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AMENDMENT 3

31 July 2008

CONSULT NOTAM FOR LATEST INFORMATION

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

AIP Amendment 3

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

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**
1.1 Chapter 1 Std.	The U.S. does not require the training organizations to have a quality assurance system as outlined in ICAO Annex 1, Appendix 2, Item 3.
1.1 Chapter 1 Std.	The U.S. issues a certificate and ATC ratings, not a license
1.2.5.2 Chapter 1 Std.	The maximum validity on a private pilot medical certificate is 36 months for private pilots under age 40 and 24 months for private pilots over age 40.* The maximum validity on an airline transport pilot medical certificate is 6 months* *Verify any changes to U.S. standards by reviewing §61.23(d) The maximum validity allowed for non−FAA air traffic controllers (required to hold an FAA Second−Class airman medical certificate) is 12 months. The maximum validity allowed for FAA air traffic controllers is 24 months for those under age 40 who work at FAA terminals or centers. Free balloon and glider pilots are not required to hold medical certificates but are prohibited from operating during periods of medical deficiency.
1.2.5.2.2 Chapter 1 Std.	U.S. commercial pilots engaged 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 Chapter 1 Std.	Free balloon and glider pilots are not required to hold a medical certificate but are prohibited from operating during periods of medical deficiency. The maximum validity on non−FAA air traffic controllers (required to hold a second−class airman medical certificate) is 12 months. The maximum validity for FAA Terminal and Center personnel over age 40 is 12 months.
1.2.5.2.4 Chapter 1 Rec.	Free balloon and glider pilots are not required to hold a medical certificate but are prohibited from operating during periods of medical deficiency. Private pilots over age 50 have a 24−month validity on their medical assessments.
1.2.5.2.5 Chapter 1 Std.	The U.S. does not defer medical examinations.
1.2.6.1.1* Chapter 1 Rec.	License holders are not required to inform the Licensing Authority of a confirmed pregnancy or any decrease in medical fitness. License holders are prohibited from operating during periods of medical deficiency. *See also ICAO state letter AN 5/22−08/33 of 5 May 2008.
1.2.9.1 Chapter 1 Std.	The United States has no "retesting" requirement, as applicants must be able to read, speak, write and understand the English language at license issue.

1.2.9.2 Chapter 1 Std.	The U.S. does not require Air traffic controllers or aeronautical station operators to demonstrate the ability to speak and understand the language.
Chapter 2	**Licences and Ratings for Pilots**
2.1.9.3 Chapter 2 Std.	The United States permits some SIC time to meet the total flight time requirements but not all SIC time is creditable
2.2.3 Chapter 2 Std.	Student pilots must meet the requirements of an FAA Third−Class medical certificate which, though not identical, meet the intent of ICAO Class 2.
2.3.1.6 Chapter 2 Std.	Private pilots must meet the requirements of an FAA Third−Class Medical Certificate which, though not identical, meet the intent of ICAO Class 2.
2.4.1.6 Chapter 2 Std.	Commercial pilots must meet the requirements of an FAA Second−Class Medical Certificate which, though not identical, meet the intent of ICAO Class 1.
2.5.1.1 Chapter 2 Std.	Minimum age is 23 years
2.5.1.6 Chapter 2 Std.	Airline transport pilots must meet the requirements of an FAA First−Class Medical Certificate which, though not identical, meet the intent of ICAO Class 1.
2.6.1.5.1 Chapter 2 Std.	Private pilots who hold an airplane instrument rating are not required to comply with ICAO Class 1 hearing standards. U.S. hearing requirements are identical for FAA First− and Third−Class medical certificates and, though not identical to ICAO, meet the intent of ICAO Class 1 hearing standards.
2.6.1.5.2 Chapter 2 Rec.	Private pilots are not required to comply with ICAO Class 1 physical, mental, and visual requirements to hold an airplane instrument rating.
2.7.1.6 Chapter 2 Std.	Private pilots must meet the requirements of an FAA Third−Class Medical Certificate which, though not identical, meet the intent of ICAO Class 2.
2.8.1.6 Chapter 2 Std.	Commercial pilots must meet the requirements of an FAA Second−Class Medical Certificate which, though not identical, meet the intent of ICAO Class 1.
2.9.1.6 Chapter 2 Std.	Airline transport pilots must meet the requirements of an FAA First−Class Medical Certificate which, though not identical, meet the intent of ICAO Class 1.
2.10.1.5.1 Chapter 2 Std.	Private pilots who hold a helicopter instrument rating are not required to comply with ICAO Class 1 hearing standards. U.S. hearing requirements are identical for FAA First− and Third−Class medical certificates and, though not identical to ICAO, meet the intent of ICAO Class 1 hearing standards.
2.10.1.5.2 Chapter 2 Rec.	Private pilots are not required to comply with ICAO Class 1 physical, mental, and visual requirements to hold a helicopter instrument rating.
2.12.1.5 Chapter 2 Std.	Glider pilots are not required to hold a medical certificate but are prohibited from operating during periods of medical deficiency.
2.13.1.5	Free balloon pilots are not required to hold a 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 Chapter 3 Std.	Flight navigators must meet the requirements of an FAA Second−Class medical certificate which, though not identical, meet the intent of ICAO Class 1.
3.3.1.5 Chapter 3 Std.	Flight engineers must meet the requirements of an FAA Second−Class medical certificate which, though not identical, meet the intent of ICAO Class 1.
Chapter 4	**Licences and Ratings for Personnel Other Than Flight Crew Members**
4.2.2.3.1 Chapter 4 Rec.	The United States endorses the certification privileges on the licence.
4.2.2.4 Chapter 4 Std.	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..

4.3.1.3 Chapter 4 Std.	a) No experience is required for applicants who have satisfactorily completed an approved training course. b) 18 months' experience is required.
4.3.1.4 Chapter 4 Std.	Non−FAA air traffic controllers must meet the requirements of an FAA Second−Class medical certificate which, though not identical, meet the intent of ICAO Class 3.
4.4.2.2.1 Chapter 4 Std.	There is no minimum experience requirement for ratings other than control tower.
4.5.1.1 Chapter 4 Std.	The United States requires the applicant shall not be less than 23 years of age.
4.5.1.3.2 Chapter 4 Std.	The United States permits the applicant to have two years of experience in the last three years
Chapter 5	**Specifications for Personnel Licences**
5.1.3.1 Chapter 5 Std.	The United States is transitioning to a plastic multi color certificate.
5.1.3.2 Chapter 5 Std.	The FAA is transitioning to a plastic multi color certificate.
Chapter 6	**Medical Provisions for Licencing**
6.3.1.2 Chapter 6 Std.	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.
6.3.2.6 Chapter 6 Std.	Electrocardiography is required for airline transport pilots but not for commercial pilots.
6.3.2.6.1 Chapter 6 Std.	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 unless clinically indicated.
6.3.2.6.2 Chapter 6 Rec.	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 unless clinically indicated.
6.3.2.9.1 Chapter 6 Rec.	Chest radiography is not specifically required unless clinically indicated.
6.3.3.4 Chapter 6 Std.	The demonstration of compliance with the visual requirements to be made with only one pair of correcting lenses is not specifically required.
6.3.3.4.1 Chapter 6 Std.	A requirement that a spare set of corrective lenses be readily available when exercising privileges is not established.
6.3.4.1.1 Chapter 6 Std.	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 Chapter 6 Std.	Applicants are not required to take a practical hearing test.
6.4.1.1 Chapter 6 Std.	Free balloon 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 Chapter 6 Std.	Free balloon and glider pilots are not required to hold a medical certificate but are prohibited from operating during periods of medical deficiency.
6.4.2.6 Chapter 6 Std.	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 Chapter 6 Std.	Routine electrocardiography for applicants for FAA third−class airman (private pilot) medical certification is not required unless clinically indicated.
6.4.2.6.2 Chapter 6 Rec.	Electrocardiography for applicants for FAA third−class airman (private pilot) medical certification is not required at first issue unless clinically indicated.
6.4.2.9.1 Chapter 6 Rec.	Radiography for private pilots is not specifically required unless clinically indicated.
6.4.3.4 Chapter 6 Std.	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 Chapter 6 Std.	The requirement that a spare set of corrective lenses be readily available when exercising the privileges of the license is not established
6.5.2.6 Chapter 6 Std.	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 Chapter 6 Std.	Electrocardiography is required for FAA ATCs but not for non−FAA ATCs unless clinically indicated.
6.5.3.4 Chapter 6 Std.	The demonstration of compliance with the visual requirements to be made with only one pair of corrective lenses is not specifically required.
6.5.3.4.1 Chapter 6 Std.	A requirement that a spare set of corrective lenses be readily available when exercising the privileges of the licence is not established
6.5.4.1.1 Chapter 6 Std.	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 Chapter 6 Std.	Applicants are not required to take a practical hearing test.

