regulatory, these recommended practices provide aviation and oil and gas industry operators with useful information in developing procedures to avoid certain hazards of offshore helicopter operations.

NOTE−
Like all aviation practices, these recommended practices are under constant review. Any questions or feedback concerning these recommended procedures may be directed to the HSAC through the feedback feature of the HSAC website (http://www.hsac.org).

1.2 Passenger Management on and about Heliport Facilities

1.2.1 Background. Several incidents involving offshore helicopter passengers have highlighted the potential for incidents and accidents on and about the heliport area. The following practices will minimize risks to passengers and others involved in heliport operations.

1.2.2 Recommended Practices

1.2.2.1 Heliport facilities should have a designated and posted passenger waiting area which is clear of the heliport, heliport access points, and stairways.

1.2.2.2 Arriving passengers and cargo should be unloaded and cleared from the heliport and access route prior to loading departing passengers and cargo.

1.2.2.3 Where a flight crew consists of more than one pilot, one crewmember should supervise the unloading/loading process from outside the aircraft.

1.2.2.4 Where practical, a designated facility employee should assist with loading/unloading, etc.

1.3 Crane−Helicopter Operational Procedures

1.3.1 Background. Historical experience has shown that catastrophic consequences can occur when industry safe practices for crane/helicopter operations are not observed. The following recommended practices are designed to minimize risks during crane and helicopter operations.

1.3.2 Recommended Practices

1.3.2.1 Personnel awareness

a) Crane operators and pilots should develop a mutual understanding and respect of the others' operational limitations and cooperate in the spirit of safety;

b) Pilots need to be aware that crane operators sometimes cannot release the load to cradle the crane boom, such as when attached to wire line lubricators or supporting diving bells; and

c) Crane operators need to be aware that helicopters require warm up before takeoff, a two−minute cool down before shutdown, and cannot circle for extended lengths of time because of fuel consumption.

1.3.2.2 It is recommended that when helicopters are approaching, maneuvering, taking off, or running on the heliport, cranes be shutdown and the operator leave the cab. Cranes not in use must have their booms cradled, if feasible. If in use, the crane's boom(s) are to be pointed away from the heliport and the crane shutdown for helicopter operations.

1.3.2.3 Pilots will not approach, land on, takeoff, or have rotor blades turning on heliports of structures not complying with the above practice.

1.3.2.4 It is recommended that cranes on offshore platforms, rigs, vessels, or any other facility, which could interfere with helicopter operations (including approach/departure paths):

a) Be equipped with a red rotating beacon or red high intensity strobe light connected to the system powering the crane, indicating the crane is under power;

b) Be designed to allow the operator a maximum view of the helideck area and should be equipped with wide−angle mirrors to eliminate blind spots; and

c) Have their boom tips, headache balls, and hooks painted with high visibility international orange.

1.4 Helicopter/Tanker Operations

1.4.1 Background. The interface of helicopters and tankers during shipboard helicopter operations is complex and may be hazardous unless appropriate procedures are coordinated among all parties. The following recommended practices are designed to minimize risks during helicopter/tanker operations.

1.4.2 Recommended Practices

1.4.2.1 Management, flight operations personnel, and pilots should be familiar with and apply the operating safety standards set forth in "Guide to Helicopter/Ship Operations", International Chamber of Shipping, Third Edition, 5−89 (as amended), establishing operational guidelines/standards and safe practices sufficient to safeguard helicopter/tanker operations.

1.4.2.2 Appropriate plans, approvals, and communications must be accomplished prior to reaching the vessel, allowing tanker crews sufficient time to perform required safety preparations and position crew members to receive or dispatch a helicopter safely.

1.4.2.3 Appropriate approvals and direct communications with the bridge of the tanker must be maintained throughout all helicopter/tanker operations.

1.4.2.4 Helicopter/tanker operations, including landings/departures, must not be conducted until the helicopter pilot−in−command has received and acknowledged permission from the bridge of the tanker.

1.4.2.5 Helicopter/tanker operations must not be conducted during product/cargo transfer.

1.4.2.6 Generally, permission will not be granted to land on tankers during mooring operations or while maneuvering alongside another tanker.

1.5 Helideck/Heliport Operational Hazard Warning(s) Procedures

1.5.1 Background

1.5.1.1 A number of operational hazards can develop on or near offshore helidecks or onshore heliports that can be minimized through procedures for proper notification or visual warning to pilots. Examples of hazards include but are not limited to:

a) Perforating operations: subparagraph 1.6.

b) H_2S gas presence: subparagraph 1.7.

c) Gas venting: subparagraph 1.8; or,

d) Closed helidecks or heliports: subparagraph 1.9 (unspecified cause).

1.5.1.2 These and other operational hazards are currently minimized through timely dissemination of a written Notice to Airmen (NOTAM) for pilots by helicopter companies and operators. A NOTAM provides a written description of the hazard, time and duration of occurrence, and other pertinent information. ANY POTENTIAL HAZARD should be communicated to helicopter operators or company aviation departments as early as possible to allow the NOTAM to be activated.

1.5.1.3 To supplement the existing NOTAM procedure and further assist in reducing these hazards, a standardized visual signal(s) on the helideck/heliport will provide a positive indication to an approaching helicopter of the status of the landing area. Recommended Practice(s) have been developed to reinforce the NOTAM procedures and standardize visual signals.

1.6 Drilling Rig Perforating Operations: Helideck/Heliport Operational Hazard Warning(s)/Procedure(s)

1.6.1 Background. A critical step in the oil well completion process is perforation, which involves the use of explosive charges in the drill pipe to open the pipe to oil or gas deposits. Explosive charges used in conjunction with perforation operations offshore can potentially be prematurely detonated by radio transmissions, including those from helicopters. The following practices are recommended.

1.6.2 Recommended Practices

1.6.2.1 Personnel Conducting Perforating Operations. Whenever perforating operations are scheduled and operators are concerned that radio transmissions from helicopters in the vicinity may jeopardize the operation, personnel conducting perforating operations should take the following precautionary measures:

a) Notify company aviation departments, helicopter operators or bases, and nearby manned platforms of the pending perforation operation so the Notice to Airmen (NOTAM) system can be activated for the perforation operation and the temporary helideck closure.

b) Close the deck and make the radio warning clearly visible to passing pilots, install a temporary marking (described in subparagraph 1.9.1.2 with the words "NO RADIO" stenciled in red on the legs of the diagonals. The letters should be 24 inches high and 12 inches wide. (See FIG ENR 6.2−1.)

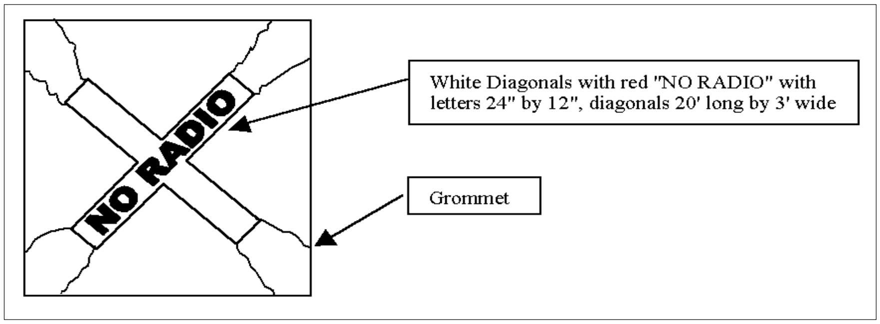
c) The marker should be installed during the time that charges may be affected by radio transmissions.

1.6.2.2 Pilots

a) When operating within 1,000 feet of a known perforation operation or observing the white X with red "NO RADIO" warning indicating perforation operations are underway, pilots will avoid radio transmissions from or near the helideck (within 1,000 feet) and will not land on the deck if the X is present. In addition to communications radios, radio transmissions are also emitted by aircraft radar, transponders, ADS−B equipment, radar altimeters, and DME equipment, and ELTs.

b) Whenever possible, make radio calls to the platform being approached or to the Flight Following Communications Center at least one mile out on approach. Ensure all communications are complete outside the 1,000 foot hazard distance. If no response is received, or if the platform is not radio equipped, further radio transmissions should not be made until visual contact with the deck indicates it is open for operation (no white "X").

FIG ENR 6.2−1
Closed Helideck Marking − No Radio



1.7 Hydrogen Sulfide Gas Helideck/Heliport Operational Hazard Warning(s)/Procedures

1.7.1 Background. Hydrogen sulfide (H_2S) gas: Hydrogen sulfide gas in higher concentrations (300−500 ppm) can cause loss of consciousness within a few seconds and presents a hazard to pilots on/near offshore helidecks. When operating in offshore areas that have been identified to have concentrations of hydrogen sulfide gas, the following practices are recommended.

1.7.2 Recommended Practices

1.7.2.1 Pilots

a) Ensure approved protective air packs are available for emergency use by the crew on the helicopter.

b) If shutdown on a helideck, request the supervisor in charge provide a briefing on location of protective equipment and safety procedures.

c) If while flying near a helideck and the visual red beacon alarm is observed or an unusually strong odor of "rotten eggs" is detected, immediately don the protective air pack, exit to an area upwind, and notify the suspected source field of the hazard.

1.7.2.2 Oil Field Supervisors

a) If presence of hydrogen sulfide is detected, a red rotating beacon or red high intensity strobe light adjacent to the primary helideck stairwell or wind indicator on the structure should be turned on to provide visual warning of hazard. If the beacon is to be located near the stairwell, the State of Louisiana "Offshore Heliport Design Guide" and FAA Advisory Circular AC 150/5390−2A, "Heliport Design Guide," should be reviewed to ensure proper clearance on the helideck.

b) Notify nearby helicopter operators and bases of the hazard and advise when hazard is cleared.

c) Provide a safety briefing to include location of protective equipment to all arriving personnel.

d) Wind socks or indicator should be clearly visible to provide upwind indication for the pilot.

1.8 Gas Venting Helideck/Heliport Operational Hazard Warning(s)/Procedures − Operations Near Gas Vent Booms

1.8.1 Background. Ignited flare booms can release a large volume of natural gas and create a hot fire and intense heat with little time for the pilot to react. Likewise, unignited gas vents can release reasonably large volumes of methane gas under certain conditions. Thus, operations conducted very near unignited gas vents require precautions to prevent inadvertent ingestion of combustible gases by the helicopter engine(s). The following practices are recommended.

1.8.2 Pilots

1.8.2.1 Gas will drift upwards and downwind of the vent. Plan the approach and takeoff to observe and avoid the area downwind of the vent, remaining as far away as practicable from the open end of the vent boom.

1.8.2.2 Do not attempt to start or land on an offshore helideck when the deck is downwind of a gas vent unless properly trained personnel verify conditions are safe.

1.8.3 Oil Field Supervisors

1.8.3.1 During venting of large amounts of unignited raw gas, a red rotating beacon or red high intensity strobe light adjacent to the primary helideck stairwell or wind indicator should be turned on to provide visible warning of hazard. If the beacon is to be located near the stairwell, the State of Louisiana "Offshore Heliport Design Guide" and FAA Advisory Circular AC 150/ 5390−2A, Heliport Design Guide, should be reviewed to ensure proper clearance from the helideck.

1.8.3.2 Notify nearby helicopter operators and bases of the hazard for planned operations.

1.8.3.3 Wind socks or indicator should be clearly visible to provide upward indication for the pilot.

ENR 7. Oceanic Operations

ENR 7.1 General Procedures

1. IFR/VFR Operations

1.1 Flights in oceanic airspace must be conducted under Instrument Flight Rule (IFR) procedures when operating:

1.1.1 Between sunset and sunrise.

1.1.2 At or above Flight Level (FL) 055 when operating within the New York, Oakland, and Anchorage Oceanic Flight Information Regions (FIRs).

1.1.3 Above FL180 when operating within the Miami and Houston FIRs and in the San Juan Control Area. Flights between the east coast of the U.S., and Bermuda or Caribbean terminals, and traversing the New York FIR at or above 5,500 feel MSL should be especially aware of this requirement.

1.1.4 At or above FL230 when operating within the Anchorage Arctic FIR.

1.2 San Juan CTA/FIR VFR Traffic.

1.2.1 All VFR aircraft entering and departing the San Juan FIR/CTA will provide San Juan Radio with an ICAO flight plan. All aircraft must establish two−way communications with San Juan Radio on 122.2, 122.3, or 122.6.

1.2.2 Communication can also be established by transmitting on 122.1 and receive using the appropriate VOR frequency for Borinquen (BQN), Mayaguez (MAZ), Ponce (PSE), and St. Croix (COY). For St. Thomas (STT), transmit on 123.6 and receive on the VOR frequency. If unable to contact San Juan Radio, the pilot is responsible for notifying adjacent ATS units and request that a position report be relayed to San Juan Radio for search and rescue purposes and flight following.

1.3 Non−RVSM aircraft are not permitted in RVSM airspace unless they meet the criteria of excepted aircraft and are previously approved by the ATS unit having authority for the airspace. In addition to those aircraft listed in ENR 1.1 General Rules, paragraph 39., Operational Policy/Procedures for Reduced Vertical Separation Minimum (RVSM) in the Domestic U.S., Alaska, Offshore Airspace, and the San Juan FIR, the following aircraft operating within oceanic and offshore airspace are excepted:

1.3.1 Aircraft being initially delivered to the State of Registry or Operator.

1.3.2 Aircraft that was formerly RVSM−approved but has experienced an equipment failure and is being flown to a maintenance facility for repair in order to meet RVSM requirements and/or obtain approval.

1.3.3 Aircraft being utilized for mercy or humanitarian purposes.

NOTE−
These exceptions are accommodated on a workload or traffic−permitting basis.

2. Flight Plan Filing Requirements

NOTE−
In addition to the following guidance, operators must also consult current Notices to Airmen (NOTAMs) and chart supplements (Supplement Alaska, Supplement Pacific) to gain a complete understanding of requirements. NOTAMs and supplements may contain guidance that is short term and/or short notice – i.e., having immediate effect.

2.1 If you are eligible for oceanic 50 NM lateral separation:

2.1.1 PBN/A1 or PBN/L1 in Field 18.

2.1.2 R in Field 10a.

2.1.3 See FAA Advisory Circular (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, for guidance on RNP 10 (RNAV 10) authorization.

2.2 If you are eligible for oceanic 50 NM longitudinal and lateral separation:

2.2.1 PBN/A1 or PBN/L1 in Field 18.

2.2.2 P2 in Field 10a.

2.2.3 D1 in Field 10b.

2.2.4 (J5, J6, or J7) and R in Field 10a.

2.2.5 SUR/RSP180 in Field 18.

2.2.6 See FAA Advisory Circular 90−117, Data Link Communications, for guidance on Required Communication Performance (RCP) and Required Surveillance Performance (RSP) authorization.

2.2.7 See FAA Advisory Circular 90-105 for guidance on RNP 10 (RNAV 10) authorization.

2.3 If you are eligible for 23 NM lateral or 30 NM longitudinal separation:

2.3.1 PBN/L1 in Field 18.

2.3.2 P2 in Field 10a.

2.3.3 D1 in Field 10b.

2.3.4 (J5, J6, or J7) and R in Field 10a.

2.3.5 SUR/RSP180 in Field 18.

2.3.6 See FAA Advisory Circular 90−117 for guidance on RCP and RSP authorization.

2.3.7 See FAA Advisory Circular 90-105 for guidance on RNP 4 authorization.

2.4 Oakland Oceanic FIR

2.4.1 In accordance with ICAO Doc 4444, flight plans with routes entering the Oakland Oceanic FIR (KZAK) must contain, among the estimated elapsed times (EET) in Field 18, an entry point for KZAK and an estimated time. It is not mandatory to file the boundary crossing point in Field 15 of the route of flight, but it is permitted.

2.4.2 The use of CPDLC and ADS−C in the Oakland Oceanic FIR (KZAK) is only permitted by Inmarsat and Iridium customers. All other forms of data link connectivity are not authorized. Users must ensure that the proper data link code is filed in Item 10a of the ICAO FPL in order to indicate which satellite medium(s) the aircraft is equipped with. The identifier for Inmarsat is J5 and the identifier for Iridium is J7. If J5 or J7 is not included in the ICAO FPL, then the LOGON will be rejected by KZAK and the aircraft will not be able to connect.

2.5 New York Oceanic FIR

2.5.1 The use of CPDLC and ADS−C in the New York Oceanic FIR (KZWY) is only permitted by Inmarsat and Iridium customers. All other forms of data link connectivity are not authorized. Users must ensure that the proper data link code is filed in Item 10a of the ICAO FPL in order to indicate which satellite medium(s) the aircraft is equipped with. The identifier for Inmarsat is J5 and the identifier for Iridium is J7. If J5 or J7 is not included in the ICAO FPL, then the LOGON will be rejected by KZWY and the aircraft will not be able to connect.

3. Flight Plan Addressing

3.1 In an effort to eliminate erroneous or duplicate flight plans that may be received from diverse locations, and to increase the safety of flight, operators must adhere to the following procedures when filing flight plans for departing flights from foreign aerodromes entering the United States National Airspace System:

3.1.1 If the filer sends an FPL to an FAA En Route facility in addition to the air traffic service unit (ATSU) responsible for the departure aerodrome, the filer must ensure that the flight plan filed is the same as the flight

ENR 7.4 Operational Policy 50 NM Lateral Separation

1. Houston, Miami, and San Juan Oceanic Airspace

1.1 The FAA and the Mexican air traffic services (ATS) providers have implemented 50 NM lateral separation between RNP 10 or RNP 4 aircraft operating in Gulf of America oceanic airspace.

1.2 Fifty (50) NM lateral separation is implemented in the Houston Oceanic CTA/FIR, the Gulf of America portion of the Miami Oceanic CTA/FIR, the Monterrey CTA, and the Merida CTA within the Mexico FIR/UTA.

1.3 RNAV routes within Houston Oceanic airspace are spaced a minimum of 50 NM to support this reduced lateral separation in the Gulf of America.

1.4 Information useful for flight planning and operations within the Gulf of America, under this 50 NM lateral separation initiative can be found in the West Atlantic, Gulf of America and Caribbean Resource Guide for U.S. Operators located at: https://www.faa.gov/headquartersoffices/avs/wat−gulf−and−caribbean−resource−guide. The Guide can also be found through a web search for "WAT, Gulf of America, and Caribbean Resource Guide."

NOTE−
For information pertaining to the operational policy of 50 NM lateral separation in the Atlantic portion of the Miami Oceanic CTA, or the San Juan CTA/FIR, please review ENR 7.4, paragraph 5., New York Oceanic Airspace.

1.5 The 50 NM lateral separation is applied at all altitudes above the floor of controlled airspace. Lateral separation of 100 NM will continue to be provided in the Houston Oceanic, Monterrey, and Merida CTA/FIRs to aircraft not authorized RNP 10 or RNP 4. Similarly, those aircraft will experience 90 NM lateral separation in Miami Oceanic CTA/FIR.