ANNEX 2 − RULES OF THE AIR	
Chapter 1	**Definitions**
Aerodrome control tower	In the U.S., an "aerodrome control facility" is referred to as a "tower" or "airport traffic control tower"; "aerodrome control" is referred to as "airport traffic control service."
Airborne collision avoidance	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 "hover taxi" for this maneuver above 100 feet above ground level (AGL) and "air taxi" below 100 feet AGL.
Area control service	The U.S. does not use the term "area control service" to indicate controlled flight in controlled areas.
Area control centre	The U.S. equivalent facility for an Area Control Centre (ACC) is an Air Route Traffic Control Center (ARTCC).
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, and off−airway routes. The U.S. also uses instrument departure procedures (DPs) and standard terminal arrivals (STARs).
Controlled airspace	The U.S. terms for controlled airspace have different parameters than for ICAO.
Danger area	The term "danger area" is not used within the U.S. or any of its possessions or territories.
Estimated off−block time	The U.S. uses the term "estimated departure time" for domestic operations.
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, automated flight service stations (AFSSs), and rescue coordination centers (RCCs).
Instrument meteorological conditions	The U.S. air traffic service units use the phrase "IFR conditions."
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."
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.
Repetitive flight plan (RPL)	The U.S. uses the term "stored flight plan" for domestic operations.
Terminal control area	In the U.S., "terminal control area" has been replaced by "Class B airspace/area." Standard IFR services are provided to IFR aircraft operating in Class B airspace.
Total estimated elapsed time	The U.S. uses "estimated time en route" for domestic operations.
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.
Visual meteorological conditions	The U.S. air traffic service units use the phrase "VFR conditions."

Chapter 2	**Applicability of the Rules of the Air**
2.2	See difference under “Movement area.”
2.5	Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care) to be carried in that aircraft.
Chapter 3	**General Rules**
3.1.8	In addition, aircraft shall not be flown in formation flight when passengers are carried for hire.
3.2 Note	See difference under “Movement area.”
3.2.2.6.1	See difference under “Movement area.”
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.
3.3.1.2.1 d)	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.
3.3.1.2.2	The U.S. requires that domestic flight plans be submitted at least 30 minutes before departure. For international flights, the U.S. recommends that they be transmitted so that they are received by ATC authorities in each Flight Information Region (FIR) to be entered, at least 2 hours prior to entry, unless otherwise provided in that State’s requirements.
3.6.1	Air traffic control clearances are not needed for VFR flight in U.S. Class C, D, or E airspace.
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.
3.6.5.2.2	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.

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).		
Day, except as provided in Section 91.155(b)	1 statute mile	Clear of clouds
Night, except as provided in Section 91.155(b)	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
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**
4.1 and Table 4−1	There is no Class F airspace in the U.S. Basic VFR weather minimums are listed in the table above.
4.1 a)	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 above.
4.1 b)	**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.

4.1 c)	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.
4.1 d)	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.
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.
4.2 a)	When an appropriate ATC clearance has been received, the special weather minimums in this section apply to the operation of an aircraft in a Class B, C, D, or E surface area under VFR. 1) No person may operate an aircraft in a Class B, C, D, or E surface area under VFR except clear of clouds; 2) No person may operate an aircraft (other than a helicopter) in a Class B, C, D or E surface area under VFR unless flight visibility is at least 1 statute mile; 3) No person may take−off or land an aircraft (other than a helicopter) at any airport in a Class B, C, D or E surface area under VFR: a) unless ground visibility at that airport is at least 1 statute mile; or b) if ground visibility is not reported at that airport, unless flight visibility during landing or take−off is at least 1 statute mile.
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.
4.6	In addition, anywhere, an altitude allowing, if a power unit fails, an emergency landing without due hazard to persons or property on the surface.
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.

PANS − RAC − DOC 4444	
There are several substantive differences between the U.S. procedures and those of ICAO, in addition to some minor variations in detail which are not considered significant. These differences are the result of initiatives and/or refinements which the U.S. has effected in the interest of improving the safety and efficiency of air traffic services.	
Part I	**Definitions**
Airborne collision avoidance system	The U.S. uses traffic alert and collision avoidance system (TCAS).
AIRMET information	In the U.S., AIRMET stands for Airman's Meteorological Information which is in−flight weather advisories issued only to amend the area forecast concerning weather phenomena which are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualifications. AIRMETs concern weather of less severity than that covered by SIGMETs or convective SIGMETs. AIRMETs cover moderate icing, moderate turbulence, sustained winds of 30 kt or more at the surface, widespread areas of ceilings less than 1,000 feet and/or visibility less than 3 miles, and extensive mountain obscurement.
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	In the U.S., the term "hover taxi" is sometimes used to indicate the ICAO term "air−taxiing." Additionally, in the U.S., air taxi is used to indicate certain commercial aircraft operations. For those operations, usually a special call sign is used, or the prefix "Tango" is added to the aircraft call sign.
ALERFA	The U.S. does not use the code words ALERFA, DETRESFA, and INCERFA to designate an alert phase, a distress phase, or an uncertainty phase in domestic airspace. The U.S. uses information request (INREQ) and alert notice (ALNOT) in domestic airspace.
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).
Automatic dependent surveillance (ADS)	The U.S. has not yet published ATS procedures for the use of Automatic Dependent Surveillance (ADS).
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."
Cruising level	The U.S. uses the term "cruising altitude."
Decision altitude	Approach with vertical guidance (VNAV).
DETRESFA	See ALERFA.
Flight information centre	In the U.S., the services provided by flight information centers (FICs) are conducted by air traffic control (ATC) facilities, automated flight service stations (AFSSs), and rescue coordination centers (RCCs).

Glide path	The U.S. uses “glideslope” rather than “glide path” although the terms are sometimes interchangeable. For the U.S., a glideslope provides vertical guidance for aircraft during approach and landing.
Holding point	The U.S. uses “holding fix” rather than “holding point.”
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.
INCERFA	See ALERFA.
Level	The U.S. uses “altitude” or “flight level” rather than “level.”
Movement area	In the U.S., the “movement area” is equivalent to the ICAO “maneuvering area” which does not include parking areas.
Pilot−in−Command	Designated by operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.
Slush	In the U.S., “slush” is not used as a weather phenomena.
Standard instrument arrival (STAR)	The U.S. uses the acronym STAR to define a standard terminal arrival.
Standard instrument departure (SID)	The U.S. uses the term departure procedure (DP) in lieu of SID.
Stopway	The U.S. does not define a stopway as a rectangular area.
Taxi−holding position	In the U.S., “taxi into position and hold” means taxi onto the departure runway in take−off position and hold while the ICAO “taxi−holding position” or “taxi−holding point” is a designated position that provides adequate clearance from a runway.
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.
Track	The U.S. uses the term “course” instead of “track.”
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.
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.
Part IV	**General Provisions**
3.2.1.1	Transfer of control points vary depending on numerous factors.
3.2.1.3	Transfer of control varies.
3.3.1a	The U.S. does not “release” aircraft. Handoff is used.
4.1	In the U.S., flight information and alerting services are provided by ATC facilities, AFSSs, and RCCs.
5.7.5.1	The flight crew shall read back to the air traffic controller safety−related parts of ATC clearances.
6.1.5	Mach speeds at or above 7,600 Meters (FL 250).
6.3.6	Only minor speed reductions of 20 knots should be used on intermediate or final approach.
6.3.7	Speed control after 7KM (4NM) should not be applied.
8, 8.4	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.

9.3	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 AFSS.
10.2.2	Standard IFR services should be provided to IFR aircraft operating in Class B airspace. U.S. Class B airspace includes a speed restriction of 250 kt indicated airspeed or less.
10.2.3	U.S. ATS controllers do not normally include clearance for transonic acceleration in their ATC clearances.
12.1.1, 12.1.1.1, 12.2	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. QNH and QFE altimeter settings are not provided in domestic U.S. airspace.
13.1	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.
13.4.1	Flight Progress Strips shall be retained for at least 30 days.
14.3, 14.4	The U.S. has not yet published ATS procedures for the use of Automatic Dependent Surveillance (ADS).
15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 16	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.
18	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.
19	The U.S. uses traffic alert and collision avoidance system (TCAS). U.S. controllers are not to issue control instructions that are contrary to the TCAS resolution advisory (RA) procedure that a crew member advises is being executed.
Part V	**Separation Methods and Minima**
	Remark: The U.S. does not use the term "area control service" to indicate controlled flight in controlled areas.
1.1	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.
3.4.1	U.S. rules allow assignment of altitude to second aircraft after first aircraft has been issued climb/descent and is observed or reports leaving that altitude.
5.2	Whenever the other aircraft concerned are within 5 minutes flying time of the holding area.
8	The U.S. uses the term "course" instead of "track." "Reciprocal" courses are sometimes referred to as "opposite" courses. The wording of the definitions for U.S. *same*, *crossing*, or *opposite/reciprocal* courses differs from the ICAO worded definitions, but the intent appears to be the same.
8.2.1.1, 8.3.1.1.1	The U.S. uses 22 kt instead of 20 kt and 44 kt instead of 40 kt.
8.4.1	The U.S. does not conduct direct pilot−controller high frequency (HF) communications. The U.S. is establishing direct pilot−controller data link communications where HF is currently being used.

14.1	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.
17.3	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.
Part VI	**Separation in the Vicinity of Aerodromes**
5.7.1	Arriving aircraft − delay of 10 minutes or more.
5.8.1	Onward clearance time.
7.3.1.2	Parallel approaches, separate radar controllers
7.3.2.9	PAOAS Criteria.
7.3.2.9	45 degree track.
7.3.2.10	Both controllers are advised when visual separation is applied.
7.3.5.3	SRA
9	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.
15	Except where a “runway use” program is in effect, in the U.S. the runway used will be the one most nearly aligned with the wind when 5 kt or more, or the “calm wind” runway when less than 5 kt unless use of another runway will be operationally advantageous or is requested by a pilot.
Part VII	**Aerodrome Control Service**
2.2	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 AFSS.
5.3.1.1.2	Taxi clearance.
6.1.2	In the U.S., airport lighting is not used for en route navigation.
8.4.3	Takeoff clearance shall include the designator of the runway.
9.3.1	Landing clearance shall include the designator of the runway.
10.3	In the U.S., “taxi into position and hold” means taxi onto the departure runway in takeoff position and hold while the ICAO “taxi−holding position” or “taxi−holding point” is a designated position that provides adequate clearance from a runway.

10.5, 10.5.1	In the U.S., the term "hover taxi" is sometimes used to indicate the ICAO term "air−taxiing." In the U.S., air−taxiing is the preferred method for helicopter movements on airports provided ground operations/conditions permit.
11.2.1	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.
11.2.2	U.S. controllers do not normally flash runway or taxiway lights.
15.1, 15.2	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.
16	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).
17	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). 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.
Part VIII	**Radar Services**
6.5.2	The U.S. has not implemented cold temperature corrections to the radar minimum vectoring altitude chart.
7.4.4.1	See Part VII, Aerodrome Control Service, 16.
7.6	U.S. ATS units do not accept aircraft speeds in metric terms nor do they use the term "minimum clean speed." The U.S. does use phrases such as "maintain maximum forward speed" or "maintain slowest practical speed."
9.3.5, 9.3.6	The U.S. normally uses "glideslope" rather than "glide path" although they are sometimes interchangeable. For the U.S., a glideslope provides vertical guidance for aircraft during approach and landing.
Part IX	**Flight Information and Alerting Service**
1.3.2	See Part IV, General Provision, 15.1.
1.3.7	The U.S. does not have special procedures for the transmission of information to supersonic aircraft.
1.4.1, 1.4.2, 1.4.3	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.
2.1.2, 2.1.3, 2.2.1	The U.S. does not use "operations normal" or "QRU" messages. U.S. controllers are not normally familiar with the term "uncertainty phase."

Part X	**Co−ordination**
3.2.10	See Part IV, General Provision, 14.3.
3.3.1.1, 3.3.2.1	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.
Part XI	**Air Traffic Services Messages**
1.3	The existing U.S. ATS automation system does not process logical acknowledgment messages (LAMs).
4.2.2.2.1	See Part IV, General Provision, 8.
4.2.3.1, 4.2.3.6, 4.2.4, 4.2.5.1, 4.2.5.4	See 1.3, above.
4.2.5.5	See Part IV, General Provision, 15.1.
4.3.1.2.1	In the U.S., traffic information messages include the position of the traffic (aircraft concerned).
4.3.2.2.1, 4.3.2.3.5	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.
4.3.2.2.1, 4.3.2.3.2, 4.3.2.3.3	U.S. controllers do not give wind speed, visibility, or RVR/RVV values in metric terms. RVR values are given in 100− or 200−foot increments while RVV values are given in $^{1}/_{4}$−mile increments.
4.3.2.3.1	In the U.S., the criteria for a variable wind is wind speed greater than 6 kt and direction varies by 60 degrees or more. If the wind is $\geq$1 kt but $\leq$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>."
4.3.2.3.3.1	RVR values between 400m and 800m in increments of 50m.
4.3.2.3.4.1	For weather phenomena, the U.S. uses "ice crystals" instead of "diamond dust" and does not use the term "dust devils."
4.3.2.3.4.2	Additionally, the U.S. uses "supercooled" (or freezing) and "partial" as descriptors for weather phenomena.
4.3.2.3.5	In the U.S., CLR is used at automated stations for SKC when no clouds below 12,000 feet are reported. SCT indicates cloud coverage between 3−4 oktas; FEW indicates cloud coverage >0 but $\leq$2 oktas.
4.3.2.3.5.1	Abbreviation NSC.
4.3.2.3.6	In the U.S., since the Celsius scale is not as finely graduated as the Fahrenheit scale, the hourly temperature and dew point to the nearest tenth of a degree will be encoded in the additive data section of METAR remarks.
4.3.2.3.7	In the U.S., an "A" precedes the altimeter which is given in inches of mercury.
Part XII	**Phraseologies**
2.3	In the U.S., "proceed" or "hold" may be used for aircraft or equipment/vehicle/personnel operations, while "taxi" and "cleared" should only be used as appropriate for aircraft instructions.
2.4 2.7	In the U.S., conditional clearances are not usually issued. However, traffic that may affect the clearance is usually issued to the aircraft with the clearance. Restricted clearances may also be issued.
2.5, 2.6, 2.7, 2.8	In the U.S., pilots may acknowledge some clearances, instructions, or other information by using "wilco," "roger," "affirmative," or other words or remarks. If the pilot reads back information, the controller should ensure the readback is correct or make corrections as appropriate.
2.8, 3.1.1 3.1.2	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" in the U.S. The U.S. sometimes uses "altitude" to mean "altitude" or "flight level."

3.1.1, 3.1.2	U.S. ATS units do not normally accept aircraft speeds or altitudes in metric terms nor do they use the term "minimum clean speed." The U.S. does not use the term "level" in lieu of "flight level" or "altitude." The U.S. also uses the phrases "maintain the highest/lowest practical speed" and "increase or reduce to a specified speed or by a specified number of knots."
3.1.2	See Part IX, Flight Information and Alerting Service, 1.3.7. Also, the term "step climb" is not used in the U.S. The word "immediately" is used only when expeditious compliance is required to avoid an imminent situation. Instead of "maintain own separation and VMC 'from,' 'above,' or 'below' . . . ," U.S. controllers say "maintain visual separation 'from' that traffic." For TCAS resolution advisories in the U.S., pilots would advise "clear of conflict, returning to . . . ."
3.1.2a,ii	To and maintain block (level) to (level).
3.1.4	See Part IV, General Provision, 18.
3.1.6	See Part XI, ATS Messages, 4.3.2.2.1.
3.1.6	See Part IV, General Provision, 12.1.
3.1.6 Note 2	"Midpoint" and "rollout" may be omitted.
3.1.9i	Temperature issued with Braking Action.
3.2.1	The U.S. uses the phraseology "rest of route remains unchanged."
3.3.1	Instead of "track," U.S. controllers would advise pilots to "fly a (degree) bearing/azimuth from/to (fix) until (time)" or "until reaching (fix or altitude)," and if required, "before proceeding on course."
3.4.7	See Part IV, General Provision, 12.1.
3.4.8	See Part VII, Aerodrome Control Service, 10.3. Also, U.S. controllers do not use the term "backtrack."
3.4.11	U.S. controllers do not say "line up" or "wait." Clearance to enter runway and await take−off clearance is stated "taxi into position and hold."
3.4.11	The U.S. does not have additional phraseology to stop a take−off after an aircraft has commenced take−off roll.
3.4.13	See 3.3.1, above.
3.4.14	See Part IV, General Provision, 12.1.
3.4.16	The U.S. does not use the term "low pass" for a clearance.
4.1.1	U.S. controllers do not use the phrases "identified" or "not identified [position]" to replace "radar contact [position]."
4.1.3	U.S. controllers do not say "closing [slowly (or quickly)] [from the left (or from the right)]" nor "heading is good" nor "rate of descent is good" nor do they give "(number) meters left (or right) of course or too high or too low." In case of elevation failure, U.S. controllers advise "no glidepath information available . . . ." instead of "elevation element unserviceable . . . ."
4.1.5	The U.S. does not use the phraseology "Start and stop all turns on the command 'now'."
4.1.5c	Start and stop all turns on the command "NOW."
4.1.6	See 3.1.1, above.
4.1.10	U.S. controllers say "radar service terminated" not "radar control terminated." U.S. controllers do not say "will shortly lose identification" or "identification lost."
4.1.11	The U.S. does not use the same phraseology for secondary radar failures. The U.S. does use (name of facility) beacon interrogator inoperative/malfunctioning. Primary radar failure is covered where secondary radar service is still available with the note that traffic advisories available on radar transponder aircraft only.
4.2.1	U.S. controllers would use "airport" rather than "field."
4.2.2	In the U.S., pilots are not told "you will intercept (radio aid or track) (distance) from (significant point or touchdown)." Neither are pilots informed "closing from left (or right) [report established]" nor "this turn will take you through (aid) [reason]" nor "taking you through (aid) [reason]." Also, see 3.1.1, above.