1.6 Operations on certain routes that fall within the boundaries of affected CTAs are not affected by the application of 50 NM lateral separation. Operation on the following routes is not affected:

1.6.1 Routes that are flown by reference to ICAO standard ground−based navigation aids (VOR, VOR/DME, NDB); and

1.6.2 Special Area Navigation (RNAV) routes Q100, Q102 and Q105 in the Houston, Jacksonville and Miami CTAs.

1.7 Provisions for Accommodation of Non− RNP 10 Aircraft (Not Authorized RNP 10 or RNP 4).

1.7.1 Operators of Non−RNP 10 aircraft must:

1.7.2 Annotate ICAO flight plan Item 18 as follows:

1.7.2.1 "RMK/NON−RNP10" (no space between letters and numbers).

1.7.2.2 Use of flight plan item 18 codes "PBN/A1" or "PBN/L1" are restricted to operators and aircraft specifically authorized for RNP 10 or RNP 4, as applicable.

1.7.3 Pilots of non−RNP 10 aircraft that operate in Gulf of America CTAs must report the lack of authorization by stating "Negative RNP 10":

1.7.3.1 On initial call to ATC in a Gulf of America CTA; or

1.7.3.2 When approval status is requested by the controller (See paragraph 1.13.1.3).

1.7.4 Non−RNP 10 operators/aircraft may file any route at any altitude in a Gulf of America CTA. They will be cleared to operate on their preferred routes and altitudes as traffic permits. 50 NM lateral separation will not be applied to non−RNP 10 aircraft.

1.7.5 Non−RNP 10 aircraft should plan on completing their climb to or descent from higher FLs within radar coverage, if possible.

1.7.6 In order to maximize operational flexibility provided by 50 NM lateral separation, operators capable of meeting RNP 10 or RNP 4 that operate on oceanic routes or areas in the Gulf of America CTAs should obtain authorization for RNP 10 or RNP 4 and annotate the ICAO flight plan accordingly.

NOTE−
RNP 10 is the minimum Navigation Specification (NavSpec) required for the application of 50 NM lateral separation. RNP 4 is an operator option; operators/aircraft authorized RNP 4 are not required to also obtain RNP 10 authorization.

1.8 RNP 10 or RNP 4 Authorization Policy and Procedures for Aircraft and Operators

1.8.1 The following is ICAO guidance on the state authority responsible for authorizations such as RNP 10, RNP 4, and RVSM:

1.8.1.1 International commercial operators:

The State of Registry makes the determination that the aircraft meets the applicable RNP requirements. The State of Operator issues operating authority (for example, Operations Specifications (OpSpecs)).

1.8.1.2 International general aviation (IGA) operators:

The State of Registry makes the determination that the aircraft meets the applicable RNP requirements and issues operating authority (for example, Letter of Authorization (LOA)).

1.9 Guidance Material.

1.9.1 FAA Advisory Circular (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, provides operational approval guidance for RNP 4 and 10. It identifies minimum aircraft capabilities and operator procedural and training requirements in order to qualify for RNP 4 and 10. AC 90−105 is consistent with the ICAO PBN Manual discussed below. Pertinent FAA and ICAO documents are posted online in the West Atlantic, Gulf of America, and Caribbean Resource Guide for U.S. Operators described in paragraph 1.4.

1.9.2 ICAO Performance−based Navigation (PBN) Manual (ICAO Doc 9613). Guidance for authorization of RNP 10 and RNP 4 is provided in ICAO Doc 9613. RNP 10 is addressed in Volume II, Part B; Chapter 1. RNP 4 is addressed in Volume II, Part C; Chapter 1.

1.9.3 Operators are encouraged to use the B036/B054 Oceanic and Remote Continental Navigation Application Guide located at: https://www.faa.gov/headquartersoffices/avs/b036b054-application-guide.

1.10 Qualification of Aircraft Equipped With a Single Long−Range Navigation System (LRNS) for RNP 10 Operations in Gulf of America CTAs.

1.10.1 Single LRNS operations in the Gulf of America, the Caribbean Sea and the other designated areas have been conducted for at least 25 years. Provisions allowing aircraft equipage with a single LRNS for operations in specified oceanic and off−shore areas are contained in the following sections of 14 Code of Federal Regulations (CFR): 91.511, 121.351, 125.203 and 135.165.

1.10.2 The FAA worked with State regulators and ATS providers in the Gulf of America and Caribbean areas, and coordinated with the ICAO North American, Central American, and Caribbean office, to implement a policy allowing single LRNS equipped aircraft, which are also qualified for RNP 10, to take advantage of RNP 10 separation criteria in the Gulf of America CTAs identified in paragraph 1.2 above.

1.10.2.1 The factors considered in allowing RNP 10 operations in the Gulf of America CTAs with single LRNS equipped aircraft were: the shortness of the legs outside the range of ground navigation aids, the availability of radar and VHF voice coverage in a large portion of Gulf of America airspace, and the absence of adverse events attributed to single LRNS aircraft in Gulf of America operations.

1.10.2.2 For U.S. operators, operational authorization for both oceanic and RNP 10 operations, when equipped with only a single LRNS, is provided via Operations Specification/Management Specification/Letter of Authorization B054, Oceanic/Remote Continental Airspace Navigation Using a Single Long−Range Navigation System. A U.S. operator must first be issued B054 in order to file a flight plan indicating RNP 10 capability for operations in the Gulf of America CTAs identified in paragraph 1.2 when equipped with only a single LRNS.

1.10.3 Operators should review their Airplane Flight Manual (AFM), AFM Supplement or other appropriate documents and/or contact the airplane or avionics manufacturer to determine the RNP 10 time limit applicable to their aircraft. They will then need to determine its effect, if any, on their operation. Unless otherwise approved, the basic RNP 10 time limit is 6.2 hours between position updates for aircraft on which Inertial Navigation Systems (INS) or Inertial Reference Units (IRU) provide the only source of long range navigation. Extended RNP 10 time limits of 10 hours and greater are already approved for many IRU systems. FAA Advisory Circular 90−105 contains provisions for extending RNP 10 time limits.

1.11 Flight Planning Requirements

1.11.1 Operators must make ICAO flight plan annotations in accordance with this paragraph and, if applicable, Paragraph 1.7, Provisions for Accommodation of Non−RNP 10 Aircraft (Not Authorized RNP 10 or RNP 4).

1.11.2 ICAO flight plans must be filed for operation on oceanic routes and areas in the Houston Oceanic CTA/FIR, the Gulf of America portion of the Miami CTA/FIR, the Monterrey CTA and Merida High CTA.

1.11.3 To inform ATC that they have obtained RNP 10 or RNP 4 authorization and are eligible for 50 NM lateral separation, operators must:

1.11.3.1 Annotate ICAO Flight Plan Item 10 (Equipment) with the letter "R"; and

1.11.3.2 Annotate Item 18 (Other Information) with, as appropriate, "PBN/A1" for RNP 10 aircraft or "PBN/L1" for RNP 4 aircraft (no space between letters and numbers).

NOTE−
The letter "R" indicates that the performance−based navigation specification (for example, RNP 10 or RNP 4) is specified in Item 18 following the indicator "PBN/."

1.12 Operator Procedures.

1.12.1 Operator procedures regarding RNP 10 and RNP 4 are contained in Advisory Circular 90−105 and ICAO PBN Manual, Volume II, Parts B and C, Chapter 1.

1.12.2 ICAO Doc 4444, Procedures for Air Navigation − Air Traffic Management, contains in−flight contingency procedures applicable in oceanic airspace, and is the source document for those procedures given the applicability of ICAO Rules of the Air over the high seas. The FAA publishes substantively identical contingency procedures in ENR 7.3 of the U.S. AIP and in Advisory Circular 91−70, Oceanic and Remote Continental Airspace Operations.

1.12.2.1 Contingency procedures include General Procedures, as well as Weather Deviation Procedures. The procedures are applicable to in−flight diversion and turn−back, loss of navigation capability, and weather avoidance scenarios.

1.12.2.2 Oceanic contingency procedures are important components of pilot training programs for oceanic operations.

1.12.3 When pilots suspect a navigation system malfunction, in addition to the actions suggested in ENR 7.3, the following actions should be taken:

1.12.3.1 Immediately inform ATC of navigation system malfunction or failure;

1.12.3.2 Accounting for wind drift, fly magnetic compass heading to maintain track; and

1.12.3.3 Request radar vectors from ATC, when available.

1.13 Pilot Report of Non−RNP 10 Status

1.13.1 The pilot must report the lack of RNP 10 or RNP 4 status in accordance with the following:

1.13.1.1 When the operator/aircraft is not authorized RNP 10 or RNP 4 (See paragraph 1.7.)

1.13.1.2 If approval status is requested by the controller:

1.13.1.3 The pilot must communicate approval status using the following phraseology in TBL ENR 7.4−1.

TBL ENR 7.4−1

Controller Request	Pilot Response
[*call sign*] "CONFIRM RNP 10 OR 4 APPROVED"	"AFFIRM RNP 10 APPROVED" or "AFFIRM RNP 4 APPROVED" as appropriate; or "NEGATIVE RNP 10"

2. Oakland Oceanic Airspace

2.1 The application of 50 NM lateral separation minima between aircraft authorized RNP 10 or RNP 4 is supported.

2.2 RNP 10 is required for all aircraft operating in the Central East Pacific (CEP) fixed track system and Pacific Organized Track System (PACOTS).

2.3 Flight planning guidelines for non−RNP 10 aircraft are published in the Pacific Chart Supplement.

3. Anchorage Oceanic FIR

3.1 The application of 50 NM lateral separation minima between aircraft authorized RNP 10 or RNP 4 is supported.

3.2 Non−RNP 10 approved aircraft may file via random track, at any altitude, at least 100 NM from the North Pacific (NOPAC) fixed track system. Aircraft entering the NOPAC should flight plan in accordance with Notices contained in the Alaska Chart Supplement.

4. Anchorage Arctic FIR

4.1 The application of 50 NM lateral separation minima between aircraft authorized RNP 10 is supported.

5. New York Oceanic Airspace

5.1 ATC applies 50 NM lateral separation between aircraft authorized RNP 10 or RNP 4 within New York Oceanic West airspace. ATC similarly applies 50 NM lateral separation in the Atlantic portion of the Miami Oceanic CTA as well as the San Juan CTA/FIR. ATC may apply 50 NM lateral separation between aircraft authorized RNP 10 or RNP 4 in New York Oceanic East.

5.2 Aircraft authorized RNP 10 or RNP 4 will have a better chance of obtaining their preferred routing and altitude in the most densely used airspace (that is, below FL 410) because of their ability to participate in ATC's use of 50 NM lateral separation. Non−RNP 10 or non−RNP 4 aircraft will be spaced at least 90 NM laterally from other aircraft.

5.3 ATC will not apply 50 NM lateral separation on routes that are within ATC radar and VHF voice radio coverage. New York Oceanic airspace contains the following routes or route segments, which, at and above FL 310, are within ATC radar and VHF radio coverage:

5.3.1 M201 between VIRST and VEGAA.

5.3.2 Y485, Y488, Y493, and Y494. Refer also to ENR 7.9 for guidance on Y−routes.

NOTE−
While flying these route segments, pilots communicate directly with ATC using VHF voice radio, and domestic procedures apply. Strategic Lateral Offset Procedures (SLOP) are not to be used. Oceanic data link procedures described in ENR 7.2 (with KZWY log−on) are also not applicable.

5.4 Flight plan filing and addressing requirements are detailed in ENR 7.1, paragraphs 2. and 3.

5.5 Operators of aircraft not authorized RNP 10 or RNP 4 are expected to follow the procedures in ENR 7.4 paragraphs 1.7 and 1.13 for alerting ATC of the RNP status. Those operators are expected to indicate their "non−RNP 10" status in Item 18 of their ATC flight plan. In addition, pilots are expected to inform ATC of their "non−RNP 10" status on initial call to ATC and when reading back a clearance to descend through FL 410.

5.6 Filing a flight plan for, and conducting operations under, RNP 10 or RNP 4 navigation specifications require the aircraft to be equipped with two operable long−range navigation systems (LRNS). Operators who indicate RNP 10 or RNP 4 capability on their ATC flight plans, and subsequently experience an LRNS failure, must alert ATC to this failure. If the pilot believes the aircraft can continue to navigate along the cleared route with the single LRNS, ATC should be informed; as such, ATC may continue the aircraft on the cleared route.

5.7 In the event of LRNS failure, pilots must inform ATC of the failure and ensure ATC is aware the aircraft is no longer qualified for the RNP level indicated on the flight plan. In addition to this notification, pilots should request ATC amend their flight plan to remove the RNP capability indication in Item 18 of the flight plan.

5.8 Information regarding operations in the New York – West Oceanic CTA, the Atlantic portion of the Miami Oceanic CTA, and the San Juan Oceanic CTA can be found in the West Atlantic, Gulf of America, and Caribbean Resource Guide for U.S. Operators, which is available at:
https://www.faa.gov/headquartersoffices/avs/wat−gulf−and−caribbean−resource−guide.

6. Provisions for Accommodation of Non−RNP 10 Aircraft (Not Authorized RNP 10 or RNP 4)

The guidance contained in paragraphs 1.7 and 1.13 of this section is applicable to all operations using Non−RNP 10 aircraft throughout the airspace covered by this document.

7. RNP 10 or RNP 4 Authorization Policy and Procedures for Aircraft and Operators

The guidance contained in paragraphs 1.8 and 1.9 of this section is applicable to operations throughout the airspace covered by this document.

8. Flight Planning Requirements

The guidance contained in paragraphs 1.7 and 1.11 of this section is applicable to operations throughout the airspace covered by this document.

9. Pilot and Dispatcher Basic and In−Flight Contingency Procedures

Information and guidance pertaining to in−flight contingency procedures, applicable in all the oceanic airspace covered by this AIP are provided in ENR 7.4, paragraph 1.12 as well as section ENR 7.3.

ENR 7.9 Y−Routes

1. Introduction

1.1 The FAA has established a network of area navigation (RNAV) routes to enhance efficiency of air traffic flow and control over the West Atlantic, Gulf of America, the Bahamas, and Puerto Rico. These RNAV routes, charted as "Y" routes, exist largely, but not exclusively, within U.S. "offshore airspace." Operators may find U.S. offshore airspace labeled as "Atlantic High," "Atlantic Low," "Gulf of America High," etc., on FAA IFR en route charts. In accordance with 14 CFR Part 71, § 71.1, § 71.33, and § 71.71, offshore airspace at and above 18,000 feet MSL is Class A airspace, while that offshore airspace below 18,000 feet MSL is Class E. The FAA normally uses domestic air traffic control procedures, vice oceanic procedures, in offshore airspace. Aircraft flying Y−routes will typically be within signal coverage of U.S. ground navigation facilities and ATC radar. Actual signal reception and radar detection are a function of aircraft altitude. The majority of Y−routes exist only in the upper altitude structure, i.e., Class A offshore airspace.

2. General Requirements

2.1 The Y−routes are designated RNAV 2 with GNSS required. Aircraft flying the Y−routes must be equipped with GNSS and able to meet RNAV 2 performance requirements. RNAV systems relying solely on DME/DME or inertial navigation are not suitable (and therefore not authorized) for use on any Y−route.

2.2 Pilots must indicate on their ATC flight plan at least the minimum equipment and capability required for RNAV 2 with GNSS. Item 10 of the flight plan must indicate G and R. Item 18 must indicate PBN/C2.

3. Operational Requirements

3.1 Pilots are expected to fly the route centerline, as defined by the aircraft RNAV system.

3.2 Operators must check predicted RAIM availability for the expected duration of their flight on a Y−route. Five (5) minutes is the maximum predicted continuous loss of RAIM allowed for flight on a Y−route.

4. Pilot Knowledge

4.1 Advisory Circular (AC) 90−100, U.S. Terminal and En Route Area Navigation (RNAV) Operations, contains pilot knowledge subject matter that is generally applicable to any RNAV operation. General aviation pilots in particular should use the RNAV subject matter contained in AC 90−100 in preparation for any flight on an RNAV route, including Y−routes.

ENR 7.10 Atlantic High Offshore Airspace Offshore Routes Supporting Florida Airspace Optimization

1. Introduction

1.1 On 27 October 2005, nine new directional offshore Class I area navigation (RNAV) Atlantic Routes (ARs) were established between Florida and northeastern US airport pairs. These routes support the Florida Airspace Optimization project and are designed to relieve traffic congestion and reduce in−trail delays. The nine new offshore RNAV routes, designated AR15, AR16, AR17, AR18, AR19, AR21, AR22, AR23 and AR24, were established between FL240 and FL600 inclusive.

1.2 None of the waypoints will be compulsory reporting points since the new and revised routes are entirely within radar coverage.

1.3 Southbound routes include AR15, AR17, AR19, and AR22, while northbound routes include AR16 and AR18. AR23, AR24 are bidirectional.

1.4 Air traffic control services for these routes in offshore airspace is provided by Washington, Jacksonville and Miami ARTCCs.

2. Filing Routes

2.1 Flights departing from and landing at airports within the domestic U.S. should file to conform with the appropriate Preferred IFR Routes listed in the Chart Supplements. International traffic southbound from the Wilmington VORTAC/Dixon NDB (ILM/DIW) area filing over MCLAW, FUNDI, Fish Hook NDB (FIS), or CANOA should file AR17. International traffic southbound from the ILM/DIW area filing over Freeport VOR (ZFP) or URSUS should file AR23 or AR24. Traffic originating south of Miami, Florida, filing over the ILM/DIW area should file AR16, AR18, AR23 or AR24.

3. Operational Requirements

3.1 Operations on these AR routes requires the use of area navigation (RNAV) systems approved for IFR enroute operations and which incorporate GPS and/or inertial system inputs. For U.S. commercial operators, i.e., those operating under 14 CFR part 91 Subpart K, 121, 125, and 135, use of RNAV systems must be authorized by their Operations Specifications, Management Specifications, or Letters of Authorization. For operators flying under part 91, their Airplane Flight Manual, Pilot Operating Handbook, or other manufacturer−provided documentation should indicate that the RNAV system meets the requirements for IFR enroute RNAV operations in Advisory Circular (AC) 20−138 or AC 90−100, or meets the requirements for inertial navigation systems in 14 CFR part 121 appendix G.

3.2 Pilots should fly the route centerlines at all times and must notify Air Traffic Control (ATC) of any loss of navigation capability that affects the aircraft's ability to track the route centerline.

3.3 ATC will provide radar separation for these routes. In the event of loss of radar, ATC will advise the aircraft and apply appropriate separation.

3.4 Pilots of aircraft without GPS and who therefore must rely on inertial RNAV systems to fly on these AR routes, are limited to one hour of operation between position updates, e.g., DME/DME update of the position in their RNAV system. This one−hour time period starts when the inertial system is placed in the navigation mode and applies en route between position updates. Pilots unable to obtain a position update for their RNAV system must inform ATC prior to one hour from the last update.

3.5 Some AR routes are co−designated Y routes, e.g., AR19/Y291. The route filed in the flight plan governs the navigation equipment and performance requirements. Filing for Y291 on a route designated AR19/Y291 for example, requires the aircraft to be equipped with GNSS and flown with RNAV 2 performance on that route, in accordance with section ENR 7.9.