4.2.3	U.S. ATS units use “course” rather than “track.”
4.2.3	The U.S. uses the phraseology for a traffic alert in lieu of the phrase “to avoid traffic”; however, the sense of urgency is the same as the word “immediately” is used by both PANS ATM and FAA.
4.2.4.1	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.”
4.2.4.2	For PAR approaches, U.S. controllers say “begin descent” and for surveillance approaches, U.S. controllers say “descend to your minimum descent altitude.”
4.2.4.4	The wheels down check is only done by U.S. military ATS units; the phraseology is “check wheels down” for military tower controllers and “wheels should be down” for military ATS radar units.
4.2.4.5	Although U.S. controllers say “go around,” they do not say “continue visually or go around.” In that case, they would say “if runway, approach/runway lights, not in sight, execute missed approach” or “if not visual, (advise you) execute missed approach.” Also, see 4.2.4.1, above.
4.2.5.1	See 4.2.4.1, above.
4.2.5.3	See Part VIII, Radar Services, 9.3.5 and 4.1.3, above.
4.2.5.4	See 4.1.3 and 4.2.4.2, above.
4.2.5.7	See 4.2.4.1, above.
4.2.5.8	See 4.2.4.5, above.
4.3.3	When a transponder appears inoperative or malfunctioning, U.S. controllers would instruct “ . . . reset transponder, squawk” or “ . . . your transponder appears inoperative/malfunctioning, reset, squawk . . . .”
4.3.6, 4.3.8	U.S. controllers do not say “squawk Charlie.” U.S. controllers may ask a pilot to “ident” or “squawk standby” or “squawk low/normal” or “squawk MAYDAY on 7700” or “squawk altitude.”
4.3.9	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.”
4.3.10	See 4.3.6, above.
4.3.11, 4.3.12	See 4.3.9, above.
4.3.13	U.S. controllers would say “verify at (altitude)” and/or “verify assigned altitude.”
6.1.1	U.S. controllers would issue MEA/MVA/MOCA/MIA instead of QNH.
Part XIV	**Procedures Related to Emergenices, Communication Failure and Contingencies**
3	The U.S. has organized this material from the perspective of the controller. ICAO has outlined information the pilot can expect to provide.
4.3	The U.S. uses 2,000 feet above the highest obstacle and for separation from other aircraft, 1,000 feet above or 2,000 feet below and 5 miles. This includes VFR aircraft.
6.1	The U.S. does not have a section pertaining to emergency separation.
6.3	As previously covered in past differences, the U.S. uses TCAS. U.S. orders speak to controller actions when advised of an aircraft responding to a resolution alert (RA).
Appendix 1	**Instructions for Air−reporting by Voice Communications**
AIREP Form of Air−report	See Part IV, General Provision, 15.1.

Appendix 2	**Flight Plan**
	See Part IV, General Provision, 8.
2.2 (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.
2.2 (Item 18)	The U.S. requires filed FIR boundary designators and accumulated estimated elapsed times to such points or FIR boundaries in the sequence and form as prescribed in 2.2, Item 18 of Doc 4444, Appendix 2.
Appendix 3	**ATS Messages**
1.1.1	See Part XI, ATS Messages, 1.3.
1.6.2	See Part XII, Phraseologies, 2.8.
1.8.1 (Field Type 3), (Field Type 15), and (Field Type 18).	See Part XI, ATS Messages. 1.3. See Appendix 2, Flight Plan, 2.2 (Item 15) and 2.2 (Item 18).
2.1, 2.4.5, 2.5	See Part XI, ATS Messages 1.3.
Attachment B	**This section now appears in the Air Traffic Services Planning Manual (Doc 9426).**
3.2 (Item 15)	See Appendix 2, Flight Plan, 2.2 (Item 15).
3.2 (Item 18)	See Appendix 2, Flight Plan, 2.2 (Item 18).

ANNEX 3 – METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION	
Chapter 3	**World Area Forecast System and Meteorological Offices**
3.2.1 b), c)	The capability to comply continues to be developed.
Chapter 4	**Meteorological Observations and Reports**
4.3.1 c)*	The U.S. does not prepare SPECI for changes in air temperature.
4.3.3 a)*	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.
4.3.3 b)*	Practices do not require SPECI for increases of mean surface wind speed.
4.3.3 c)*	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 1 minute.
4.3.3 d)*	Practices do not require SPECI for wind direction changes based on local criteria.
4.3.3 f)*	SPECI are not prepared for the equivalents in feet of 150, 350, or 600 meters. U.S. military stations may not report a SPECI based on RVR.
4.3.3 g)*	Practices do not require SPECI for the onset, cessation, or change in intensity of: – freezing fog. – moderate or heavy precipitation (including showers thereof). – low drifting dust, sand or snow. – blowing dust, sand or snow (including snowstorm). – duststorm. – sandstorm.
4.3.3 h)*, j)*	Practices do not require SPECI when the height of the lowest BKN or OVC cloud layer or vertical visibility changes to or passes 100 feet (30 meters) unless an approach minimum exists.
4.5.6*, 4.5.9 a)*	Practices use 6−knot criterion for average wind speed to report variable wind direction in METAR and SPECI.
4.5.9 b)*	Practices define wind gust 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.
4.6.5*	Practice is to report prevailing visibility. Prevailing visibility is defined as the visibility that is considered representative of visibility conditions at the station (automated observation), or the greatest distance seen throughout at least half the horizon circle, not necessarily continuous (manual observation).
4.7.14*	RVR values, reported in feet (FT), are based on light setting 5 (highest available) for the designated instrument runway. RVR tendency is not reported.
4.8.2*	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.
4.8.4*	The practice is to not report the following weather phenomena at unstaffed stations in METAR or SPECI: DZ, PL, IC, SG, GR, GS, SA, DU, FU, VA, PY, PO, SQ, FC, DS, and SS.
4.8.5*	The practice is to not report the following characteristics of present weather phenomena in METAR or SPECI: SH, DR, MI, BC, and PR at unstaffed stations.
4.8.6*	The practice with respect to the proximity indicator VC is between 5 to 10 statute miles from the point of observation with the exception of precipitation for which the VC indicates >0 to 10 statute miles from the point of observation.

4.9.5*	The U.S. 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 about 12,000 feet are not reported. At staffed automated sites, clouds above 12,000 feet may be augmented.
4.13.1*	Practices require the inclusion of a modifier field to designate AUTO for totally ''automated'' observations (no human augmentation) or COR for corrected observations between the date and time of the report and the surface wind direction and speed.
4.13.2	The U.S. does not use the term CAVOK in meteorological reports.
Chapter 6	**Forecasts**
6.2.5 b)*	Change groups and amendment criteria below 1/2 statute mile (800 meters) are not used.
6.2.5 d)*	The 100 foot (30 meter) change group and amendment criterion is not used.
6.2.17*	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.
6.2.18*	Practices require the forecast of non−convective low−level wind shear within 2,000 feet of the ground in the Optional Group.
6.2.19*	The U.S. does not use CAVOK and NSC in meteorological forecasts.
6.3*, 6.4*	Landing and takeoff forecasts are provided by the TAF.
6.5*	Upper winds and upper−air temperatures are not included in area forecasts.
6.6.2, 6.6.3	Area forecasts are issued three times a day in the U.S., with the exception of Alaska and Hawaii where they are issued four times a day. They are valid for a 12−hour period beginning 1 hour after issuance and have an 18−hour outlook.
Chapter 7	**SIGMET and AIRMET Information, Aerodrome Warnings and Wind Shear Warnings**
7.3.1	The U.S. does not include cloud amount or type in AIRMET.
9.6.1, 9.6.3	The U.S. does not report ISOL, OCNL, or FREQ in accordance with the guidance on the use of the terms given in Attachment F.
*Indicates ICAO Recommended Practice	

ANNEX 4 − AERONAUTICAL CHARTS	
Chapter 1	**Definitions**
Air taxiway	The U.S. does not depict defined surfaces for air−taxiing of helicopters.
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.
Final approach and take−off area (FATO)	The U.S. does not depict final approach and take−off areas (FATOs).
Helicopter stand	The U.S. does not use this term.
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 2	**General Specifications**
2.1	The titles of charts produced by the U.S. are not those provided for in Annex 4.
2.2.1	The marginal note layouts, in some cases, differ from those set forth in Appendices 1, 5, and 6.
2.4.1	Visibility distances are expressed in statute miles and fractions thereof.
2.4.4	Conversion scale (meters/feet) is not shown on Radio Navigation Charts.
Chapter 3	**Aerodrome Obstacle Chart − ICAO Type A (Operating Limitations)**
3.1	The U.S. produces an Airport Obstruction Chart which covers the basic requirements called for by Aerodrome Obstruction Chart − ICAO Type A.
Chapter 4	**Aerodrome Obstacle Chart − ICAO Type B**
4.1	The U.S. produces an Airport Obstruction Chart which covers the basic requirements called for by Aerodrome Obstruction Chart − ICAO Type B.
Chapter 5	**Aerodrome Obstacle Chart − ICAO Type C**
5.8.1	The navigation grid on U.S. Aircraft Position Chart 3097 comprises lines parallel to 54° West Meridian and the navigation grid on U.S. Aircraft Position Chart 3096 comprises lines parallel to 92° West Meridian. These changes to the ICAO Standard were made to provide navigation grid lines vertical to a great circle projection base.
Chapter 6	**Precision Approach Terrain Chart − ICAO**
6.9.1.1	Only outbound magnetic bearings from VOR facilities and inbound magnetic bearings to low/medium frequency radio navigation facilities are shown.

Chapter 7	**En Route Chart − ICAO**
7.9.3.1.1 1) and 5)	The U.S. depicts geographic positions in degrees and minutes to the hundredth of a degree.
Chapter 8	**Area Chart − ICAO**
8.9.3.1.1 1) and 6)	The U.S. depicts geographic positions in degrees and minutes to the hundredth of a degree.
Chapter 9	**Standard Departure Chart − Instrument (SID) − ICAO**
9.3.1	Charts covering continental U.S. between latitudes 24° and 52° North are based on standard parallels at 33° and 45° and between latitudes 52° and 72° North on standard parallels at 55° and 65°.
9.4.1	The U.S. uses a sheet numbering system which differs from the index in Appendix 7.
9.8.3.2*	The elevation of the highest point on any sheet is not always cleared of hypsometric tinting.
9.9.3.1.1 2d) and 3)	The U.S. depicts geographic positions in degrees and minutes to the hundredth of a degree.
9.10.1	Heliports are not shown.
Chapter 10	**Standard Arrival Chart − Instrument (STAR) − ICAO**
10.8.3.2*	The elevation of the highest point on any sheet is not always cleared of hypsometric tinting.
10.9.3.1.1 2d) and 3)	The U.S. depicts geographic positions in degrees and minutes to the hundredth of a degree.
Chapter 11	**Instrument Approach Chart − ICAO**
11.10.4.3	The U.S. does not depict geographic position of the final approach fix.
Chapter 12	**Visual Approach Chart − ICAO**
12.2.1	Stopways are not indicated.
12.5.5.2.1	The datum (MSL) is stated in the Instrument Approach Chart legend, not on the chart.
12.6.2	Runway threshold elevations are not shown.
Chapter 13	**Aerodrome/Heliport Chart − ICAO**
13.6.1.d Surface type for heliports.	The U.S. does not show "type of surface for heliports."
13.6.2 Elevated helidecks, etc.	The U.S. does not show "surface level, elevated, or helidecks."
Chapter 14	**Aerodrome Ground Movement Chart − ICAO**
14.6.1 c)	The U.S. does not depict geographic positions of aircraft stands.
14.6.1 f)	The U.S. does not depict taxiway centerline points.
Appendix 2	**ICAO Chart Symbols**
No. 21	Tidal flats are shown in brown stipple over the blue open water tint.
No. 45	Rocks awash are shown by a six−armed symbol as adopted by the International Hydrographic Bureau.
No. 54, 61	Spaces between sides of bridge and road or railroad symbols are filled solid.
No. 70	Oil or gas fields are shown with an oil well derrick symbol.
No. 77	Ruins are shown by a solid square, properly annotated.

No. 94	The runway surface indicator (letter H) and the lighting indicator (letter L) are not normally used on high altitude Radio Navigation Charts. Only those airports with a minimum of 5,000 feet hard−surfaced runways are shown. The letter H is not used on low altitude Radio Navigation Charts. All airports depicted have hard−surfaced runways, excepting that where the letter "S" follows the runway length, the runway surface is soft. On Visual Navigation Charts of the 1:500 000 scale, a miniature runway layout depiction indicates airports with hard−surfaced runways at least 1,500 feet long.
No. 110	Aerodrome traffic zones are termed "SURFACE AREAS" in U.S. usage. These are all of standard dimensions. Limits are not shown, but airports at which SURFACE AREAS have been established are indicated by a color−coded airport symbol.
No. 113	Limits of advisory areas are shown on Radio Navigation Charts with a crenellated line. This depiction is indicated in the legend as the border of an Air Route Traffic Control Center (ARTCC).
No. 116	The nomenclature "non−compulsory" is used instead of "on request" for appropriate position reporting points.
No. 127	Isogonic lines are shown on Radio Navigation Charts only as short sections of continuous lines extending inward from the neat lines.
*Indicates ICAO Recommended Practice.	

ANNEX 5 − UNITS OF MEASUREMENT TO BE USED IN AIR−GROUND COMMUNICATIONS
General Statement: Most of the individual SI quantities and measurement units listed in the Annex are not commonly used in routine international air operations. Although most U.S. national standards and practices do not specifically utilize the SI units, the SI units of measurement are acceptable and not prohibited from use by U.S. regulations. Under the present operational practices, these differences are not significant and are identified in U.S. Aeronautical Information and Technical Publications. In accordance with Article 38 of the Convention, the U.S. wishes to file the enclosed Notice of Differences to Annex 5, Fourth Edition, as amended by Amendment 13. Only those differences recognized as necessary for the safety or regularity of international air navigation and required for day−to−day operations in U.S. airspace are listed separately in this notification. In addition, we do not support the establishment of dates for planning purpose for termination of the use of bar, knot, nautical mile, and foot. (Chapter 4, Table 4−1) Until sufficient operational analysis identifies and resolves the safety issues, the establishment of termination dates for use of the bar, knot, nautical mile, and foot is unacceptable.
Reference: Table 3−4, Chapter 3, Annex 5, Fourth Edition, as Amended by Amendment 13.

Chapter 3.3 (Table 3−4)

Ref. No.	Quantity	Unit (SI)	Differences as of 5 January 1988
1.4	distance (short)	meter	foot
1.12	runway length	meter	foot
1.13	runway visual range	meter	foot
1.15	time	hour and minute, the day of 24 hours beginning at midnight UTC	Time may be given in local time
1.16	visibility	kilometer	statute mile and fraction
2.12	mass (weight)	kilogram	pound (lb)
3.2	altimeter setting	hectopascal	inches of mercury
6.7	temperature	°C	C° except Fahrenheit used for surface air and dew point temperature
10.1	absorbed dose	Gy	rd
10.2	absorbed dose rate	Gy/s	rd/s
10.4	dose equivalent	Sv	rem
10.5	radiation exposure	C/kg	R
10.6	exposure rate	C/kg·s	R/s
All non−SI alternative units listed in this table will continue to be utilized where permitted. (1.1, 1.3, 1.5, 1.7, 4.1, 4.7, 4.15, 4.16)			

ANNEX 6 – OPERATION OF AIRCRAFT	
PART I	
Chapter 1	**Definitions**
Aerodrome operating minima	This term is not used in the U.S.
Category I (Cat I) operation	For a Category I operation, the U.S. requires a decision height (DH) of not less than 200 feet and either visibility of not less than 1/2 mile or a runway visual range of 2,400 feet (RVR 1,800 feet with operative touchdown zone and runway centerline lights).
Category II (Cat II) operation	The U.S. requires that Category II provide approaches to minima of less than 200 feet decision height/2,400 runway visual range to as low as 100 feet decision height/1,200 feet runway visual range.
Category IIIA (Cat IIIA) operation	U.S. criteria are the same as those adopted in Part 1 of Annex 6. However, the runway visual range is expressed as not less than 700 feet (200 meters).
Category IIIB (Cat IIIB) operation	U.S. criteria are the same as those adopted in Part 1 of Annex 6. However, the runway visual range is expressed as less than 700 feet (200 meters) but not less than 150 feet (50 meters).
Cruising level	The term “cruising altitude” is used in lieu of “cruising level” in U.S. ATC phraseology.
Decision height	Although not identical, the U.S. definition of decision height is not substantially different.
General aviation operation	General aviation is defined as all civil aviation operations other than scheduled air transportation and nonscheduled air transport operations for remuneration or hire. The classification of general aviation flying by powered aircraft is, as follows: Instructional flying. Use of an aircraft for purposes of flight instruction with an instructor. The flights may be performed by aero−clubs, flying schools, fixed−base operators, or commercial operators. Business flying. Use of an aircraft to carry personnel and/or property to meet the transport needs of officials of a business, firm, company, or corporation. These flights may be performed by a commercial pilot or by a private pilot. Pleasure flying. Use of an aircraft for personal or recreational purpose not associated with a business or profession. Aerial work. Use of an aircraft for activities such as: (1) crop dusting, chemical or fertilizer spraying, seed dissemination, prevention of frost formation, insect fighting, animal herding, or (2) aerial photography, patrol and surveillance, prospecting, construction, advertising, medical relief, and rescue work. Other flying. All flights by pilots for maintaining their flight proficiency should also be included under this heading as well as all general aviation flights that cannot be included in the above four categories.

Instrument meteorological conditions (IMC) Visual meteorological conditions (VMC)	The U.S. difference, as stated in the Supplement to Annex 2, 5th Edition, dated February 1967 as amended by Amendment 1 is as follows: It will be impracticable to implement the terms ''instrument meteorological conditions'' and ''visual meteorological conditions,'' abbreviated as ''IMC'' and ''VMC'' as they appear in Chapter 1, Definitions, and within the other paragraphs of the Annex where they appear. Use of the terms ''IFR conditions'' and ''VFR conditions'' rather than ''instrument meteorological conditions'' and ''visual meteorological conditions'' will have no effect with respect to the safety of air navigation. The terms ''IFR conditions'' and ''VFR conditions'' have been in effect in the U.S. for many years and are well known to all pilots and providers of the various aeronautical services. Therefore, a change from the present phraseology to the new phraseology would, in so far as the U.S. is concerned, impose a change which is not justified from the standpoint of improvement of the overall aviation procedures and practices. U.S. Federal Aviation Regulations specify the use of the phrases ''IFR conditions'' and ''VFR conditions.''
Maximum mass	The U.S. Federal Aviation Regulations state ''weight'' rather than "mass."
Obstacle clearance limit (OCL)	This term is not used in the U.S. Federal Aviation Regulations.
Pressure altitude	Although not identical, the U.S. definition of pressure altitude is not substantially different.
Synthetic flight trainer: flight simulator, flight procedures trainer, basic instrument flight trainer	The U.S. does not have a regulatory definition of these terms; however, the terms are in common usage in the U.S. and have a meaning that is similar to the ICAO definition.
Chapter 4	**Flight Operations**
4.3.1 d)	The U.S. Federal Aviation Regulations state "weight" rather than "mass."
4.3.7.2	When refueling with passengers embarking, on board, or disembarking an airplane, two−way communication is not required between the ground crew supervising the refueling and the qualified personnel on board the airplane. The U.S. refueling safety procedures which meet the intent of this Standard are contained in each operator's approved operating manual.
4.3.8.2	U.S. regulations require descent within 4 minutes to 14,000 feet rather than 13,000 feet (620 hPa).
4.4.4.4	U.S. regulations require all occupants of seats equipped with combined safety belts and shoulder harnesses to be properly secured during take−offs and landings and still be able to properly perform their assigned duties.
4.4.9.2	The U.S. Federal Aviation Administration (FAA) develops standard flight operational noise abatement procedures for each airplane type. Alternative flight operational noise procedures are also developed by the FAA for certain airports that have unique noise situations.
Chapter 5	**Aeroplane Performance Operating Limitations**
5.2.6, 5.2.7 a), b), c), d)	The U.S. Federal Aviation Regulations state ''weight'' rather than "mass."
5.2.8.1	U.S. regulations do not require that account be taken of the loss, if any, of runway length due to alignment of the airplane prior to take−off in determining the length of the runway available.
Chapter 6	**Aeroplane Instruments, Equipment and Flight Documents**
6.2.4.2	The U.S. Federal Aviation Regulations express lengths in feet and inches.