ENR 7.11 Reduced Separation Climb/Descent Procedures

1. Automatic Dependent Surveillance− Broadcast (ADS−B) In−Trail Procedure (ITP)

1.1 The ITP is designed for use in non−surveillance oceanic airspace to enable appropriately equipped ADS−B In aircraft to perform flight level (FL) changes previously unavailable with procedural separation minima applied. The improved traffic information available to ADS−B In−equipped aircraft allows ITP maneuvers to occur safely with reduced separation minima applied. ITP will enable flight crews to execute FL changes to improve ride comfort, avoid weather, or obtain more favorable winds to improve fuel economy and arrival times. The ITP is only available within the Anchorage, Oakland, and New York Oceanic Flight Information Regions (FIR).

1.2 FAA air traffic procedures for the ADS−B ITP mirror those contained within ICAO Document 4444 (Doc. 4444), Procedures for Air Navigation Service− Air Traffic Management (PANS−ATM), Section 5.4.2.7, Longitudinal Separation Minima Based on Distance Using ADS−B In−Trail Procedure (ITP), with one difference. Section 5.4.2.7.3.2 of Doc. 4444 states, "A controller may clear an aircraft for an ITP climb or descent provided the following conditions are satisfied: d) both the ITP aircraft and reference aircraft are either on; 2) parallel or same tracks with no turns permitted during the manoeuvre." The FAA's Advanced Technology and Oceanic Procedures (ATOP) automation platform is designed to ensure that separation will not decrease below required minima for same track aircraft should either the reference or maneuvering aircraft turn during the ITP. FAA Order JO 7110.65, Air Traffic Control, states that an aircraft may be cleared for an ITP climb or descent if both the ITP aircraft and reference aircraft are on the "same tracks with no turns permitted that reduce required separation during the ITP."

1.3 Equipment specifications and guidance for pilot procedures is available in FAA Advisory Circular (AC) 90−114, Automatic Dependent Surveillance−Broadcast (ADS−B) Operations, Appendix 2, ADS−B In−Trail Procedure.

1.4 Additional information is also available in ICAO Circular 325, In−Trail Procedure (ITP) Using Automatic Dependent Surveillance−Broadcast (ADS−B).

2. Automatic Dependent Surveillance− Contract (ADS−C) Climb Descend Procedure (CDP)

2.1 The ADS−C CDP is designed to improve service to properly equipped aircraft by allowing an oceanic air traffic controller to have an option for granting an altitude change request when other standard separations (such as ADS−C distance−based 30 NM longitudinal separation minima) do not allow for a climb or descent through the altitude of a blocking aircraft. It is an air traffic control tool to be applied between maneuvering and blocking aircraft pairs. The CDP is only available within the Anchorage, Oakland, and New York Oceanic FIRs.

2.2 FAA air traffic procedures, published in FAA Order JO 7110.65, Chapter 8, mirror those in ICAO Document 4444 (Doc 4444), Procedures for Air Navigation Service−Air Traffic Management (PANS−ATM), Section 5.4.2.8, Longitudinal Separation Minima Based on Distance Using ADS−C Climb and Descend Procedure (CDP), and in ICAO Circular 342, Automatic Dependent Surveillance – Contract (ADS−C) Climb and Descend Procedure (CDP). The FAA's ATOP automation platform is designed to alert the controller before separation decreases below the required minima. Aircraft pair distance verification is performed by the ground automation system, using near simultaneous ADS−C demand reports.

2.3 The implementation of the ADS−C CDP is intended to facilitate increased access to optimum flight levels for aircraft operating in airspace where no ATS surveillance service is available. It is similar to the ADS−B ITP [see ICAO Circular 325, In−Trail Procedure (ITP) Using Automatic Dependent Surveillance–Broadcast (ADS−B)] in that it is a climb or descend through procedure. Unlike the ITP, however, the pilots involved in an ADS−C CDP may not be aware of which separation minima a controller is utilizing.

ENR 7.12 New York Oceanic Control Area (OCA) West Flight Level Allocation

1. Background

1.1 The primary air traffic flows in the New York OCA West airspace are between Northeast and Mid− Atlantic U.S. airports and Caribbean and South American destinations.

1.2 This primary flow is regularly crossed by the flow of traffic transitioning to and from the Southeast U.S./Caribbean and the North Atlantic and New York OCA East airspace.

1.3 The ATS routes that comprise the West Atlantic (WAT) are bi-directional. Therefore, it is important that the northbound flows are procedurally separated from the southbound flows to the maximum extent possible.

2. Altitude Filing

2.1 A Flight Level schema has been designed as a guide for operators and dispatchers to determine what altitudes to file to transit the OCA West airspace.

2.2 The following aircraft should file **ODD** flight levels:

2.2.1 Aircraft operating South or Southeast bound on the following routes: L451, L452, L453, L454, L455, L456, L457, L459, L461, and L462;

2.2.2 Northeast bound on M201, M202. M203, M204; and

2.2.3 East or Northeast bound on L375, L435, M325, M326, M327, M328, M329, M330, M331, M593, M594, M595, M596, M597, and M525.

2.3 For aircraft operating opposite direction to that listed above on the same routes – aircraft should file **EVEN** flight levels.

NOTE−
Due to the amount of crossing traffic throughout the region, final altitude assignments will always be determined dynamically by ATC, based on the current traffic and operational conditions.

ENR 7.13 Gulf of America RNAV Routes Q100, Q102, and Q105

1. Introduction

The three Q routes over the northern portion of the Gulf of America, Q100, Q102, and Q105, are not the same as the RNAV Q routes over the continental United States. There are some differences in operating procedures when flying the Gulf Q routes.

2. Operational Requirements

2.1 Operations on these Gulf Q routes requires the use of area navigation (RNAV) systems approved for IFR enroute operations and which incorporate GPS and/or inertial system inputs. For U.S. commercial operators, i.e., those operating under 14 CFR part 91 subpart K, 121, 125, and 135, use of RNAV systems must be authorized by their Operations Specifications, Management Specifications, or Letters of Authorization. For operators flying under part 91, their Airplane Flight Manual, Pilot Operating Handbook, or other manufacturer−provided documentation should indicate that the RNAV system meets the requirements for IFR enroute RNAV operations published in Advisory Circular (AC) 20−138 or AC 90−100, or meets the requirements for inertial navigation systems in 14 CFR part 121 appendix G.

2.2 Pilots should fly the route centerlines at all times and must notify Air Traffic Control (ATC) of any loss of navigation capability that affects the aircraft's ability to track the route centerline.

2.3 Pilots of aircraft without GPS and who therefore must rely on inertial RNAV systems to fly on a Gulf Q route, are limited to 1.5 hours of operation between position updates, e.g., DME/DME update of the position in their RNAV system. This 1.5−hour time period starts when the inertial system is placed in the navigation mode and applies en route between position updates. Pilots unable to obtain a position update for their RNAV system must inform ATC prior to 1.5 hours from the last update.

2.4 Routes Q100 and Q102 are co−designated Y280 and Y290 respectively. The route filed in the flight plan governs the navigation equipment and performance requirements. Filing for Y280 on the route designated Q100/Y280 requires the aircraft to be equipped with GNSS and flown with RNAV 2 performance on that route, in accordance with section ENR 7.9.

NOTE−
ATC normally provides radar monitoring along the three Gulf Q routes. Pilots can expect ATC to advise them when radar monitoring is unavailable and to adjust aircraft separation as necessary.

5. Emergency UAS Authorizations Through Special Government Interest (SGI) Airspace Waivers

5.1 Background. UAS are used by public safety agencies to respond to emergencies. The SGI process is for any Part 107 or Part 91 operator that either due to time limitations, airspace restrictions or emergency situations that requires expedited authorization by contacting the system operations support center (SOSC) at 9−ATOR−HQ−SOSC@faa.gov.

5.2 The SGI process, depending on the nature of the operation, can be completed in a matter of minutes. This process enables response to an emergency with UAS in an expeditious manner.

5.3 Public Safety organizations may apply for expedited airspace authorizations through the SGI process. The SGI process is defined in FAA Order JO 7210.3, Facility Operation and Administration.

REFERENCE−
FAA Order JO 7210.3, Facility Operation And Administration,

5.4 Additional information regarding SGI authorizations can be located at the FAA's Emergency Situations webpage.

NOTE−
The FAA's Emergency Situations website may be reviewed at:
https://www.faa.gov/uas/advanced_operations/emer gency_situations/.

6. Environmental Best Practices

6.1 Unmanned aircraft operate in a similar environment to manned aircraft. Since most UAS operations are conducted at low altitude, hazards, risks and potential environment factors may be encountered on a more frequent basis. In addition to the Bird Hazards, Flight over National Refuges, Parks, and Forests, the following factors must also be considered:

6.1.1 Flight Near Protected Conservation Areas. UAS, if misused, can have devastating impacts on protected wildlife. UAS operators may check for conservation area airspace restrictions on the B4UFLY mobile app.

6.1.2 Flight(s) Near Noise Sensitive Areas. Consider the following:

6.1.2.1 UAS operations and flight paths should be planned to avoid prolonged or repetitive flight at low altitude near noise sensitive areas.

6.1.2.2 As described in FAA Order 1050.1, Environmental Impact: Policies and Procedures, an area is "noise sensitive" if noise interferes with any normal activities associated with the area's use.

REFERENCE−
FAA Order 1050.1, Environmental Impact: Policies and Procedures.

6.1.2.3 To the extent consistent with FAA safety requirements, operators should observe best practices developed by the National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, and National Oceanic and Atmospheric Administration when operating above areas administered by those agencies. The National Park Service provides additional guidance at their Unmanned Aircraft Systems website.

NOTE−
The National Park Service, Unmanned Aircraft Systems website may be viewed at: https://www.nps.gov/subjects/sound/uas.htm.

6.2 Some bird species have shown the potential to attack UAS that approach their nesting and hunting areas too closely. The type of birds that are most likely to attack sUAS are raptors such as hawks, eagles, and falcons. However, gulls, geese, and crows have also been known to attack UAS. Aggressive bird attacks may damage UAS propellers or other critical equipment, and may result in sudden loss of power or engine failure. Remote pilots and recreational flyers should consider reviewing engine−out procedures, especially when operating near high bird concentrations.

7. Resources for UAS Operators

7.1 FAA.GOV/UAS. The FAA UAS website, www.faa.gov/uas, is the central point for information about FAA UAS rules, regulations, and safety best practices.

7.2 FAA DroneZone. The FAA DroneZone is the Agency's portal for registering drones, requesting Part 107 airspace authorizations and waivers, registering as a CBO, requesting fixed sites, and other tasks.

7.3 Local FAA Offices. Flight Standards District Offices (FSDOs), can be the best in−person source for UAS information. A list of FSDOs in the United States is at https://www.faa.gov/about/office_org/field_offices/fsdo/all_fsdos/.

7.4 Aeronautical Information. The FAA provides aeronautical information to NAS users, including UAS pilots, through a variety of methods including publications like this manual, other publications, Advisory Circulars (ACs), charts, website and mobile applications, etc. Check https://www.faa.gov/air_traffic/flight_info/aeronav/ for these items.

7.5 The UAS Support Center. For general question or comment about UAS or drones, the FAA's Support Center is available at 844−FLY−MY−UA or UASHelp@faa.gov.

7.6 Clubs and Associations. Local UAS recreational clubs, CBO organizations, and business associations are excellent resources for information and updates on flying in the local region.

7.7 LAANC. LAANC is the Low Altitude Authorization and Notification Capability, a collaboration between FAA and industry. It automates the application and approval process for airspace authorizations. Using applications developed by an FAA−approved UAS service supplier (USS) you can apply for an airspace authorization at over 600 airports. Download the free LAANC app at https://www.faa.gov/uas/programs_partnerships/data_exchange/.

7.8 B4UFLY. The B4UFLY mobile application is a partnership between the FAA and Kittyhawk. The app helps recreational flyers know whether it is safe to fly their drone, as well as increases their situational awareness. Download the free B4UFly app at https://www.faa.gov/uas/recreational_fliers/where_can_i_fly/b4ufly/.

7.9 Weather Sources. Aviation weather services (such as https://www.aviationweather.gov/) are generally targeted towards manned aviation, the FAA is currently working on UAS−specific weather applications.

7.10 NOTAM. The Notices to Airmen (NOTAM) system, like aviation weather sources, remains primarily predicated on manned aviation needs. However, the system provides continual updates on all aviation activity to include UAS flight activities which have been input to the FAA, as well as airport status. The NOTAM system will be of greatest use to larger UAS activities, UAS en route operations in controlled airspace, and those flying to or from airports. NOTAM, temporary flight restrictions (TFRs), and aircraft safety alerts can be accessed at https://www.faa.gov/pilots/safety/notams_tfr/.

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6.2.3 Forms and instructions can be obtained from the following addresses.

Army:	Director, USAASA ATTN: MOAS−AS Building 1466 9325 Gunston Road, Suite N319 Ft. Belvoir, VA 22060−5582 Telephone: (703) 806−4864
Air Force:	HQ USAF/XOO−CA 1480 Air Force Pentagon, Room 4D1010 Washington DC 20330−1480 Telephone: (703) 697−5967
Navy/ Marine Corps:	Commander Naval Facilities Engineering Command, Code 141JB 200 Stovall Street, Room 10N45 Alexandria, VA 22332−2300 Telephone: (703) 325−0475

At Coast Guard airfields, prior permission must be requested from the commanding officer of the airfield to be used.

7. Applicable ICAO Documents

ICAO Standards and Recommended Practices contained in Annex 14 are applied with the exceptions noted in GEN 1.7, Differences from ICAO Standards, Recommended Practices and Procedures.

8. Maintenance of Aerodrome Movement Areas

8.1 It is the responsibility of the relevant aerodrome authority to maintain the aerodrome in a satisfactory condition.

8.2 Clearance of snow and measurement of snow, ice, standing water, braking action, etc., and the reporting of such pavement conditions is within the responsibility of the aerodrome authority.

9. Dissemination of Information on the Condition of Paved Surface

9.1 Information on surface condition of runways, taxiways and aprons will be published, when available and when necessary.

9.2 At aerodromes where an ATS unit is established, if a runway is affected by standing water, snow, slush or ice during the approach of an aircraft for landing, and such conditions are notified by the aerodrome management to the ATS unit, such conditions will be made available to the aircraft.

10. Rescue and Fire Fighting Facilities

10.1 Adequate rescue and fire−fighting vehicles, equipment and personnel are provided at aerodromes available for international commercial air transport.

10.2 Temporary interruptions to rescue and fire−fighting service, or non−availability of such services, are made known by NOTAM.

10.3 Certificated Aerodromes (14 CFR Part 139)

Aerodromes serving certain air carriers under 14 CFR Part 139 are indicated by a CFR Index which relates to the availability of crash, fire, and rescue equipment. (See TBL AD 1.1−1.)

11. Bird Concentrations in the Vicinity of Aerodromes

11.1 Animal and bird notices are not normally published in aerodrome remarks. Pilots should be aware that animals and birds are frequently found in the vicinity of aerodromes and should exercise due caution. However, selected bird notices may be published, but only after approval by the appropriate Regional Bird Hazard Group.

TBL AD 1.1−1
14 CFR PART 139 CERTIFICATED AIRPORTS

Indexes and Fire Fighting and Rescue Equipment Requirements

Airport Index	Required Number of Vehicles	Aircraft Length	Agent & Water for Foam
A	1	$<$ 90'	500# DC or 450# DC + 100 gal H_20
B	1 or 2	$\geq$ 90' & $<$ 126'	Index A + 1500 gal H_20
C	2 or 3	$\geq$ 126' & $<$ 159'	Index A + 3000 gal H_20
D	3	$\geq$ 159' & $<$ 200'	Index A + 4000 gal H_20
E	3	$\geq$ 200'	Index A + 6000 gal H_20
$>$ Greater Than; $<$ Less Than; $\geq$ Equal To or Greater Than; H_20 Water; DC Dry Chemical			
NOTE− Vehicle and capacity requirements for airports holding limited operating certificates are determined on a case−by−case basis.			

12. Airport Lighting Aids

12.1 Approach Light Systems (ALS)

12.1.1 Approach light systems provide the basic means for transition from instrument flight to visual flight for landing. Operational requirements dictate the sophistication and configuration of the approach light system for a particular runway.

12.1.2 Approach light systems are a configuration of signal lights starting at the landing threshold and extending into the approach area a distance of 2400−3000 feet for precision instrument runways and 1400−1500 feet for nonprecision instrument runways. Some systems include sequenced flashing lights which appear to the pilot as a ball of light traveling towards the runway at high speed (twice each second).

12.2 Visual Glideslope Indicators

12.2.1 Visual Approach Slope Indicator (VASI)

12.2.1.1 The VASI is a system of lights so arranged to provide visual descent guidance information during the approach to a runway. These lights are visible from 3−5 miles during the day and up to 20 miles or more at night. The visual glide path of the VASI provides safe obstruction clearance within plus or minus 10 degrees of the extended runway centerline and to 4 NM from the runway threshold. Descent, using the VASI, should not be initiated until the aircraft is visually aligned with the runway. Lateral course guidance is provided by the runway or runway lights. In certain circumstances, the safe obstruction clearance area may be reduced by narrowing the beam width or shortening the usable distance due to local limitations, or the VASI may be offset from the extended runway centerline. This will be noted in the Chart Supplement and/or applicable Notices to Airmen (NOTAMs).

12.2.1.2 VASI installations may consist of either 2, 4, 6, 12, or 16 light units arranged in bars referred to as near, middle, and far bars. Most VASI installations consist of 2 bars, near and far, and may consist of 2, 4, or 12 light

15.3.1.2 Medium Intensity Flashing White Obstruction Lights. Medium intensity flashing white obstruction lights may be used during daytime and twilight with automatically selected reduced intensity for nighttime operation. When this system is used on structures 500 feet (153 m) AGL or less in height, other methods of marking and lighting the structure may be omitted. Aviation orange and white paint is always required for daytime marking on structures exceeding 500 feet (153 m) AGL. This system is not normally installed on structures less than 200 feet (61 m) AGL.

15.3.1.3 High Intensity White Obstruction Lights. Flashing high intensity white lights during daytime with reduced intensity for twilight and nighttime operation. When this type system is used, the marking of structures with red obstruction lights and aviation orange and white paint may be omitted.

15.3.1.4 Dual Lighting. A combination of flashing aviation red beacons and steady burning aviation red lights for nighttime operation and flashing high intensity white lights for daytime operation. Aviation orange and white paint may be omitted.

15.3.1.5 Catenary Lighting. Lighted markers are available for increased night conspicuity of high−voltage (69KV or higher) transmission line catenary wires. Lighted markers provide conspicuity both day and night.

15.3.2 Medium intensity omnidirectional flashing white lighting system provides conspicuity both day and night on catenary support structures. The unique sequential/simultaneous flashing light system alerts pilots of the associated catenary wires.

15.3.3 High intensity flashing white lights are being used to identify some supporting structures of overhead transmission lines located across rivers, chasms, gorges, etc. These lights flash in a middle, top, lower light sequence at approximately 60 flashes per minute. The top light is normally installed near the top of the supporting structure, while the lower light indicates the approximate lower portion of the wire span. The lights are beamed towards the companion structure and identify the area of the wire span.

15.3.4 High intensity flashing white lights are also employed to identify tall structures, such as chimneys and towers, and obstructions to air navigation. The lights provide a 360 degree coverage about the structure at 40 flashes per minute and consist of from one to seven levels of lights depending upon the height of the structure. Where more than one level is used, the vertical banks flash simultaneously.

15.4 LED Lighting Systems

15.4.1 Certain light−emitting diode (LED) lighting systems fall outside the combined visible and near−infrared spectrum of night vision goggles (NVGs) and thus will not be visible to a flightcrew using NVGs.

15.4.2 The FAA changed specifications for LED−based red obstruction lights to make them visible to pilots using certain NVG systems, however, other colors may not be visible.

15.4.3 It is recommended that air carriers/operators—including Part 91 operators—who utilize NVGs incorporate procedures into manuals and/or standard operating procedures (SOPs) requiring periodic, unaided scanning when operating at low altitudes and when performing a reconnaissance of landing areas.

16. Runway Lead−in Light System (RLLS)

16.1 The lead−in lighting system consists of a series of flashing lights installed at or near ground level to describe the desired course to a runway or final approach. Each group of lights is positioned and aimed so as to be conveniently sighted and followed from the approaching aircraft under conditions at or above approach minimums under consideration. The system may be curved, straight, or combination thereof, as required. The lead−in lighting system may be terminated at any approved approach lighting system, or it may be terminated at a distance from the landing threshold which is compatible with authorized visibility minimums permitting visual reference to the runway environment.

16.2 The outer portion uses groups of lights to mark segments of the approach path beginning at a point within easy visual range of a final approach fix. These groups are spaced close enough together (approximately one mile) to give continuous lead−in guidance. A group consists of at least three flashing lights in a linear or cluster configuration and may be augmented by steady burning lights where required. When practicable, groups flash in sequence toward runways. Each system is designed to suit local conditions and to provide the visual guidance intended. The design of all RLLS is compatible with the requirements of U.S. Standards for Terminal Instrument Procedures (TERPS) where such procedures are applied for establishing instrument minimums.

17. Airport Marking Aids and Signs

17.1 General

17.1.1 Airport pavement markings and signs provide information that is useful to a pilot during takeoff, landing, and taxiing.

17.1.2 Uniformity in airport markings and signs from one airport to another enhances safety and improves efficiency. Pilots are encouraged to work with the operators of the airports they use to achieve the marking and sign standards described in this section.

17.1.3 Pilots who encounter ineffective, incorrect, or confusing markings or signs on an airport should make the operator of the airport aware of the problem. These situations may also be reported under the Aviation Safety Reporting Program as described in ENR 1.14 Pilots may also report these situations to the FAA regional airports division.

17.1.4 The markings and signs described in this section reflect the current FAA recommended standards.

REFERENCE−
AC 150/5340−1, Standards for Airport Markings.
AC 150/5340−18, Standards for Airport Sign Systems.

17.2 Airport Pavement Markings

17.2.1 General. For the purpose of this section, the airport pavement markings have been grouped into the four areas:

17.2.1.1 Runway Markings.

17.2.1.2 Taxiway Markings.

17.2.1.3 Holding Position Markings.

17.2.1.4 Other Markings.

17.2.2 Marking Colors. Markings for runways are white. Markings defining the landing area on a heliport are also white except for hospital heliports which use a red “H” on a white cross. Markings for taxiways, areas not intended for use by aircraft (closed and hazardous areas), and holding positions (even if they are on a runway) are yellow.

17.3 Runway Markings

17.3.1 General. There are three types of markings for runways: visual, nonprecision instrument, and precision instrument. TBL AD 1.1−5 identifies the marking elements for each type of runway, and TBL AD 1.1−6 identifies runway threshold markings.

17.3.2 Runway Designators. Runway numbers and letters are determined from the approach direction. The runway number is the whole number nearest one−tenth the magnetic azimuth of the centerline of the runway, measured clockwise from the magnetic north. The letters differentiate between left (L), right (R), or center (C) parallel runways, as applicable:

17.3.2.1 For two parallel runways “L” “R.”

17.3.2.2 For three parallel runways “L” “C” “R.”

17.3.3 Runway Centerline Marking. The runway centerline identifies the center of the runway and provides alignment guidance during takeoff and landing. The centerline consists of a line of uniformly spaced stripes and gaps.

22.2 Runway Location Sign. This sign has a black background with a yellow inscription and yellow border, as shown in FIG AD 1.1−44. The inscription is the designation of the runway on which the aircraft is located. These signs are intended to complement the information available to pilots through their magnetic compass and typically are installed where the proximity of two or more runways to one another could cause pilots to be confused as to which runway they are on.

22.3 Runway Boundary Sign. This sign has a yellow background with a black inscription with a graphic depicting the pavement holding position marking, as shown in FIG AD 1.1−45. This sign, which faces the runway and is visible to the pilot exiting the runway, is located adjacent to the holding position marking on the pavement. The sign is intended to provide pilots with another visual cue which they can use as a guide in deciding when they are "clear of the runway."

22.4 ILS Critical Area Boundary Sign. This sign has a yellow background with a black inscription with a graphic depicting the ILS pavement holding position marking, as shown in FIG AD 1.1−46. This sign is located adjacent to the ILS holding position marking on the pavement and can be seen by pilots leaving the critical area. The sign is intended to provide pilots with another visual cue which they can use as a guide in deciding when they are "clear of the ILS critical area."

23. Direction Signs

23.1 Direction signs have a yellow background with a black inscription. The inscription identifies the designation(s) of the intersecting taxiway(s) leading out of intersection that a pilot would normally be expected to turn onto or hold short of. Each designation is accompanied by an arrow indicating the direction of the turn.

23.2 Except as noted in subparagraph 23.5, each taxiway designation shown on the sign is accompanied by only one arrow. When more than one taxiway designation is shown on the sign, each designation and its associated arrow is separated from the other taxiway designations by either a vertical message divider or a taxiway location sign as shown in FIG AD 1.1−47.

23.3 Direction signs are normally located on the left prior to the intersection. When used on a runway to indicate an exit, the sign is located on the same side of the runway as the exit. FIG AD 1.1−48 shows a direction sign used to indicate a runway exit.

23.4 The taxiway designations and their associated arrows on the sign are arranged clockwise starting from the first taxiway on the pilot's left. (See FIG AD 1.1−47.)

23.5 If a location sign is located with the direction signs, it is placed so that the designations for all turns to the left will be to the left of the location sign; the designations for continuing straight ahead or for all turns to the right would be located to the right of the location sign. (See FIG AD 1.1−47.)

23.6 When the intersection is comprised of only one crossing taxiway, it is permissible to have two arrows associated with the crossing taxiway, as shown in FIG AD 1.1−49. In this case, the location sign is located to the left of the direction sign.

24. Destination Signs

24.1 Destination signs have a yellow background with a black inscription indicating a taxi route to a destination on the airport. These signs supplement standard taxiway direction signs to optimize taxi paths to specific areas of the airport.

24.2 Destination signs always have an arrow showing the direction of the taxi route to the destination indicated on the sign. Where the destination sign arrow indicates a turn, the sign location is prior to the intersection. The sign may reside on the opposite side of an intersection for straight ahead paths and for ending taxiway intersections.

24.3 Inbound destination signs identify a taxi path to specific areas of the airport. Sign legends are typically short descriptions or abbreviations of the destination. FIG AD 1.1−50 shows examples of typical inbound destination signs. Common sign legends include:

24.3.1 APRON. General parking, servicing, and loading areas.

24.3.1.1 FBO Apron. An apron where itinerant general aviation operators can park their aircraft and expect to have access to traditional Fixed Base Operator services subject to terms and conditions.

24.3.1.2 GA Transient Apron. An apron where itinerant general aviation operators can park their aircraft without FBO services and subject to terms and conditions.

24.3.1.3 GA Tenant Apron. An area designated for parking of based general aviation aircraft, i.e., tie down area.

24.3.1.4 North/South/East/West Apron. An apron designation describing relative location on the airport.

24.3.2 CARGO. Areas set aside for cargo handling.

24.3.3 CIVIL. Areas set aside for civil aircraft.

24.3.4 FUEL. Areas where aircraft receive fuel or related services.

24.3.5 INTL. Areas set aside for handling international flights.

24.3.6 MIL. Areas set aside for military aircraft.

24.3.6.1 ANG. Area reserved for air national guard.

24.3.6.2 USN. Area reserved for U.S. Navy

24.3.7 PARKING. Alternative name for apron area.

24.3.8 PAX. Areas set aside for passenger handling.

24.3.9 RAMP. Name synonymous with APRON.

24.3.10 TERM. Gate positions at which aircraft load or unload passengers and cargo.

24.4 Outbound destination signs identify the general direction to departure runways. The sign legend consists of direction arrow(s) and the applicable runway designations. FIG AD 1.1−51 is an example of a typical outbound destination sign.

24.5 When sign indicates the inscription for two or more destinations having a common taxi route are placed on a sign, the destinations are separated by a “dot” (•) separates the destinations and one arrow indicates the direction of the taxi path, as shown in FIG AD 1.1−51.

24.6 When a sign shows the inscription for two or more destinations having different taxiing routes, each destination will have its own arrow to indicate the taxi direction. A vertical black message divider separates each destination, as shown in FIG AD 1.1−52.

25. Information Signs

25.1 Information signs have a yellow background with a black inscription. They are used to provide the pilot with information on such things as areas that cannot be seen from the control tower, applicable radio frequencies, and noise abatement procedures. The airport operator determines the need, size, and location for these signs.

26. Runway Distance Remaining Signs

26.1 Runway distance remaining signs have a black background with a white numeral inscription and may be installed along one or both side(s) of the runway. The number on the signs indicates the distance (in thousands of feet) of landing runway remaining. The last sign (i.e., the sign with the numeral “1”) will be located at least 950 feet from the runway end. FIG AD 1.1−52 shows an example of a runway distance remaining sign.

27. Aircraft Arresting Systems

27.1 Certain airports are equipped with a means of rapidly stopping military aircraft on a runway. This equipment, normally referred to as EMERGENCY ARRESTING GEAR, generally consists of pendant cables supported over the runway surface by rubber "donuts." Although most devices are located in the overrun areas, a few of these arresting systems have cables stretched over the operational areas near the ends of a runway.

27.2 Arresting cables which cross over a runway require special markings on the runway to identify the cable location. These markings consist of 10 feet diameter solid circles painted "identification yellow," 30 feet on center, perpendicular to the runway centerline across the entire runway width. Additional details are contained in AC 150/5220−9, Aircraft Arresting Systems for Joint Civil/Military Airports.

NOTE−
Aircraft operations on the runway are not restricted by the installation of aircraft arresting devices.

27.3 Engineered Materials Arresting Systems (EMAS). EMAS, which is constructed of high energy−absorbing materials of selected strength, is located in the safety area beyond the end of the runway. EMAS will be marked with yellow chevrons. EMAS is designed to crush under the weight of commercial aircraft and will exert deceleration forces on the landing gear. These systems do not affect the normal landing and takeoff of airplanes. More information concerning EMAS is in FAA Advisory Circular AC 150/5220−22, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns. (See FIG AD 1.1−53.)

NOTE−
EMAS may be located as close as 35 feet beyond the end of the runway. Aircraft and ground vehicles should never taxi or drive across the EMAS or beyond the end of the runway if EMAS is present.

28. Security Identification Display Area (SIDA)

28.1 Security Identification Display Areas (SIDA) are limited access areas that require a badge issued in accordance with procedures in 49 CFR Part 1542. A SIDA can include the Air Operations Area (AOA), e.g., aircraft movement area or parking area, or a Secured Area, such as where commercial passengers enplane. The AOA may not be a SIDA, but a Secured Area is always a SIDA. Movement through or into a SIDA is prohibited without authorization and proper identification being displayed. If you are unsure of the location of a SIDA, contact the airport authority for additional information. Airports that have a SIDA will have a description and map detailing boundaries and pertinent features available. (See FIG AD 1.1−54.)

28.2 Pilots or passengers without proper identification that are observed entering a SIDA may be reported to the Transportation Security Administration (TSA) or airport security and may be subject to civil and criminal fines and prosecution. Pilots are advised to brief passengers accordingly. Report suspicious activity to the TSA by calling AOPA's Airport Watch Program, 866−427−3287. 49 CFR 1540 requires each individual who holds an airman certificate, medical certificate, authorization, or license issued by the FAA to present it for inspection upon a request from TSA.