6.3	a) Large airplanes that have a U.S. original type certificate issued on or before 30 September 1969, which are certificated for operations above 25,000 feet altitude or are turbine−engine powered must have one or more flight data recorders that record data from which time, altitude, airspeed, vertical acceleration, heading and the time of each radio transmission either to or from air traffic control (ATC) can be determined. b) Large airplanes that have a U.S. original type certificate issued after 30 September 1969, which are certificated for operations above 25,000 feet altitude or are turbine−engined powered must have one or more flight data recorders that record data from which the following information may be determined: time, altitude, airspeed, vertical acceleration, heading, time of each radio transmission either to or from ATC, pitch attitude, roll attitude, sideslip angle or lateral acceleration, pitch trim position, control column or pitch control surface position, control wheel or lateral control surface position, rudder pedal or yaw control surface position, thrust of each engine, position of each thrust reverser, trailing edge flap or cockpit flap control position, and leading edge flap or cockpit flap control position.
6.3.1.1	Pursuant with above paragraph a), recorders do not record engine power, configuration, or operation. Pursuant with paragraph b), recorders do not record operation.
6.3.1.2	Pursuant with above paragraph a), recorders do not record engine power or configuration of lift and drag devices.
6.3.5.1	The U.S. does not require such equipage for all aircraft which meet this weight criterion. U.S. regulations (14 CFR 135.152) only require that multi−engine, turbine−powered airplanes or rotorcraft with 10−19 seats that are brought onto the U.S. register after 11 October 1991, be equipped with the flight data recorder specified in this standard.
6.4	Although the U.S. does provide air traffic control services to aircraft operating under VFR, it does not specifically provide for en route "controlled VFR flights" in the ICAO context. The U.S. does not, therefore, have specific requirements or regulations regarding airman certification or aircraft minimum equipment for "controlled VFR flights."
6.5.1 a), c)	The U.S. Federal Aviation Regulations do not require all seaplanes for all flights to be equipped with: a) equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea; or b) one sea anchor (drogue).
6.5.3.1	The U.S. 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.
6.7.5	U.S. regulations require that oxygen dispensing units capable of being automatically presented to the passengers and cabin attendants (before the cabin pressure altitude exceeds 15,000 feet) be installed, in all transport category aircraft approved to operate above 30,000 feet, type certificated on or after 1 September 1977.
6.9.2	The U.S. Federal Aviation Regulations state "weight" and express weight in pounds.
6.12	The U.S. Federal Aviation Regulations do not require airplanes operated above 15,000 meters (49,000 feet) to carry equipment to measure and indicate continuously the dose rate of total cosmic radiation being received and the cumulative dose on each flight.
6.15.1, 6.15.2	The U.S. Federal Aviation Regulations state "weight" and express weight in pounds.
6.17.1	The U.S. only requires one automatic−type, emergency locator transmitter in operable condition that meets the requirement of TSO−C91. However, installations of emergency locator transmitters which occur after 21 June 1995 must meet the requirements of TSO−C91A.
6.17.2	Emergency locator transmitters are not required for: turbojet−powered aircraft, aircraft while engaged in scheduled flights by scheduled air carriers, or aircraft while used to show compliance with regulators or crew training.
6.18.1	U.S. regulations do not require such airplanes to be equipped with an airborne collision avoidance system (ACAS II). U.S. regulations only require equipage with TCAS II which is not equivalent to ACAS II.
6.18.2	U.S. regulations do not require such airplanes to be equipped with an airborne collision avoidance system (ACAS II). U.S. regulations only require equipage with TCAS I.

6.19	U.S. regulations do not require that all airplanes be equipped with pressure−altitude reporting transponders. The U.S. requirement for pressure altitude reporting transponders depends on the specific airspace in which airplanes fly.
Chapter 8	**Aeroplane Maintenance**
8.1.3	U.S. regulations do not require persons who sign maintenance releases to be licensed strictly in accordance with the provisions of Annex 1. U.S. requirements do not include knowledge of human performance/limitations or entries on the license such as specific aircraft model and avionic systems or components (or under broad categories).
8.7.5.4	There is no comparable requirement in U.S. regulations for training in knowledge and skills related to human performance.
8.7.6.2	U.S. regulations require that records of work shall be retained until the work is repeated, superseded by other work or for one year after the work is performed.
8.8.2	The U.S. does not require records to be maintained after the end of the operating life of the unit.
Chapter 9	**Aeroplane Flight Crew**
9.5	The U.S. Federal Aviation Regulations do not require a flight crew member to have a spare set of suitable lenses readily available when exercising the privileges of a license for which he/she was assessed as fit subject to suitable correcting lenses being worn. However, the U.S. practice is to require extra correcting lenses when a flight crew member's defective visual acuity necessitates a limitation; i.e., worse than 20/100 uncorrected distance visual acuity.
Chapter 11	**Manuals, Logs and Records**
11.1.11	a) Operators may conduct operations without an approved minimum equipment (MEL) list provided all instruments and equipment are fully operable. b) The U.S. prohibits operations to be conducted solely under the provisions of a master minimum equipment list (MMEL). Each operator must develop its own MEL, based on the MMEL, which includes operational procedures. When approved, the MEL may be used only by the individual operator.
PART II	
General	The U.S. does not accept any provision of Annexes 2, 6, 10, or 11 or any other Annex as a Standard or Recommended Practice as applicable to State aircraft. In accordance with Article 3(a) of the Convention of International Civil Aviation, the Convention and its Annexes are not applicable to State aircraft. In so far as any provisions of Annexes 2, 6, 10 or 11 address the operation or control of State aircraft, the U.S. considers such provisions to be in the nature of a special recommendation of the Council, advisory only, and not requiring the filing of differences under Article 38 of the Convention.
Chapter 1	**Definitions**
Category I (Cat I) operation	For a Category I operation, the U.S. requires a decision height (DH) of not less than 200 feet and either visibility of not less than 1/2 mile or a runway visual range of 2,400 feet (RVR 1,800 feet with operative touchdown zone and runway centerline lights).
Category II (Cat II) operation	The U.S. requires that Category II provide approaches to minima of less than 200 feet DH/2,400 runway visual range to as low as 100 feet DH/1,200 runway visual range.
Category IIIA (Cat IIIA) operation	U.S. criteria are the same as those adopted in Part 1 of Annex 6. However, the runway visual range is expressed as not less than 700 feet (200 meters).
Category IIIB (Cat IIIB) operation	U.S. criteria are the same as those adopted in Part 1 of Annex 6. However, the runway visual range is expressed as less than 700 feet (200 meters), but not less than 150 feet (50 meters).

Minimum descent altitude (MDA) or minimum descent height (MDH)	The U.S. does not use MDH (or height above airport) as an altitude or height in a nonprecision approach or circling approach below which descent must not be made without the required visual reference.
Chapter 3	**General**
3.5	The pilot−in−command is not required to have available on board the airplane essential information concerning search and rescue services.
Chapter 4	**Flight Preparation and In−Flight Procedures**
4.3	Except as provided for in 14 CFR 91.519 for large and turbine−powered, multi−engine airplanes, the pilot−in−command is not required to ensure that crew members and passengers are familiar with the location and use of emergency exits, life jackets, oxygen dispensing equipment, or other emergency equipment provided for individual use.
4.6.2.1	A destination alternate airport is not required when the weather at the airport of intended landing is forecast to have a ceiling of at least 2,000 feet and a visibility of at least 3 miles. In addition, standard alternate airport minima are prescribed as follows: 600−foot ceiling and 2 miles visibility are prescribed for precision approaches, and 800−foot ceiling and 2 miles visibility for nonprecision approaches.
4.6.2.2 b)	The forecast period for the destination alternate airport is from 1 hour before to 1 hour after the estimated time of arrival. In addition, the minima for ceiling/visibility at the airport of intended landings are 2,000 feet and 3 miles; that is, when at least such minima exist, no alternate airport is required.
4.6.3	A flight is permitted to continue towards the airport of intended landing when the latest available meteorological information indicates that conditions at that airport will, at the expected time of arrival, be at or below the specified airport meteorological minima.
4.9	The pilot−in−command is not required to ensure that all persons on board the aircraft during an emergency are instructed in emergency procedures.
4.14 b)	The pilot−in−command is not required to discontinue a flight at the nearest suitable airport when flight crew members' capacity to perform functions is significantly reduced by impairment of faculties from causes such as fatigue, sickness or lack of oxygen.
4.18.1, 4.18.2	The recommendation concerning aircraft refueling with passengers on board is not addressed in U.S. regulations. U.S. experience has not demonstrated a need for such regulation.
Chapter 6	**Aeroplane Instruments and Equipment**
6.1.3.1.1	All airplanes on all flights are not required to be equipped with an accessible first aid kit, portable fire extinguishers, seat or berth for each person, current and suitable air navigation charts, or spare electrical fuses. However, spare fuses are required on all airplanes operated at night or under instrument flight rules. In addition, general aviation aircraft presently are not required to carry on board either procedures, as prescribed in Annex 2, for pilots−in−command of intercepted aircraft or visual signals for use by intercepting and intercepted aircraft. (See ENR 1.12, Interception of Civil Aircraft National Security and Interception Procedures.)
6.1.3.1.2	All airplanes on all flights are not required to be equipped with ground/air signal codes for search and rescue purposes.
6.2.1 b), c)	An accurate time piece and a sensitive pressure altimeter are not required for VFR flight.
6.3.1 a), b), c), and d)	The U.S. does not require all seaplanes on all flights to be equipped with the items listed in subparagraphs a), b), c), and d).
6.3.2	Single−engine airplanes flying over water are not required to be equipped with life jackets or equivalent individual flotation devices when the airplane is operated more than 50 nautical miles from land suitable for an emergency landing.