FIG AD 1.1−13
Precision Instrument Runway Markings

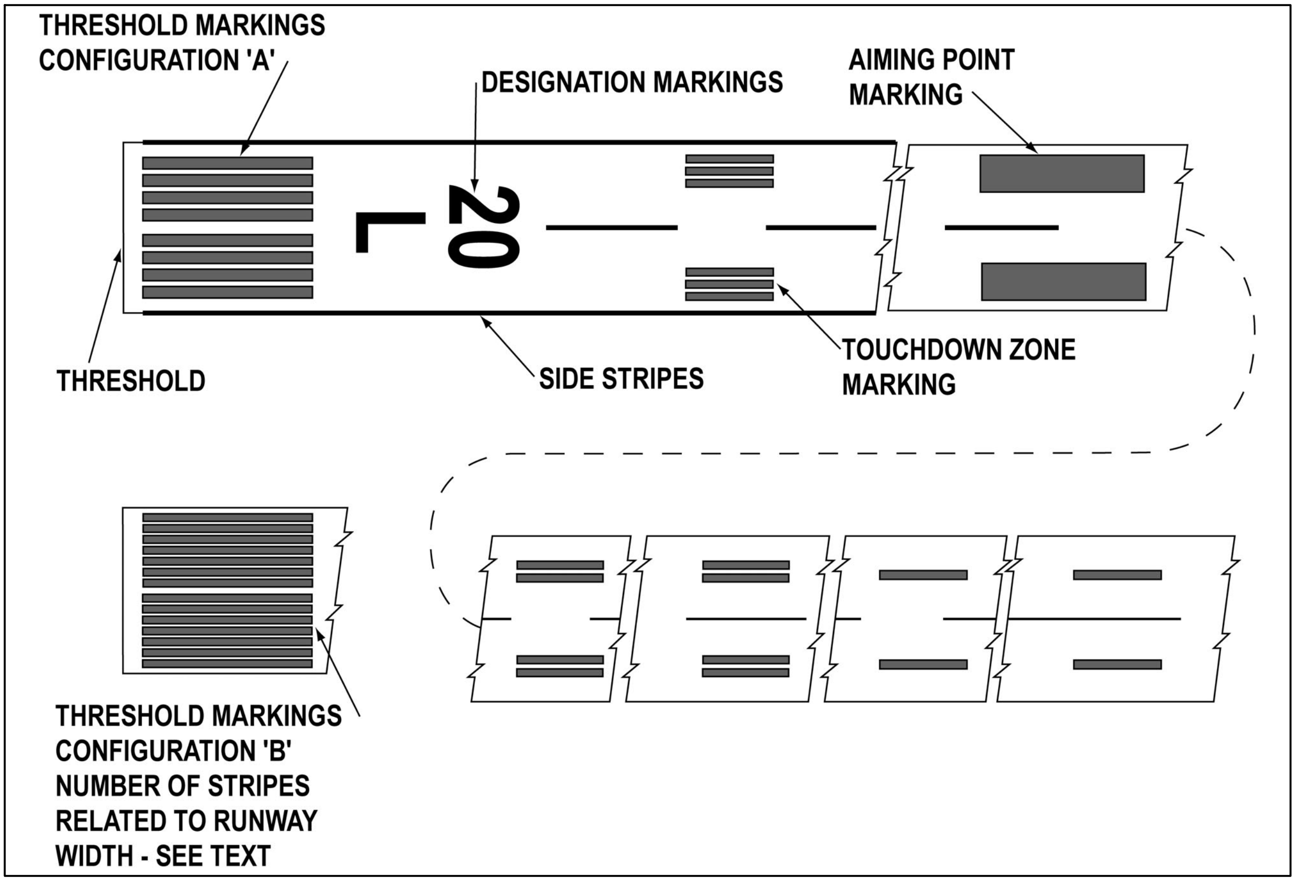


FIG AD 1.1−14

Nonprecision Instrument Runway and Visual Runway Markings

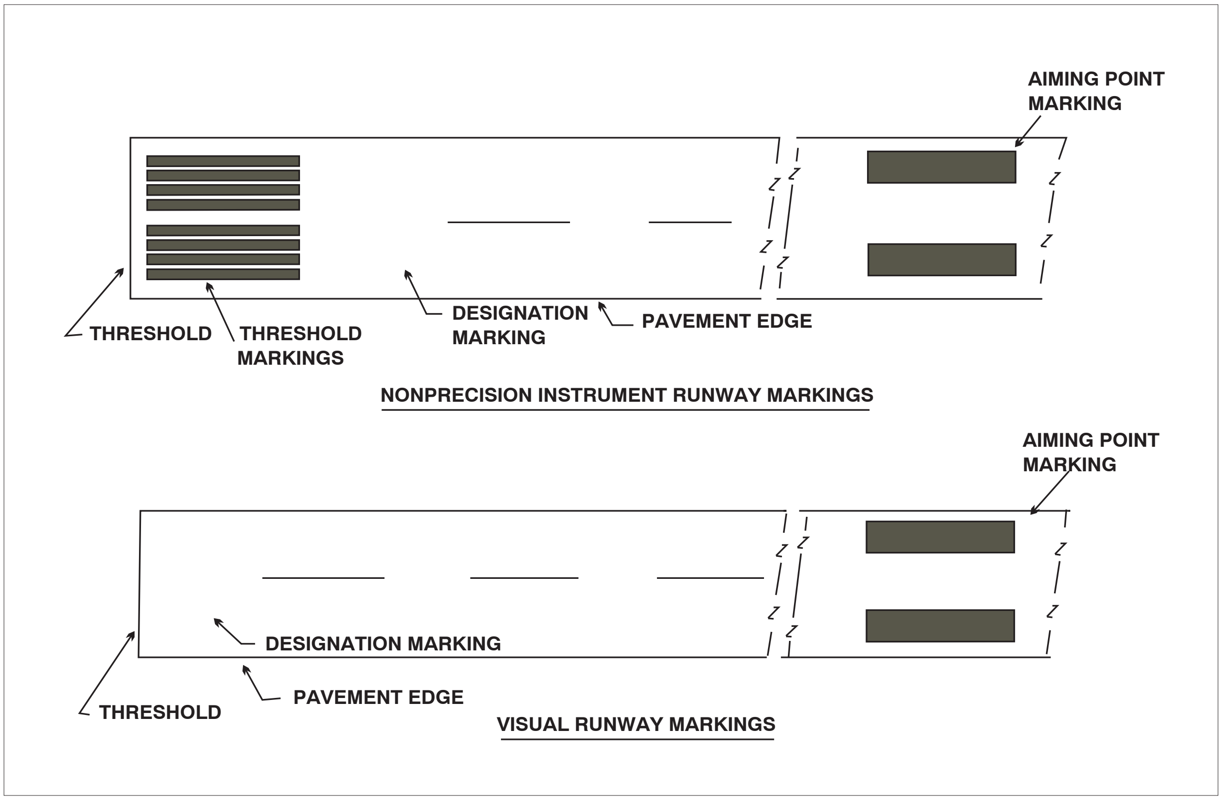


FIG AD 1.1−15

Runway Shoulder Markings

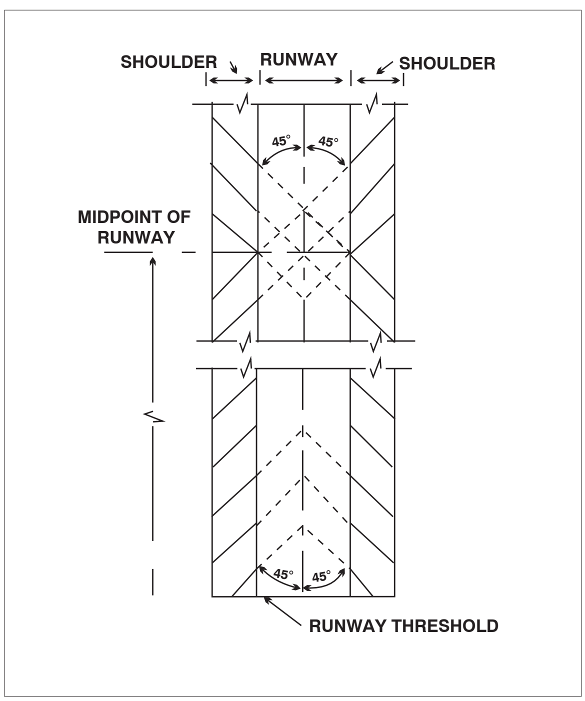


FIG AD 1.1−16

Relocation of a Threshold with Markings for Taxiway Aligned with Runway

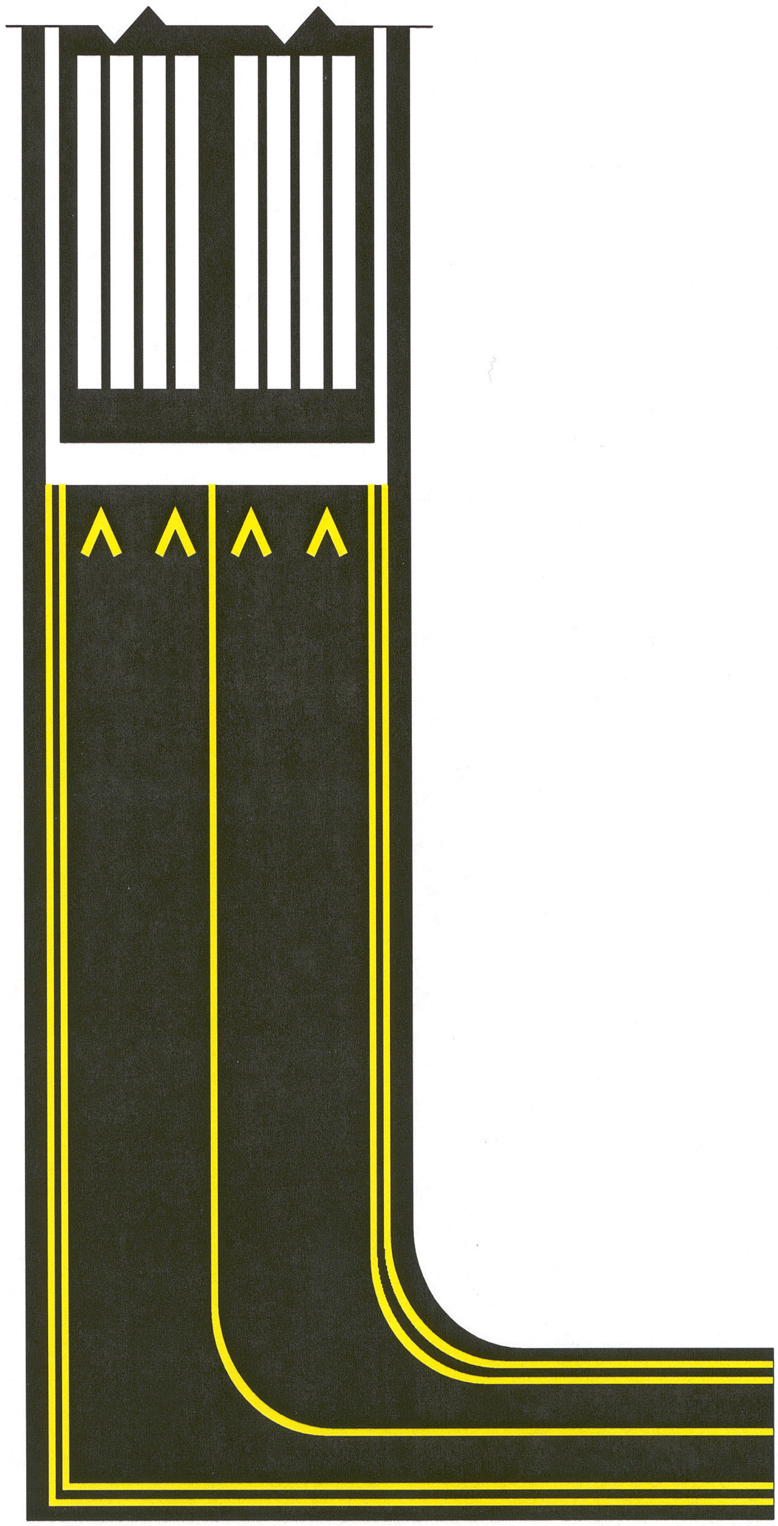


FIG AD 1.1−17
Displaced Threshold Markings

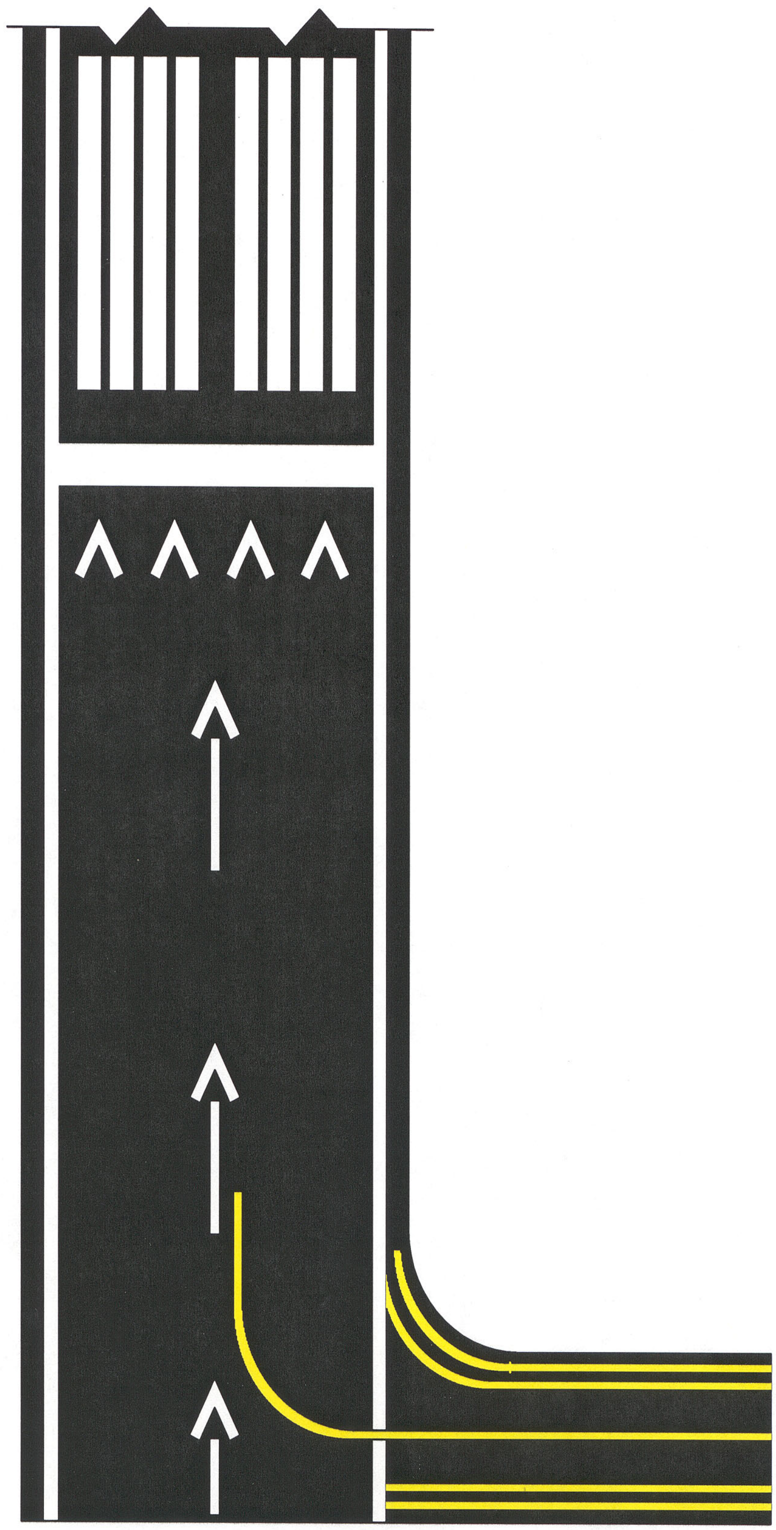


FIG AD 1.1−18

Markings for Blast Pad or Stopway or Taxiway Preceding a Displaced Threshold

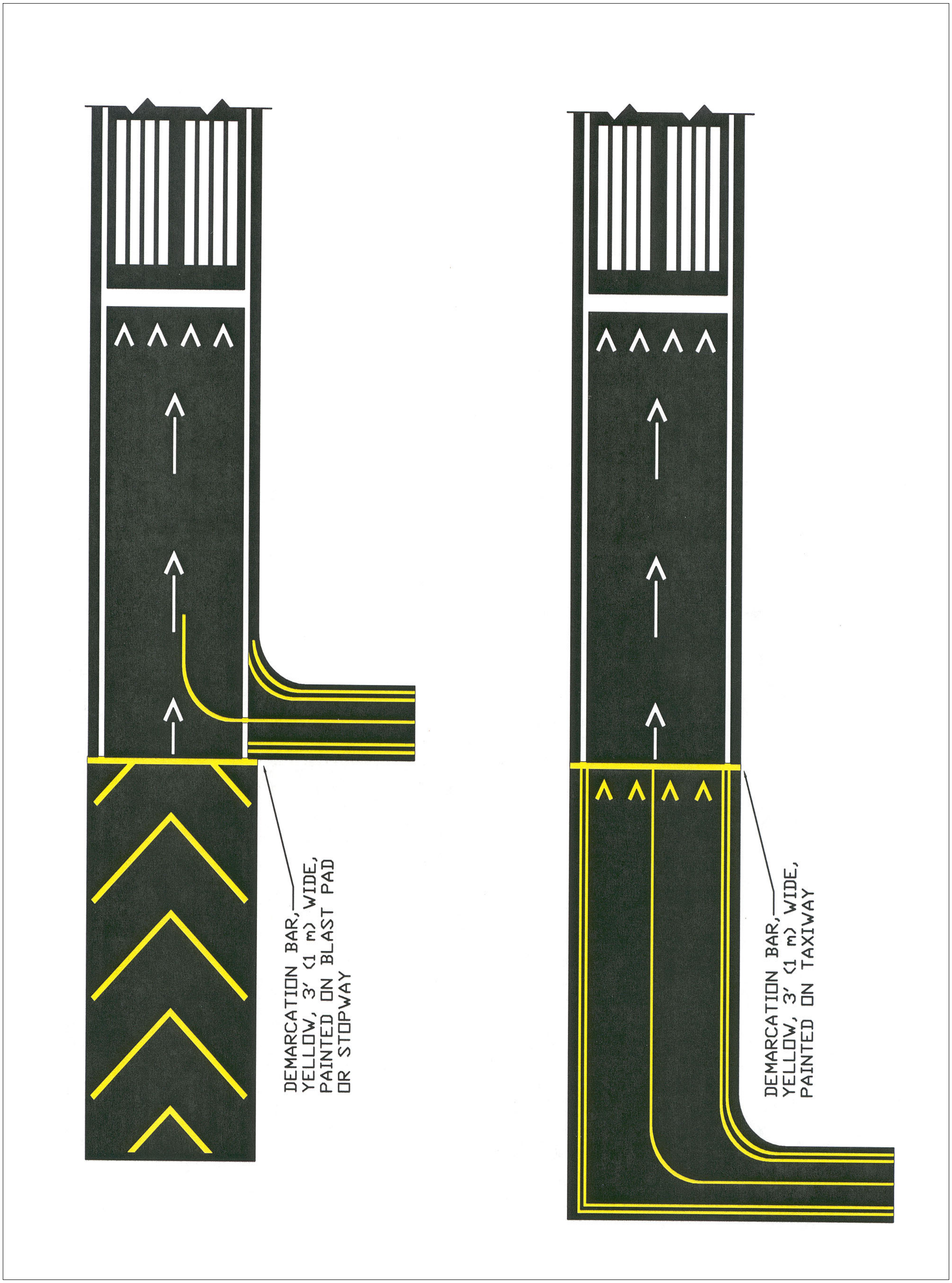


FIG AD 1.1−19

Markings for Blast Pads and Stopways

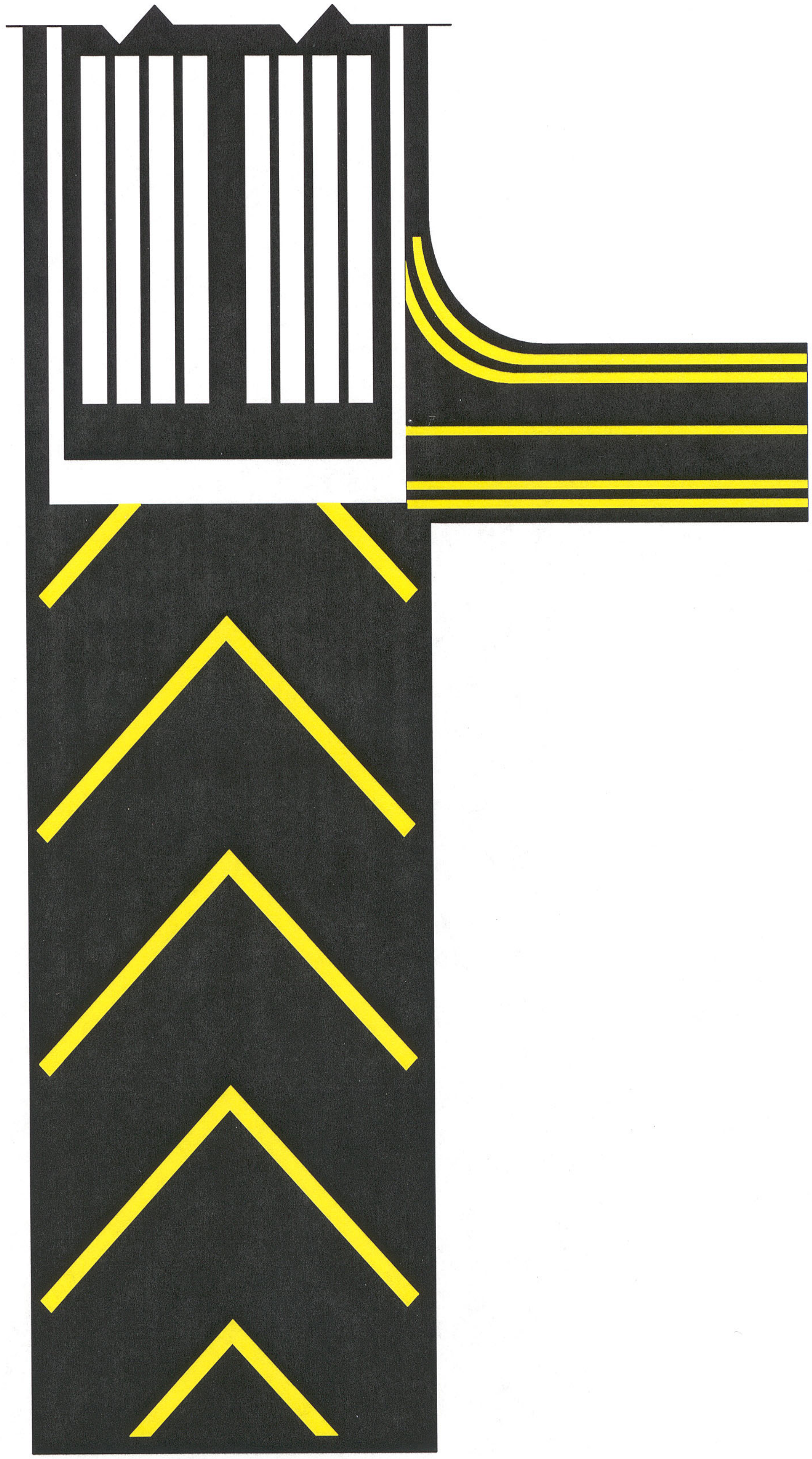


FIG AD 1.1−20
Enhanced Taxiway Centerline

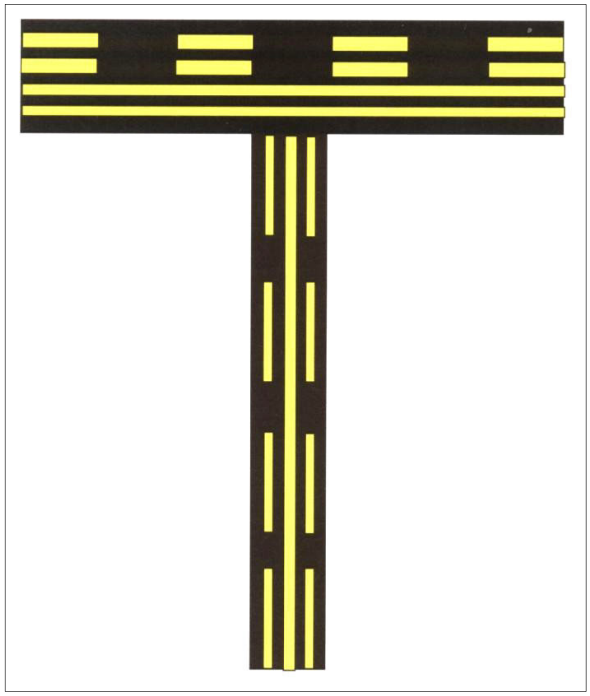


FIG AD 1.1−21
Dashed Markings

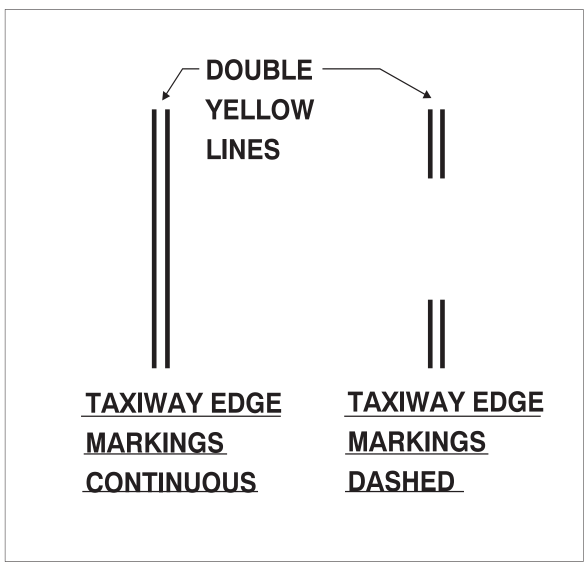


FIG AD 1.1−22
Taxi Shoulder Markings

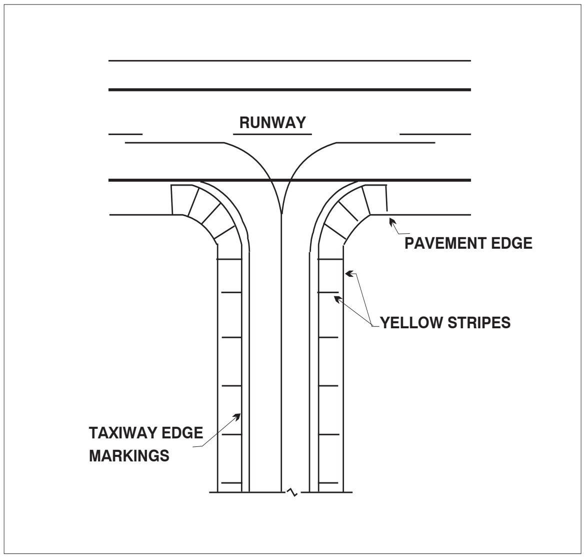


FIG AD 1.1−23
Surface Painted Signs

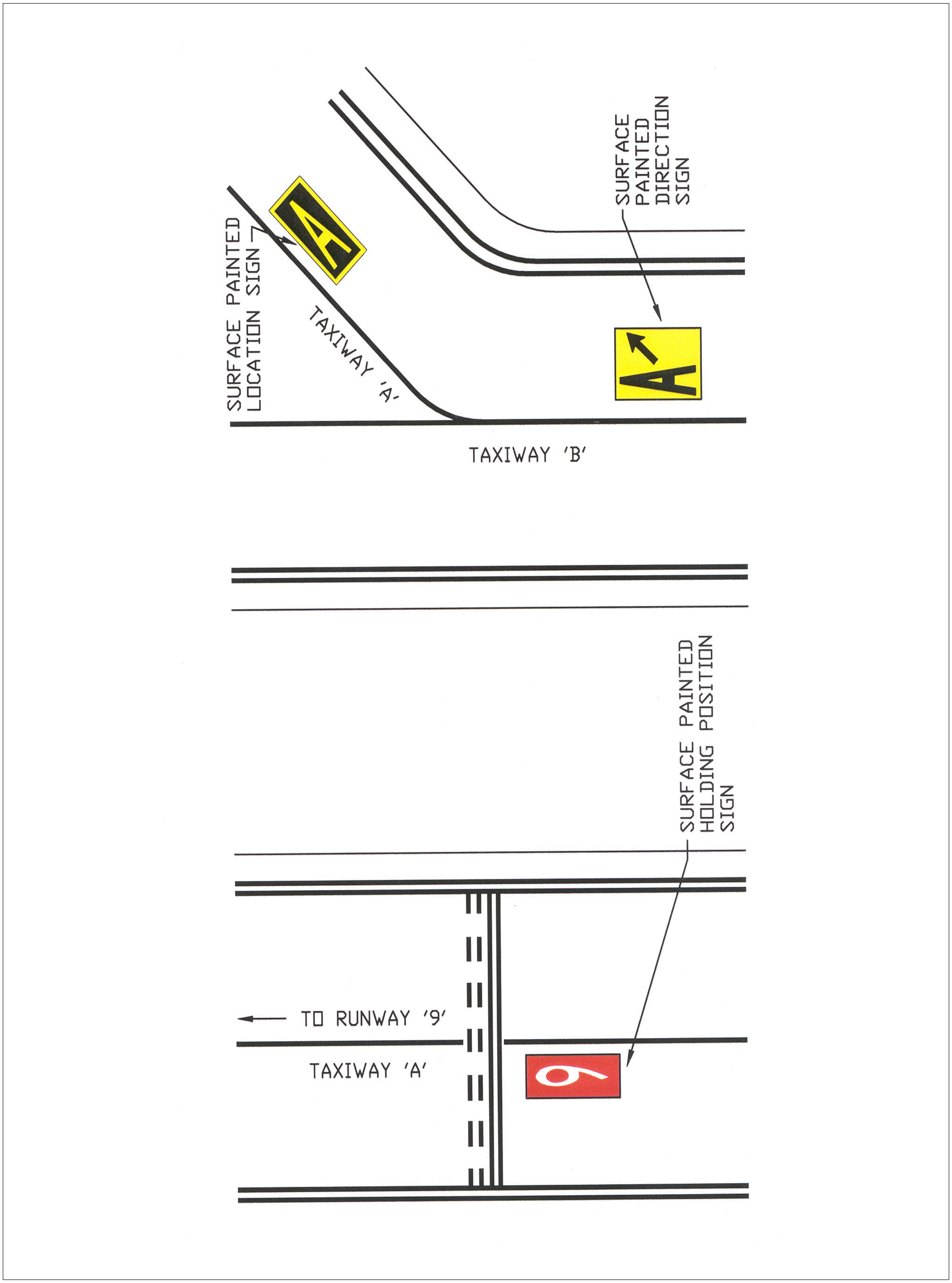


FIG AD 1.1−24

Geographic Position Markings

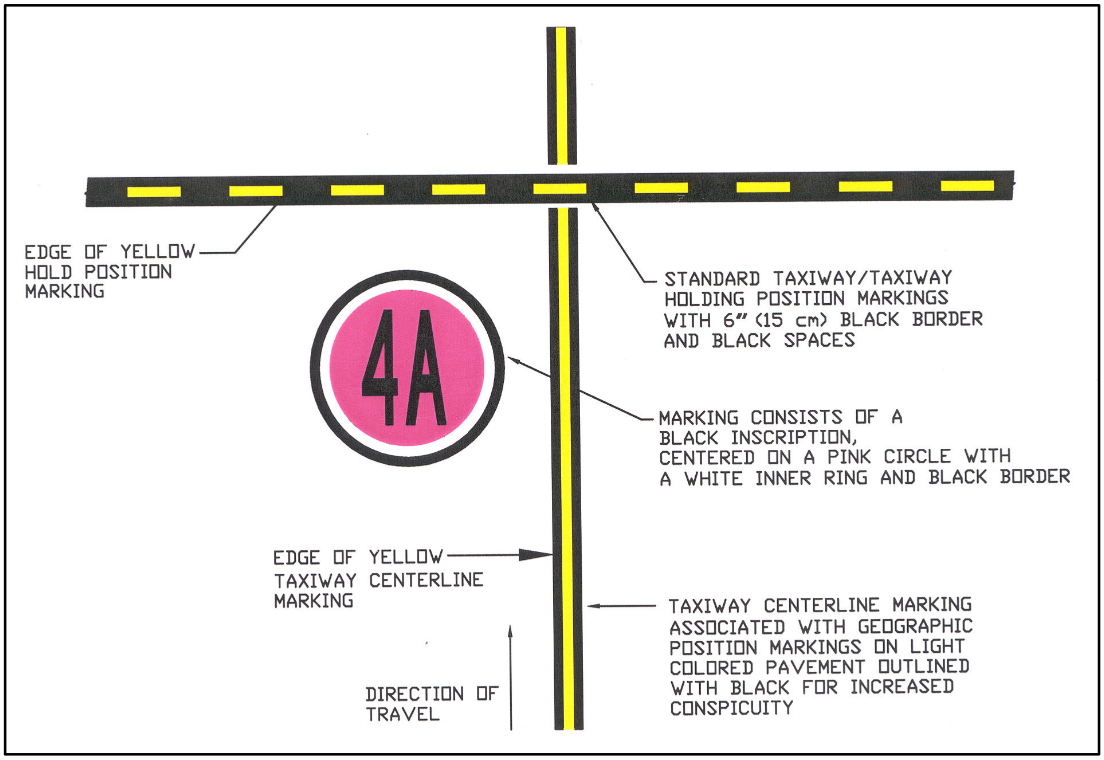


FIG AD 1.1−25

Runway Holding Position Markings on Taxiway

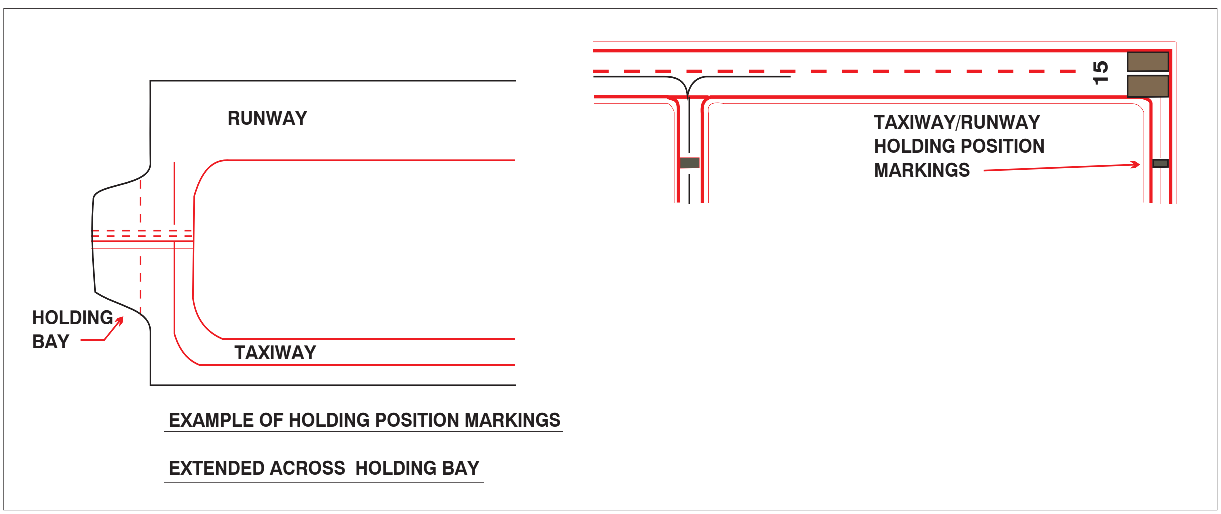


FIG AD 1.1−26
Runway Holding Position Markings on Runways

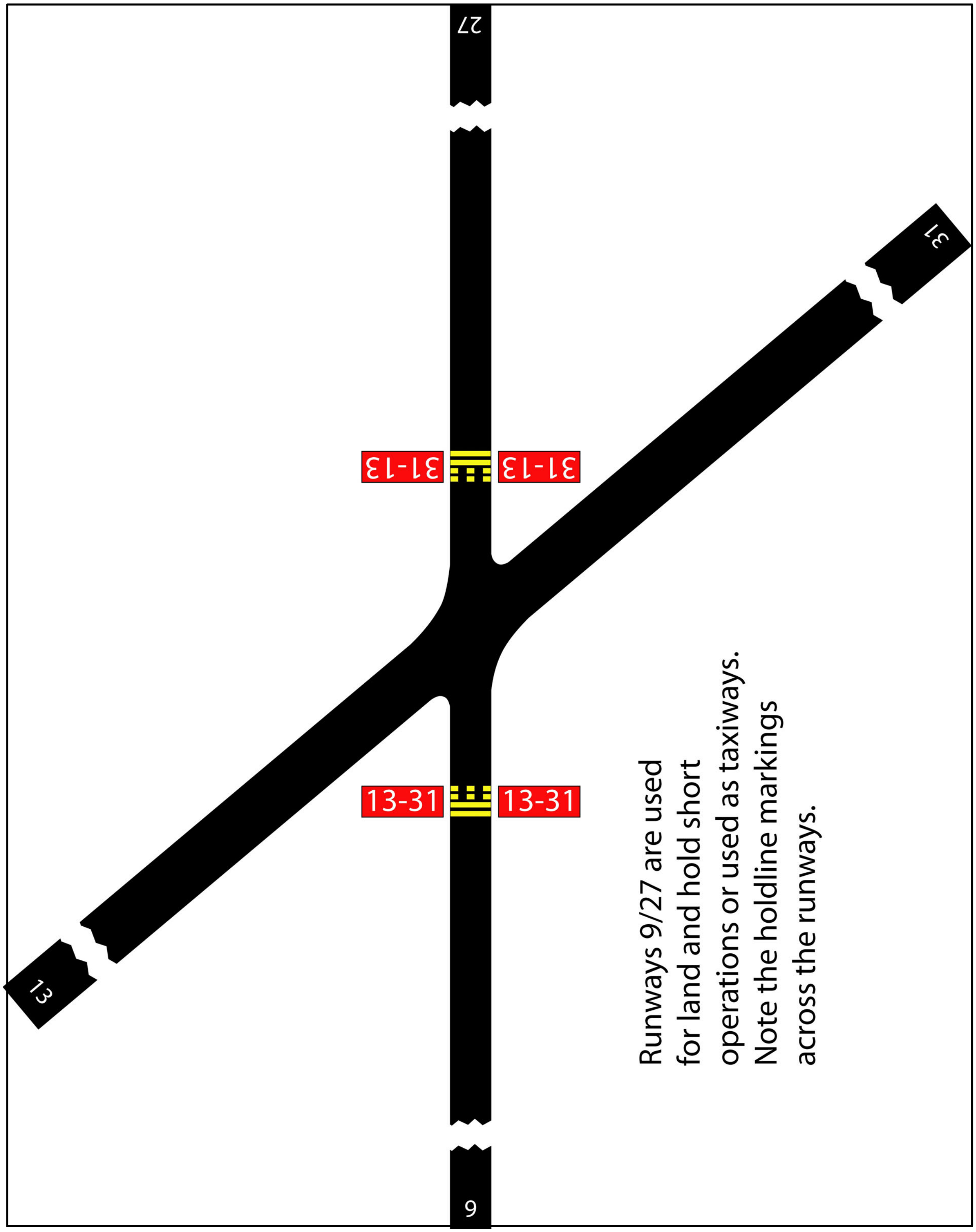
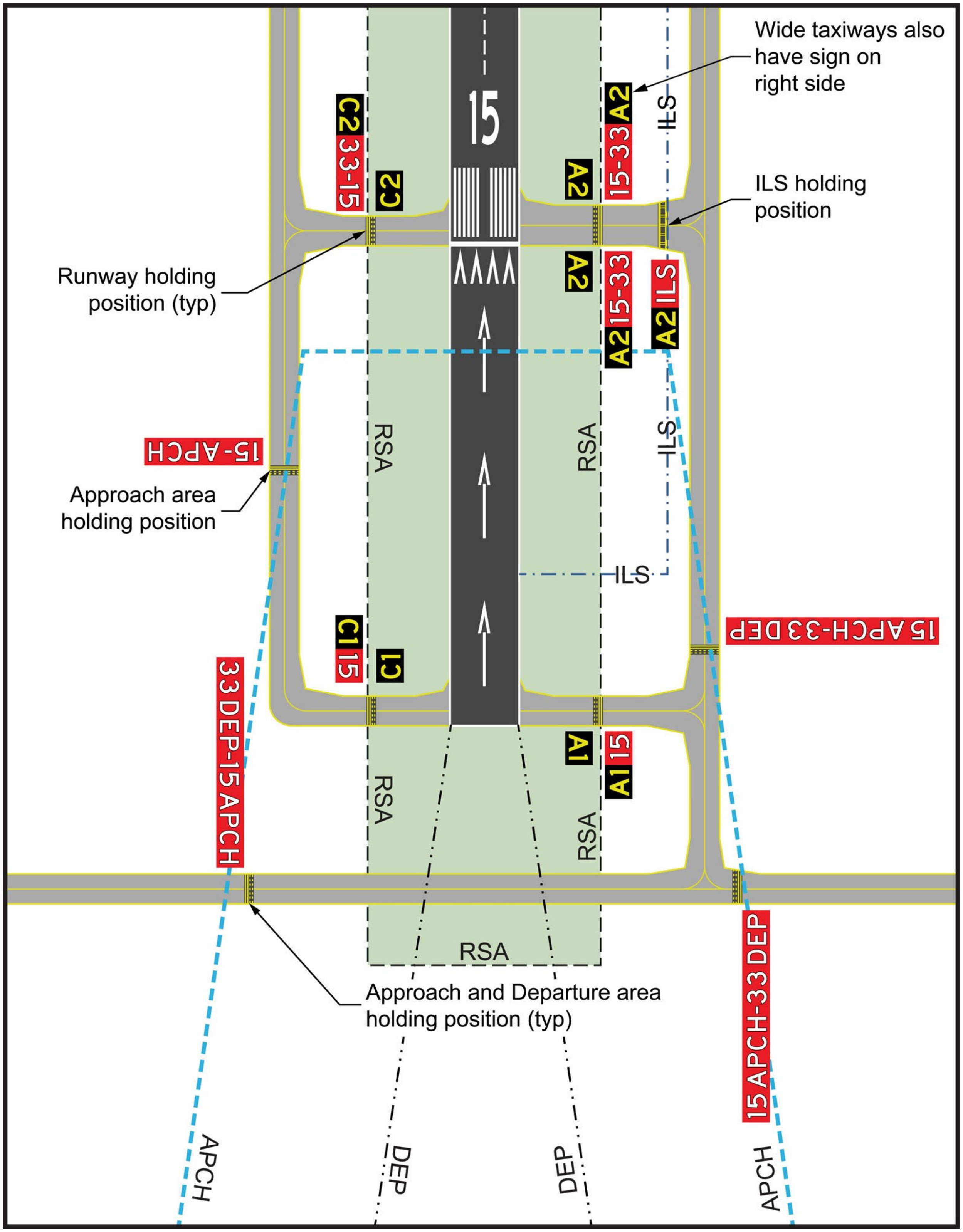


FIG AD 1.1−27

Taxiways Located in Runway Approach Area and Departure Areas



NOTE−

1. *Refer to Advisory Circular 150/5300−13 for additional information on obstruction surfaces.*

2. *Because Taxiway C does not enter the departure area of Runway 33, the sign on Taxiway C does not include the "33 DEP" legend.*

3. *The location of a holding position is relative to the point on the aircraft that infringes the surface; for inclining surfaces such as an approach surface, the location of the holdline position may differ from the location of the infringement point.*