6.3.3 a)	Only large and turbine−powered, multi−engine airplanes are required to carry life preservers or an approved flotation means for each occupant of an airplane on a flight over water more than 50 nautical miles from the nearest shore.
6.3.3 b)	Only large and turbine−powered, multi−engine airplanes on flights over water for more than 30 minutes flying time or 100 nautical miles from the nearest shore are required to have life rafts and pyrotechnic signaling devices.
6.4	Not all airplanes on flights over land areas designated as areas in which search and rescue would be especially difficult are specifically required to be equipped with signaling devices or life−saving equipment.
6.5	All airplanes on high altitude flights, both pressurized and unpressurized, are required to carry oxygen for the crew and passengers.
6.6 f), h), and i)	All airplanes when operated in accordance with the instrument flight rules or when the airplane cannot be maintained in a desired altitude without reference to one or more flight instruments are not required to be equipped with: −− an outside air temperature indicator. −− an airspeed indicating system with a means of preventing malfunctioning due to condensation or icing; or −− a rate of climb and descent indicator.
6.7 a), c), d), e) and f)	All airplanes operated at night are not required to be equipped with: −− A turn and bank indicator. −− An attitude indicator (artificial horizon). −− A heading indicator (directional gyroscope). −− A means of indicating whether the supply of power to the gyroscope instruments is adequate. −− A sensitive pressure altimeter. −− A means of indicating the outside air temperature. −− A timepiece with a sweep second hand. −− An airspeed indicating system with a means of preventing malfunctioning due to either condensation or icing. −− A rate−of−climb and descent indicator. −− A landing light. −− Illumination for flight instruments and equipment. −− Lights in passenger compartments; or −− An electric torch for each crewmember station.
6.9	The U.S. does not require general aviation aircraft to be equipped with ground proximity warning systems.
6.10.3.1 and Recommendation 6.10.3.2	The requirement for U.S. general aviation airplanes to be equipped with flight data recorders (FDRs) is based on passenger and engine configurations. Specifically, FDRs are required for U.S. civil registered multiengine, turbine−powered airplanes having a passenger seating configuration of 10 passengers or more, excluding any pilot seats.
6.10.4.1 and Recommendation 6.10.4.2	The requirement for U.S. general aviation airplanes to be equipped with cockpit voice recorders (CVRs) is based on passenger, crew, and engine configurations. Specifically, CVRs are required for U.S. civil registered multiengine, turbine−powered airplanes having a passenger seating configuration of six passengers or more, and for which two pilots are required by type certification.
6.10.7.2	U.S. regulations do not require that flight recorders be deactivated upon completion of flight time following an accident or incident, or prohibit their reactivation before their disposition is determined. U.S. regulations require that such recorders be operated continuously from the use of checklist before the flight to completion of the final checklist at the end of the flight (14 CFR Section 91.609(d) and (g)).
6.12.1	Emergency locator transmitters are not required for: turbojet−powered aircraft while operated in scheduled flights by scheduled air carriers; training operations within a 50−nautical mile radius of the airport from which the flight began; flight operations incident to design and testing; flight operations of new aircraft incident to manufacture, preparation, and delivery; agricultural aircraft operations; aircraft certificated for research and development purposes; operations showing compliance with regulations, crew training, exhibition, air racing, or market surveys; or aircraft equipped to carry not more than one person.

Recommenda-tion 6.14	U.S. regulations do not require that flight crew members communicate through boom or throat microphones below the transition level/altitude.
Chapter 7	**Aeroplane Communication and Navigation Equipment**
7.1.1	All airplanes operated at night are not required to have radio communications equipment capable of conducting two−way communications with aeronautical stations.
7.1.2	When more than one radio communications equipment unit is required, it is not required that each unit be independent of the other or others.
7.1.4	Except when operating under instrument flight rules, airplanes operated 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 at any time during flight with aeronautical stations.
7.1.5	The U.S. does not base its requirement for radio communications equipment in general aviation aircraft on the criteria included in ICAO Annex 6, Part II (Chapters 6 and 7); for example, all night operations, operations over land areas in which search and rescue would be especially difficult, etc. Instead, U.S. requirements for such equipment is based upon the type of airspace with which the aircraft is to be involved; that is, use of controlled airspace such as terminal control areas (Class B Airspace), airport radar service areas, and positive control areas (Class A Airspace). Thus, U.S. requirements do not depend on such ICAO factors as time of day of the operation or the nature of the land over which the operation is to be conducted. Where such equipment is required by U.S. regulations, the aeronautical emergency frequency of 121.5 MHz is automatically available to all such radio−equipped aircraft since the VHF communications frequency range encompasses the emergency frequency of 121.5 MHz.
7.2.4	An airplane is not required to be provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the airplane to proceed in accordance with 7.2.1.
Chapter 8	**Aeroplane Maintenance**
8.3.2	The U.S. does not require records to be maintained after the end of the operating life of the unit.
PART III	
SECTION I	
General	The U.S. does not accept any provision of Annexes 2, 6, 10, or 11 or any other Annex as a Standard or Recommended Practice as applicable to State aircraft. In accordance with Article 3(a) of the Convention of International Civil Aviation, the Convention and its Annexes are not applicable to State aircraft. In so far as any provisions of Annexes 2, 6, 10, or 11 address the operation or control of State aircraft, the U.S. considers such provisions to be in the nature of a special recommendation of the Council, advisory only, and not requiring the filing of differences under Article 38 of the Convention.
Chapter 1	**Definitions**
Minimum descent altitude (MDA) or minimum descent height (MDH)	The U.S. does not use MDH (or height above airport) as an altitude or height in a non−precision approach or circling approach below which descent must not be made without the required visual reference.
Performance Class 1 helicopter	The U.S. does not have performance class designations for helicopters.
Performance Class 2 helicopter	The U.S. does not have performance class designations for helicopters.
Performance Class 3 helicopter	The U.S. does not have performance class designations for helicopters.

SECTION II − International Commercial Air Transport	
2.2.11	The U.S. regulations require that helicopters flown over water in passenger−carrying operations must simply be equipped with flotation devices.
2.3.4.1 b)	The U.S. has no requirement that a point of no return (PNR) be determined.
2.3.4.3	The U.S. has no related requirement for the use of on−shore versus off−shore alternate heliports.
2.3.6.2 b)	The requirement for fuel reserves for VFR operations is 20 minutes at normal cruise speed.
2.3.6.3.1	There is no U.S. requirement for maintenance of a specific altitude above a destination. In addition, the U.S. requirement is based on normal cruise speed, not holding speed, and provides for a single, 30−minute reserve.
2.3.6.3.2	There is no requirement for maintenance of a specific altitude above an alternate. In addition, the requirement is based on normal cruise speed, no holding speed, and provides for a single, 30−minute reserve.
2.3.6.3.3	The U.S. has no related requirement. If the destination weather so requires, an alternate must be specified and a 30−minute fuel reserve carried.
Chapter 3	**Helicopter Performance Operating Limitations**
3.1.1	The U.S. has no related performance class requirements.
Chapter 4	**Helicopter Instruments, Equipment and Flight Documents**
4.3.3.1 and Recommendation 4.3.3.2	The U.S. requires that multi−engine, turbine−powered rotorcraft having a passenger seating configuration of 20 or more seats be equipped with one or more flight recorders. In addition, multi−engine, turbine−powered rotorcraft, brought onto the U.S. register after 1 October 1991 having a passenger seating configuration of 10 to 19 seats must have one or more flight recorders.
4.3.5	The U.S. requires cockpit voice recorders in all multi−engine, turbine−powered rotorcraft having a passenger seating configuration of 20 or more seats and in all multi−engine, turbine−powered rotorcraft having a passenger seating configuration of six or more and for which two pilots are required by certification or operating rules.
4.5.1	U.S. regulations require that helicopters flown over water in passenger−carrying operations must simply be equipped with flotation devices.
4.5.2.1	Life rafts and pyrotechnic signaling devices are only required for extended over−water operations; that is, with respect to helicopters, an operation over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline and more than 50 nautical miles from an off−shore heliport structure.
4.7 (all)	The U.S. does not require rotorcraft to carry emergency locator transmitters.
4.11.1 c)	The U.S. requires only one landing light for operations conducted at night for hire.
4.15	U.S. regulations do not require that all helicopters be equipped with pressure−altitude reporting transponders. The U.S. requirement for pressure−altitude reporting transponders depends on the specific airspace in which helicopters fly.
Chapter 6	**Helicopter Maintenance**
6.3	There is no comparable requirement in U.S. regulations for training in knowledge and skills related to human performance.
Chapter 7	**Helicopter Flight Crew**
7.4.1	Recency of experience need not be in the same type of helicopter.
7.4.2	Recency of experience need not be in the same type of helicopter.
7.4.3.3	There is no U.S. equivalent for nonscheduled, commercial helicopter operations.
7.5	The U.S. has no related requirement.
Chapter 11	**Security**
11.1	The U.S. has no related requirement.