FIG AD 1.1−28

Holding Position Markings: ILS Critical Area

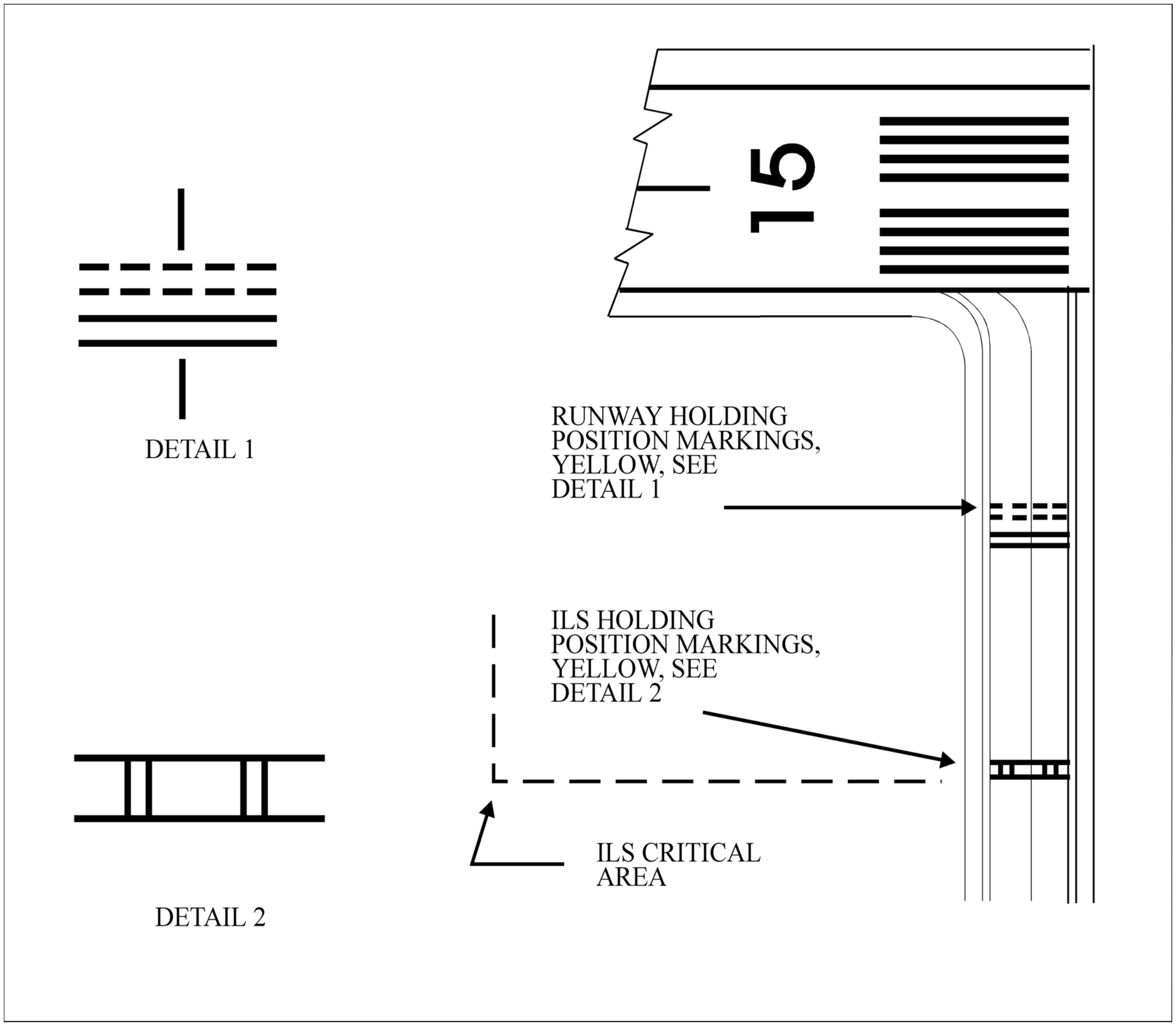


FIG AD 1.1−29

Holding Position Markings: Taxiway/Taxiway Intersections

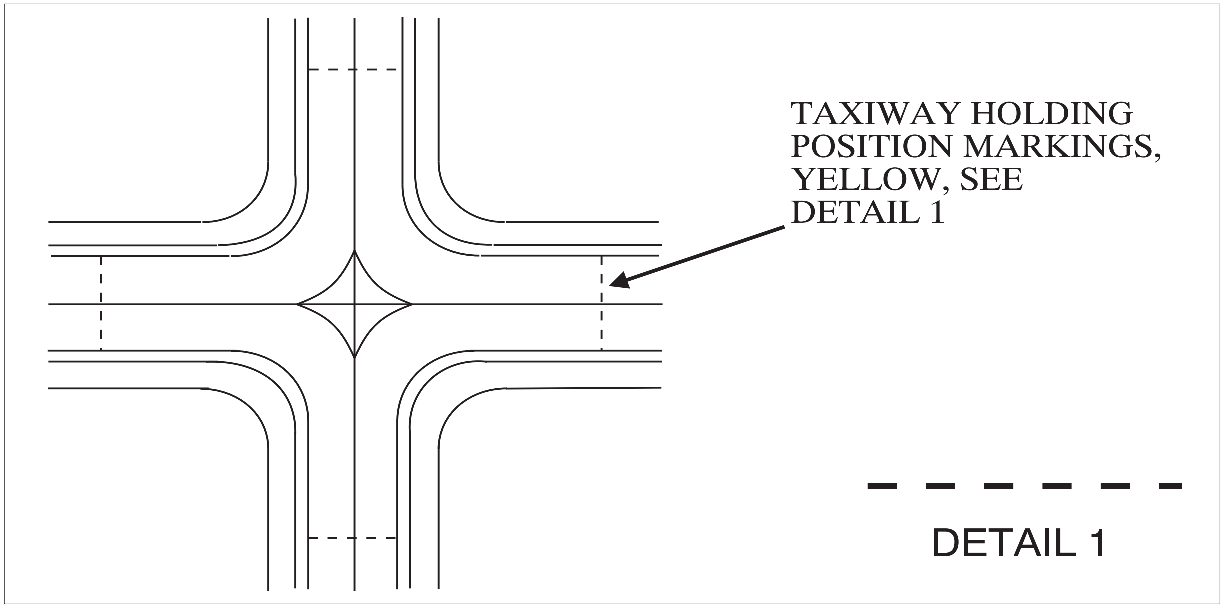


FIG AD 1.1−30

Vehicle Roadway Markings

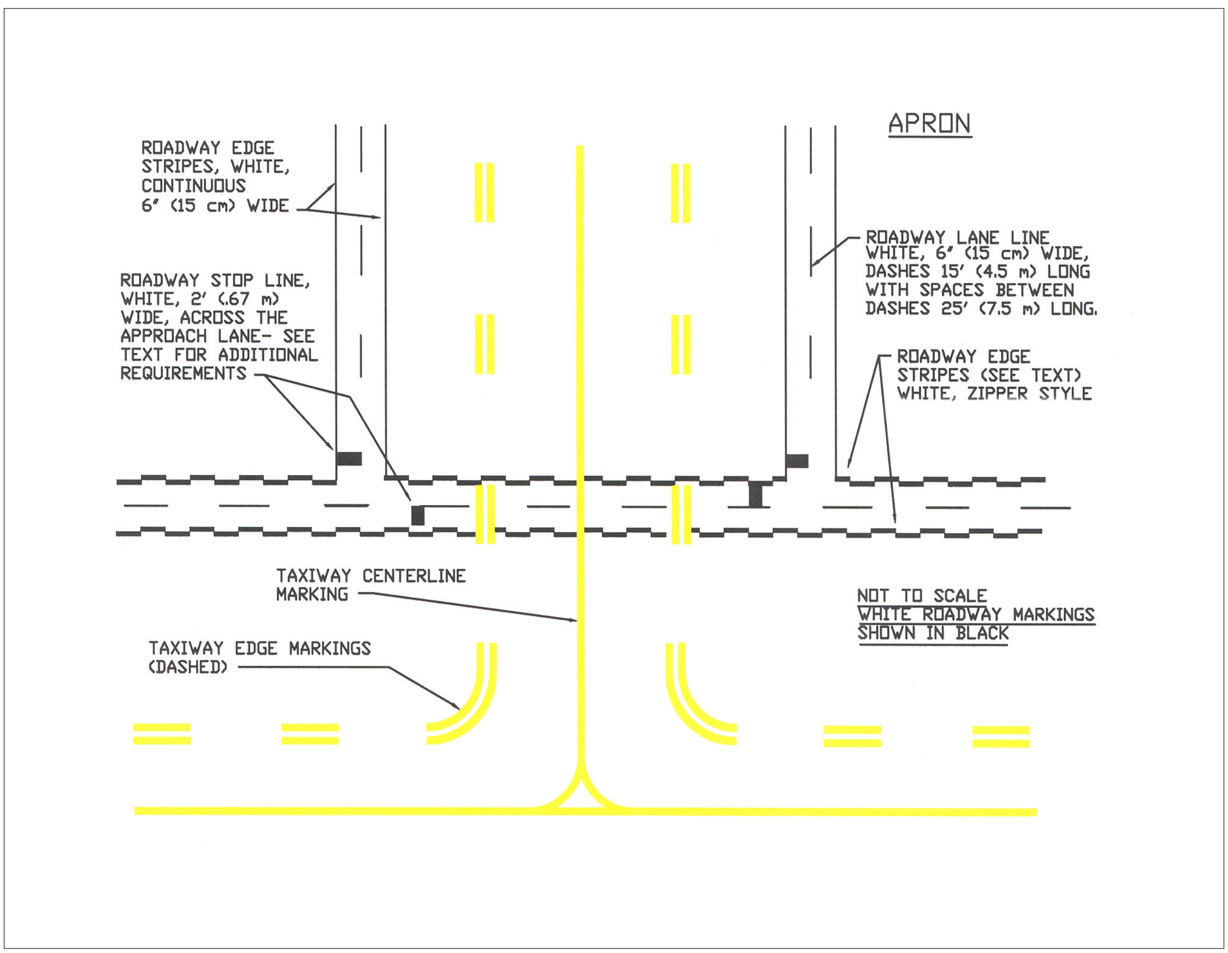


FIG AD 1.1−31

Roadway Edge Stripes, White, Zipper Style

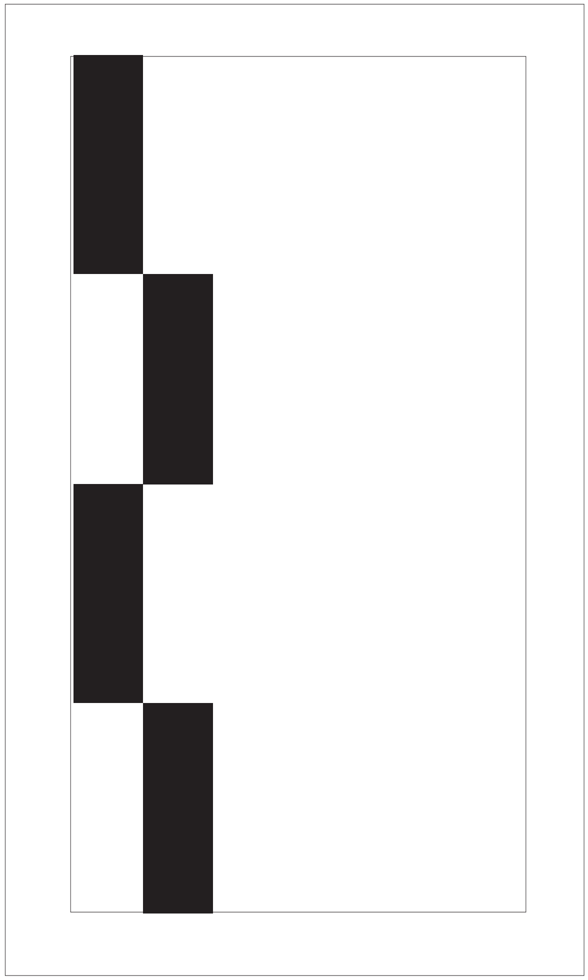


FIG AD 1.1−32
Ground Receiver Checkpoint Markings

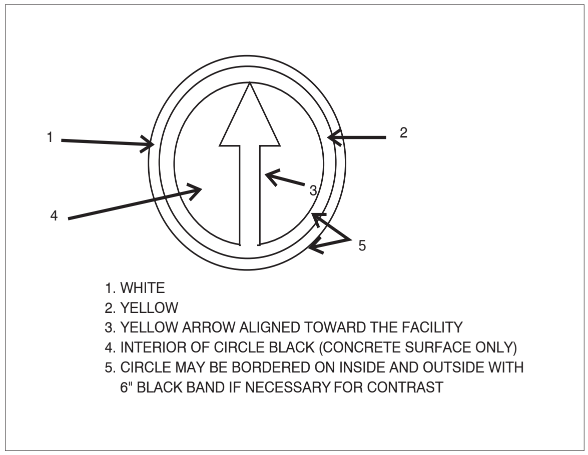


FIG AD 1.1−33
Nonmovement Area Boundary Markings

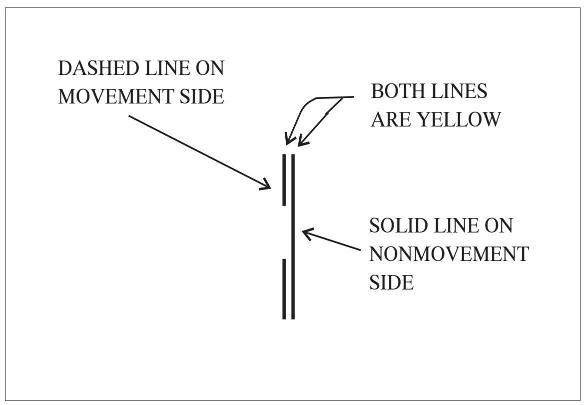


FIG AD 1.1−34
Closed or Temporarily Closed Runway and Taxiway Markings

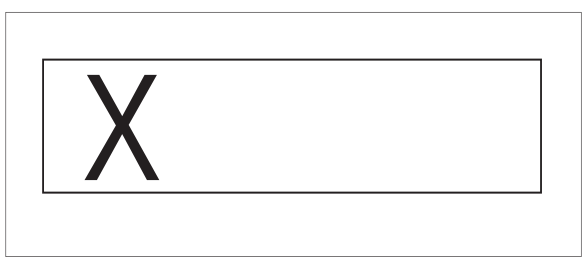


FIG AD 1.1−35
Helicopter Landing Areas

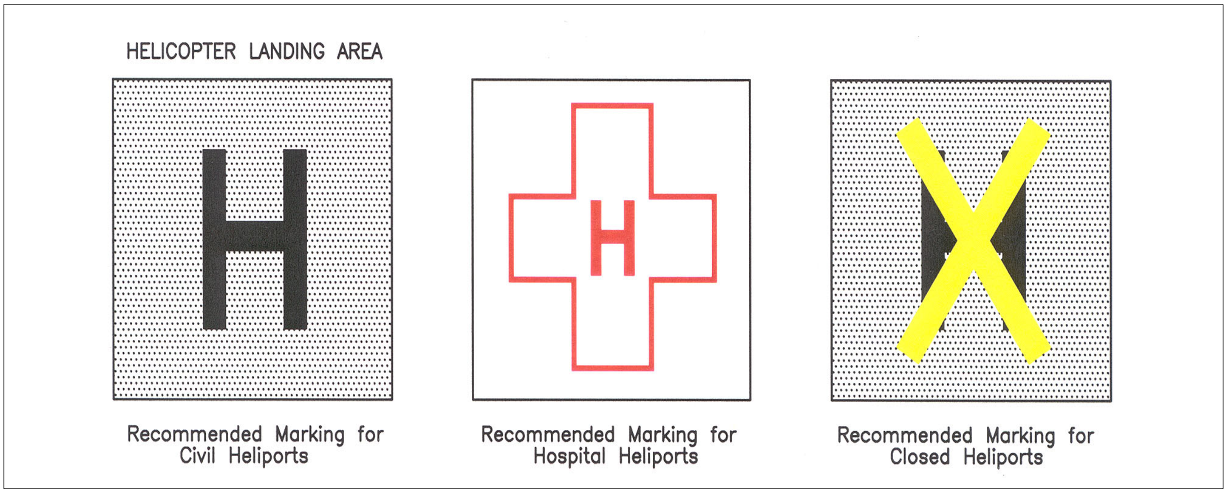


FIG AD 1.1−36
Runway Holding Position Sign

FIG AD 1.1−37
Holding Position Sign at Beginning of Takeoff Runway

FIG AD 1.1−38
Holding Position Sign for a Taxiway that Intersects the Intersection of Two Runways

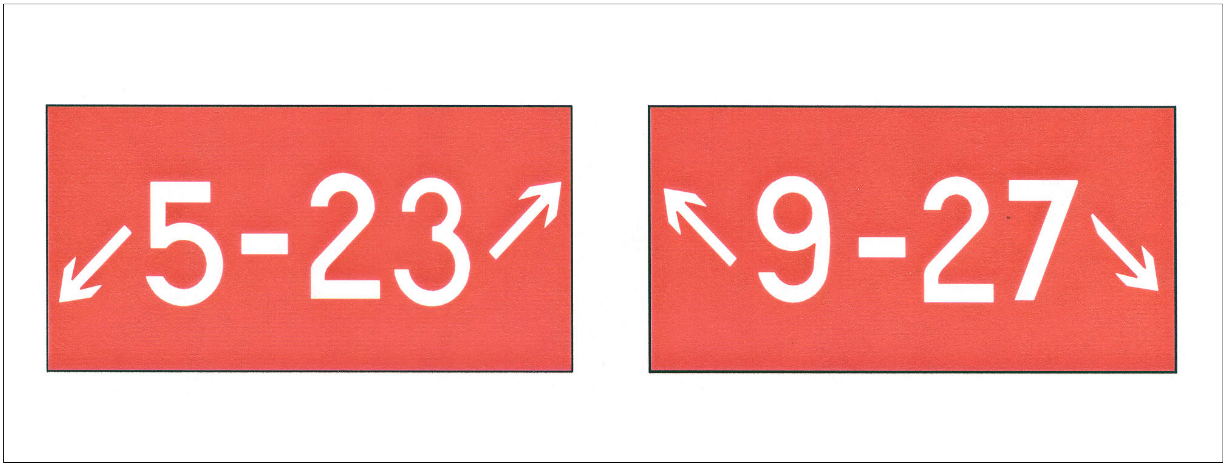


FIG AD 1.1−39
Holding Position Signs for Runway Approach and Departure Areas

FIG AD 1.1−40
Holding Position Sign for ILS Critical Area

FIG AD 1.1−41
Sign Prohibiting Aircraft Entry into an Area

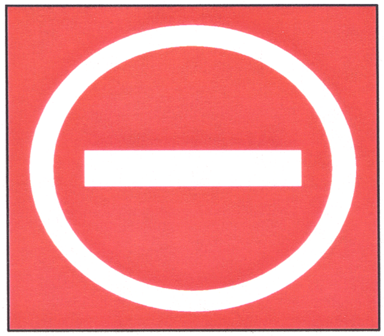


FIG AD 1.1−42
Taxiway Location Sign

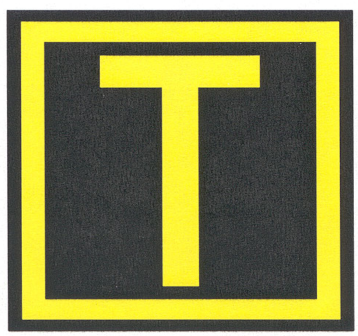


FIG AD 1.1−43
Taxiway Location Sign Collocated with Runway Holding Position Sign

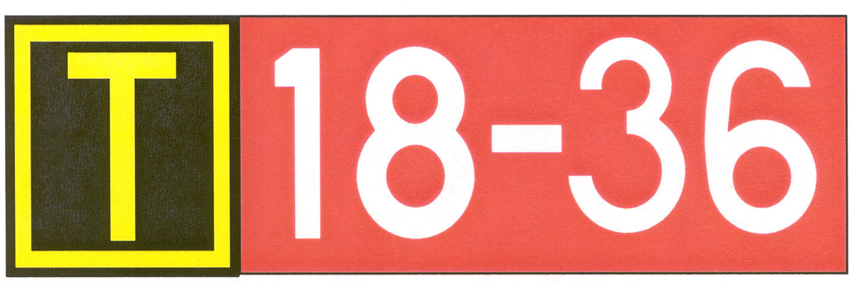


FIG AD 1.1−44
Runway Location Sign

FIG AD 1.1−45
Runway Boundary Sign

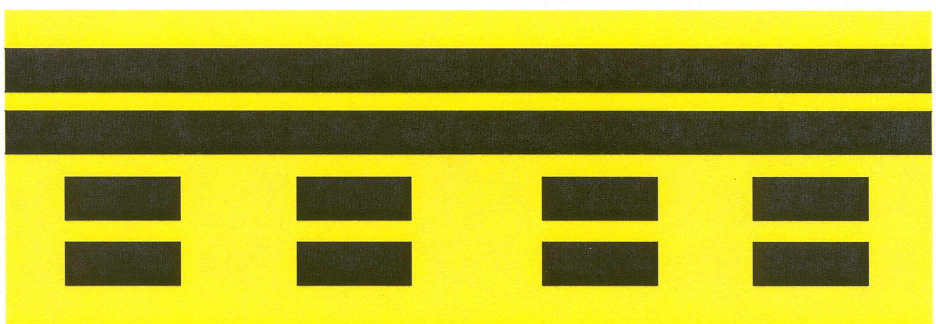


FIG AD 1.1−46
ILS Critical Area Boundary Sign

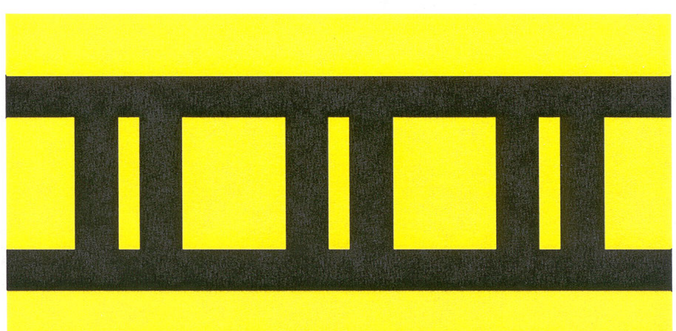


FIG AD 1.1−47
Direction Sign Array with Location Sign on Far Side of Intersection

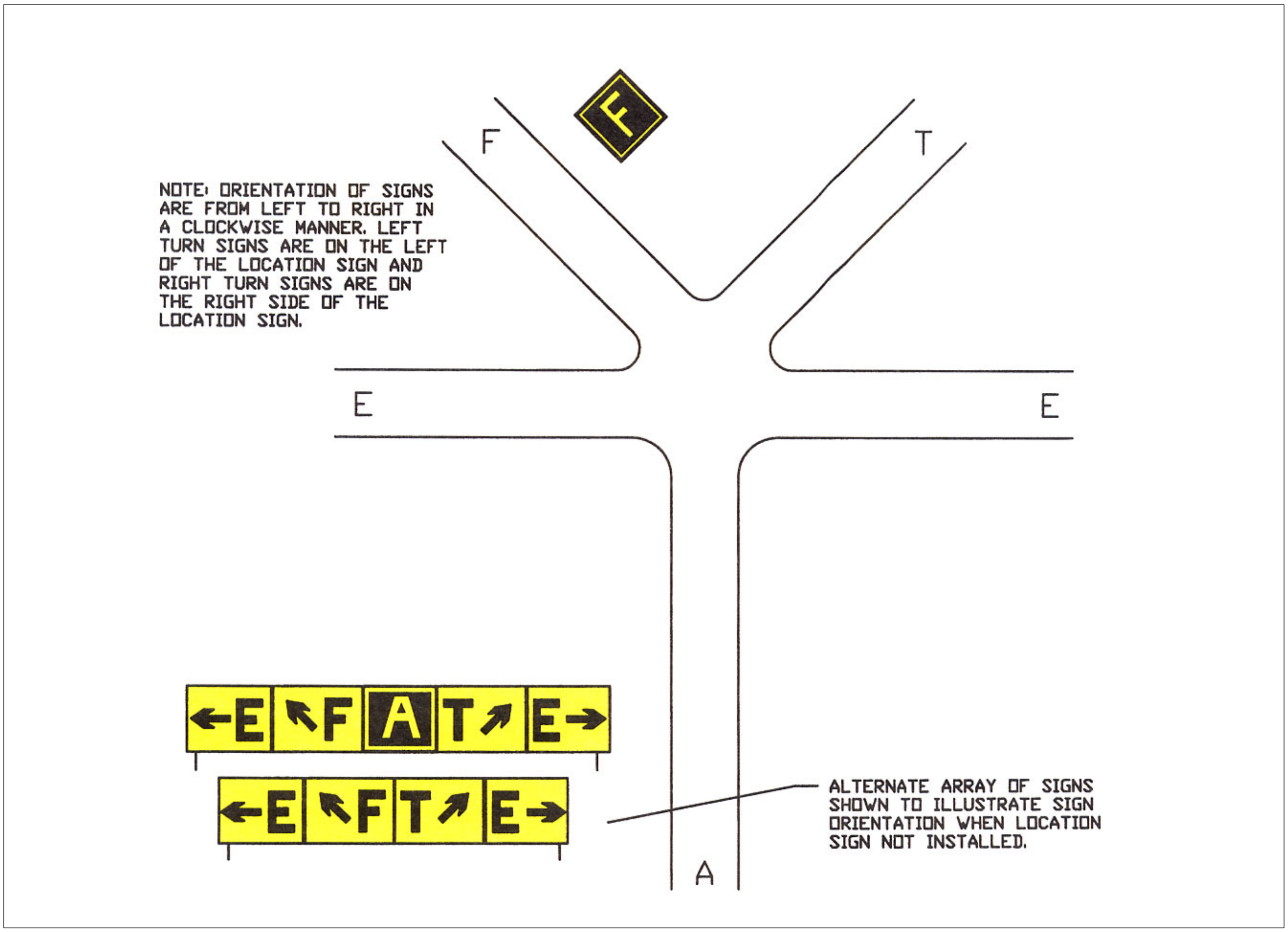


FIG AD 1.1−48
Direction Sign for Runway Exit

FIG AD 1.1−49
Direction Sign Array for Simple Intersection

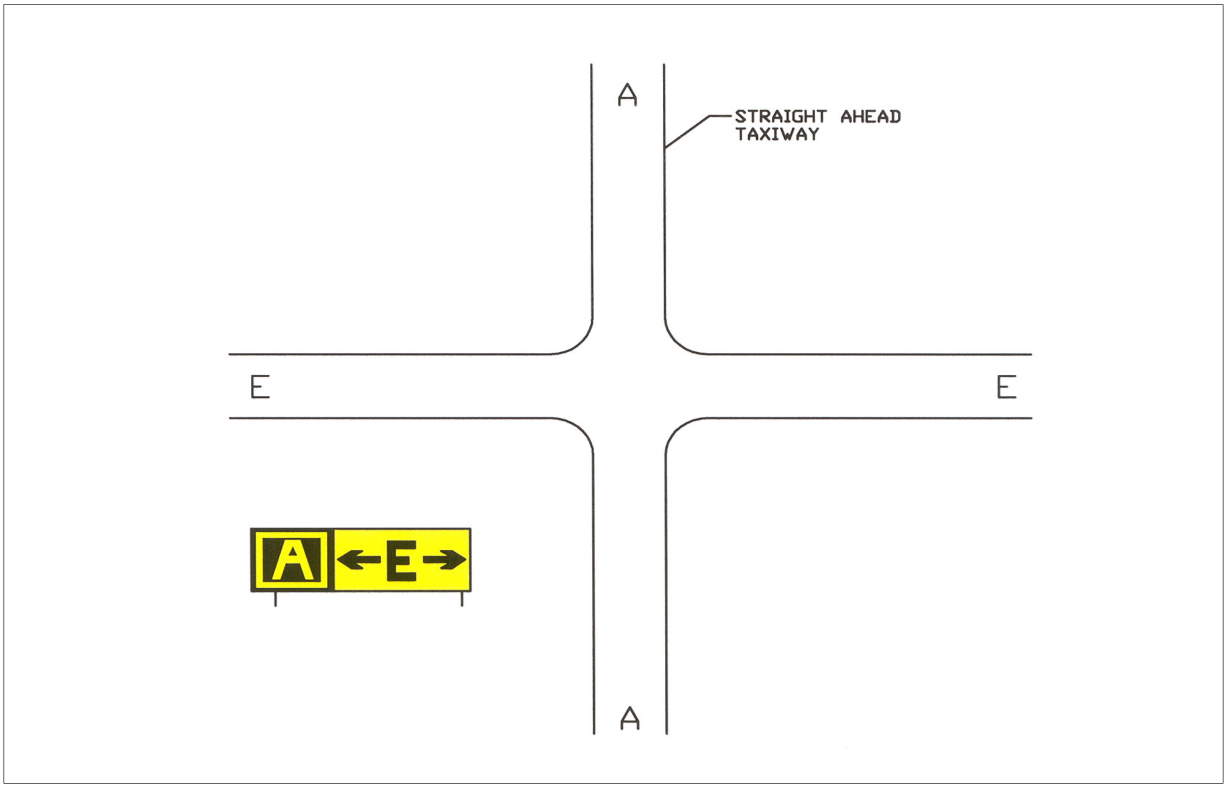


FIG AD 1.1−50
Inbound Destination Sign Examples

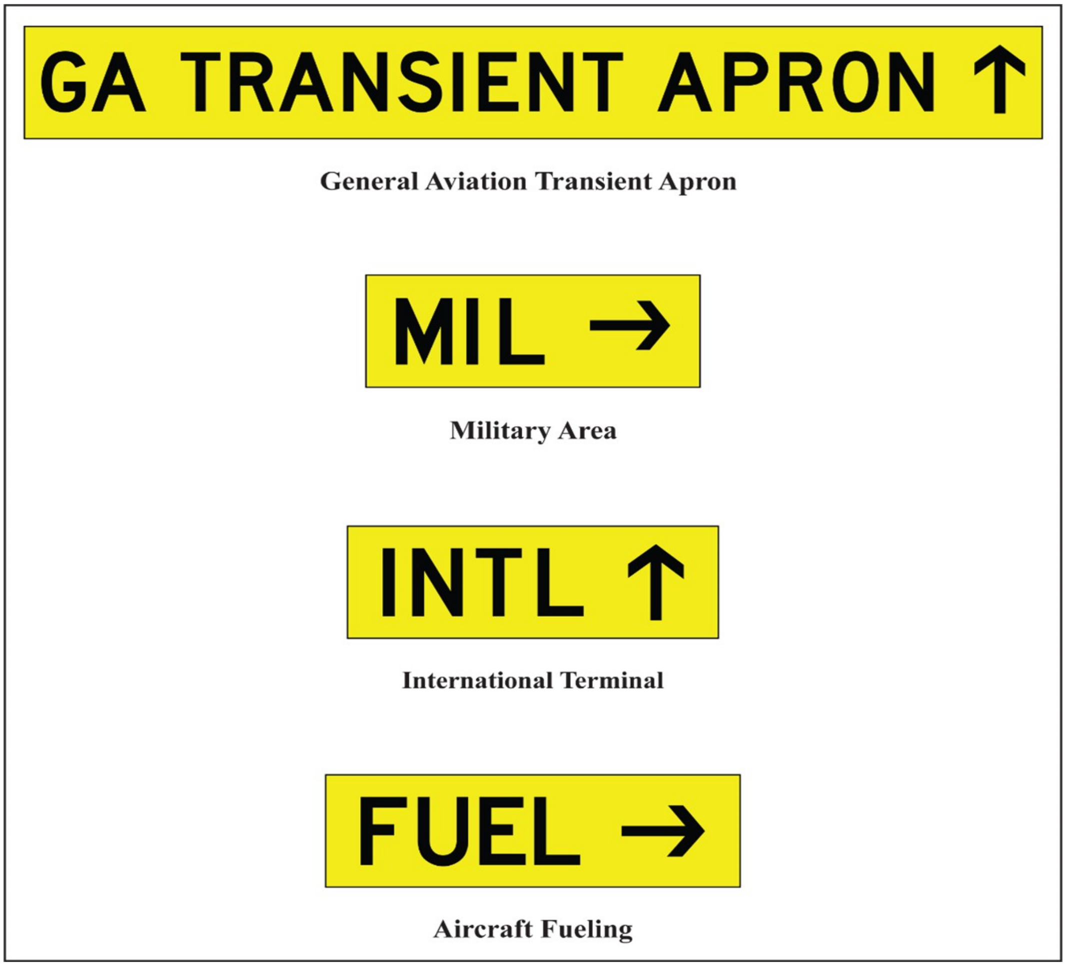


FIG AD 1.1−51
Destination Sign for Common Taxiing Route to Two Runways

FIG AD 1.1−52

Runway Distance Remaining Sign Indicating 3,000 feet of Runway Remaining

FIG AD 1.1−53

Engineered Materials Arresting System (EMAS)

FIG AD 1.1−54
Sample SIDA Warning Sign

TBL 1−13

Filing for Performance Based Navigation (PBN) Routes

Type of Routing	Capability Required	Item 10a	Item 18 PBN/ See NOTE 2	Item 18 NAV/ See NOTE 3	Notes
RNAV SID or STAR (See NOTE 1)	RNAV 1	GR	D2		If GNSS
		DIR	D4		If DME/DME/IRU
RNP SID or STAR (See NOTE 2)	RNP 1 GNSS	GR	O2		If GNSS only
	RNP 1 GNSS	DGIR	O1		If GNSS primary and DME/DME/IRU backup
RNP SID or STAR with RF required (See NOTE 2)	RNP 1 GNSS	GRZ	O2	Z1	If GNSS only
	RNP 1 GNSS	DGIRZ	O1	Z1	If GNSS primary and DME/DME/IRU backup
Domestic Q−Route (see separate requirements for Gulf of America Q−Routes)	RNAV 2	GR	C2		If GNSS
		DIR	C4		If DME/DME/IRU
T−Route	RNAV 2	GR	C2		GNSS is required for T−Routes
RNAV (GPS) Approach	RNP Approach, GPS	GR	S1		*Domestic arrivals do not need to file PBN approach capabilities to request the approach.*
RNAV (GPS) Approach	RNP Approach, GPS Baro−VNAV	GR	S2		
RNAV (GPS) Approach with RF required	RNP Approach, GPS RF Capability	GRZ	S2	Z1	
RNP AR Approach with RF	RNP (Special Authorization Required) RF Leg Capability	GR	T1		
RNP AR Approach without RF	RNP (Special Authorization Required)	GR	T2		

NOTE−

1. *If the flight is requesting an RNAV SID only (no RNAV STAR) or RNAV STAR only (no RNAV SID) then consult guidance on the FAA website at https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/air_traffic_services/flight_plan_filing.*

2. *PBN descriptor D1 includes the capabilities of D2, D3, and D4. PBN descriptor B1 includes the capabilities of B2, B3, B4, and B5. PBN descriptor C1 includes the capabilities of C2, C3, and C4.*

3. *In NAV/, descriptors for advanced capabilities (Z1, P1, R1, M1, and M2) should be entered as a single character string with no intervening spaces, and separated from any other entries in NAV/ by a space.*

EXAMPLE−

NAV/Z1P1M2 SBAS

7. Automated Departure Clearance Delivery (DCL or PDC). When planning to use automated pre−departure clearance delivery capability, file as indicated below.

(a) PDC provides pre−departure clearances from the FAA to the operator's designated flight operations center, which then delivers the clearance to the pilot by various means. Use of PDC does not require any special flight plan entry.

(b) DCL provides pre−departure clearances from the FAA directly to the cockpit/FMS via Controller Pilot Datalink Communications (CPDLC). Use of DCL requires flight plan entries as follows:

• Include CPDLC codes in Item 10a only if the flight is capable of en route/oceanic CPDLC, the codes are not required for DCL.

• Include Z in Item 10a to indicate there is information provided in Item 18 DAT/.

• Include the clearance delivery methods of which the flight is capable, and order of preference in Item 18 DAT/. (See AIM 5−2−2)

  ○ VOICE − deliver clearance via Voice
  ○ PDC − deliver clearance via PDC
  ○ FANS − deliver clearance via FANS 1/A
  ○ FANSP − deliver clearance via FANS 1/A+

EXAMPLE−
DAT/1FANS2PDC
DAT/1FANSP2VOICE

8. Operating in Reduced Vertical Separation Minima (RVSM) Airspace (Item 10a). When planning to fly in RVSM airspace (FL 290 up to and including FL 410) then file as indicated below.

(a) If capable and approved for RVSM operations, per AIM 4−6−1, Applicability and RVSM Mandate (Date/Time and Area), file a W in Item 10a. Include the aircraft registration mark in Item 18 REG/, which is used to post−operationally monitor the safety of RVSM operations.

• Do not file a "W" in Item 10a if the aircraft is capable of RVSM operations, but is not approved to operate in RVSM airspace.

• If RVSM capability is lost after the flight plan is filed, request that ATC remove the 'W' from Item 10a.

(b) When requesting to operate non−RVSM in RVSM airspace, using one of the exceptions identified in AIM 4−6−10, do not include a "W" in Item 10a. Include STS/NONRVSM in Item 18. STS/NONRVSM is used only as part of a request to operate non−RVSM in RVSM airspace.

9. Eligibility for Reduced Oceanic Separation. Indicate eligibility for the listed reduced separation minima as indicated in the tables below. Full Operational Requirements for these services are found in the U.S. Aeronautical Information Publication (AIP) ENR 7, Oceanic Operations, available at http://www.faa.gov/air_traffic/publications/atpubs/aip_html/index.html.

TBL 1−14
Filing for Gulf of America CTA

Dimension of Separation	Separation Minima	ADS−C Surveillance Requirements	Comm. Requirement	PBN Requirement	Flight Plan Entries			
					ADS−C in Item 10b	CPDLC in Item 10a	PBN in Item 18 PBN/ (also File 'R' in Item 10a)	PBN in Item 18 NAV/
Lateral	50 NM	N/A (ADS−C not required)	Voice comm− HF or VHF as required to maintain contact over the entire route to be flown.	RNP10 or RNP4	N/A	N/A	A1 or L1	N/A

NOTE−
If not RNAV10/RNP10 capable and planning to operate in the Gulf of America CTA, then put the notation NONRNP10 in Item 18 RMK/, preferably first.

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