SECTION III − International General Aviation	
Chapter 2	**Flight Operations**
2.3.1 b), c), d), and e	The U.S. has no related requirement.
2.3.2	The U.S. has no related requirement.
2.6.2.1	A destination alternate heliport is not required when the weather at the heliport of intended landing is forecast to have a ceiling of at least 2,000 feet and a visibility of at least 3 miles. In addition, standard alternate heliport minima are prescribed as follows: 600−foot ceiling and 2 miles visibility are prescribed for precision approaches, and 800−foot ceiling and 2 miles visibility for non−precision approaches.
2.6.2.2	The forecast period for the destination heliport is from 1 hour before to 1 hour after the estimated time of arrival. In addition, the minima for ceiling/visibility at the heliport of intended landing are 2,000 feet and 3 miles; that is, when at least such minima exist, no alternate heliport is required.
2.7.1 b)	The U.S. has no related requirement.
2.7.2	The U.S. has no requirement for one engine inoperative performance capability.
2.8.2b)	The U.S. requirement for fuel reserves for VFR operations is 20 minutes at normal cruise speed.
2.8.3.1	There is no U.S. requirement for maintenance of a specific altitude above the destination. In addition, the requirement is based on normal cruise speed, not holding speed, and provides for a single 30−minute reserve.
2.8.3.2	There is no U.S. requirement for maintenance of a specific altitude above the alternate. In addition, the requirement is based on normal cruise speed, not holding speed, and provides for a single 30−minute reserve.
2.8.3.3	The U.S. has no related requirement. If the destination weather so requires, an alternate must be specified and a 30−minute fuel reserve carried.
2.8.4 d)	The U.S. has no related requirement.
2.9.1	The U.S. oxygen supply requirement applies to crew members at altitudes between 12,500 and 14,000 feet. For passengers, the requirement applies above 15,000 feet.
2.10	The U.S. requirement for flight crew members applies at altitudes above 14,000 feet.
2.11	The pilot−in−command is not required to ensure that all persons on board the aircraft during an emergency are instructed in emergency procedures.
2.14 b)	The U.S. has no related requirement.
2.17	The U.S. has no related requirement.
2.18	The recommendations concerning aircraft refueling with passengers on board are not addressed in U.S. regulations. U.S. experience has not demonstrated a need for such regulation.
2.19	The U.S. has no related requirement.
Chapter 3	**Helicopter Performance Operating Limitations**
3.3	The U.S. does not have performance class designations for helicopters.
3.4	The U.S. does not have performance class designations for helicopters.
Chapter 4	**Helicopter Instruments, Equipment and Flight Documents**
4.1.3.1	The U.S. does not require general aviation helicopters to be equipped with a first aid kit or portable fire extinguishers, or to have procedures for pilots−in−command of intercepted aircraft or a list of visual signals for use by intercepting and intercepted aircraft. Spare fuses are not required for day VFR operations.
4.1.3.2	The U.S. has no related requirement.
4.1.3.3	The U.S. requires rotorcraft manufactured after 16 September 1992 to be equipped with a safety belt and shoulder harness for each occupant's seat.
4.1.4.1	The U.S. has no related requirement.
4.1.4.2	The U.S. has no related requirement.

4.2.1	An accurate time piece is not required for VFR flight. In addition, a non−sensitive pressure altimeter is required.
4.3.1	The U.S. has no related requirement.
4.3.2.1	Approved flotation gear and at least one pyrotechnic signaling device are required for aircraft operating for hire over water and beyond a power−off gliding distance from shore.
4.3.2.3	The U.S. has no related requirement.
4.3.2.6	The U.S. has no related requirement.
4.4	The U.S. has no related requirement.
4.6 f)	Only one attitude indicator (artificial horizon) is required.
4.7.1	Landing lights and electric torches are not required for all night operations.
4.9.3.1 and Recommendation 4.9.3.2	The requirement for U.S. general aviation helicopters to be equipped with flight data recorders (FDRs) is based on passenger and engine configurations. Specifically, FDRs are required for U.S. civil registered multiengine, turbine−powered rotorcraft having a passenger seating configuration of 10 passengers or more, excluding any pilot seats.
4.9.4.1 and Recommendation 4.9.4.2	The requirement for U.S. general aviation helicopters to be equipped with cockpit voice recorders (CVRs) is based on passenger, crew, and engine configurations. Specifically, CVRs are required for U.S. civil registered multiengine, turbine−powered rotorcraft having a passenger seating configuration of six passengers or more, and for which two pilots are required by type certification.
4.9.7.2	U.S. regulations do not require that flight recorders be deactivated upon completion of flight time following an accident or incident, or prohibit their reactivation before their disposition is determined. U.S. regulations require that such recorders be operated continuously from the use of checklist before the flight to completion of the final checklist at the end of the flight (14 CFR 91.609 (d) and (g)).
4.10	Emergency locator transmitters are not required for rotorcraft.
4.12	U.S. regulations do not require that flight crew members communicate through boom or throat microphones below the transition level/altitude.
Chapter 5	**Helicopter Communication and Navigation Equipment**
5.2.2	The U.S. has no minimum navigation equipment requirement for VFR flights.

ANNEX 7 – AIRCRAFT NATIONALITY AND REGISTRATION MARKS	
3.3.1 and 4.2.1	The marks on wing surfaces are not required.
3.2.5 and Section 8	Identification plates are not required on unmanned, free balloons.
4.2.2	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.
Section 6	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.

ANNEX 8 – AIRWORTHINESS OF AIRCRAFT	
PART II Procedures for Certification and Continued Airworthiness	
Chapter 4	**Continued Airworthiness of Aircraft**
4.2.3 (d)	This provision requires the State of Registry to address mandatory continuing airworthiness information from the State of Design. The U.S. does not generally issue Airworthiness Directives for non−type certificated aircraft. This includes foreign aircraft that are U.S.−registered, but operate under experimental rather than standard airworthiness certificates.
PART III Aeroplanes	
Part IIIA	
Chapter 4	**Design and Construction**
4.1.6 (b), 4.1.6 (g), 4.1.6 (h), 4.1.6 (i)	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 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 (b)	This provision addresses the lights' affect on outside observers in reference to "harmful dazzle." The U.S. regulations do not address the affect of aircraft lights on outside observers. However, visibility to other pilots and the lights' affect 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	**Large Aeroplane Certification**
D.2 (b)	The United States 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 published a Notice of Proposed Rulemaking that, when adopted, will meet the intent of these provisions.
D.2 (f)	The provision requires lavatory fire protection systems (detection and suppression) for all airplanes covered by Part IIIB. U.S. regulations only require lavatory fire protection systems for airplanes with 20 or more passengers.
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. The FAA published a Notice of Proposed Rulemaking that, when adopted, will meet the intent of these provisions.
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.

D.2 (i)	The FAA published a Notice of Proposed Rulemaking that, when adopted, will meet the intent of these provisions.
D.5.	While there are no specific electrical bonding requirements in the FARs, U.S. regulations address lightning and system requirements. The FARs do not address the protection of those persons coming into contact with an airplane on the ground or in the water.
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.
F.4.2 (b)	This provision addresses the lights' affect on outside observers in reference to "harmful dazzle." The U.S. regulations do not address the affect of aircraft lights on outside observers. However, visibility to other pilots and the lights' affect on the flight crew is addressed.
F.5.	U.S. regulations do not address electromagnetic interference from external sources. High Intensity Radiated Fields (HIRF) are addressed by Special Conditions but only for flight critical systems, not flight essential systems.
G.3.5.	The United States does not have similar requirements. The FAA proposed new U.S. regulations with the purpose of eventually meeting the intent of these provisions.
K.2, K.3.1, K.3.2, K.4	With respect to K.1 and K.3, the United States does not have any specific requirements. With respect to K.2 the FAA has no current requirements with respect to the flight crew compartment bulkhead. 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 IV Helicopters	
Part IVA	
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 not adopted the requirements to present take off distance for non−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' affect on outside observers in reference to "harmful dazzle." The U.S. regulations do not address the affect of aircraft lights on outside observers. However, visibility to other pilots and the lights' affect on the flight crew is addressed.
PART VII Propellers	
Sub−Part B	**Design and Construction**
B.2	U.S. Regulations do not require a failure analysis.
Sub−Part C	**Test and Inspections**
C.2 (c)	U.S. Regulations do not contain bird impact or lightning strike requirements.

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 − VOLUME I − AERONAUTICAL TELECOMMUNICATIONS	
PART I	
Chapter 3	
3.1.4.1 3.1.4.2 3.1.4.3	The U.S. does not require such equipage for aircraft.
3.1.7.3.1 c)	When necessary to achieve coverage to the edges of the localizer course, the U.S. authorizes coverage over a greater distance than that specified in 3.1.7.3.1 c); i.e., up to 1,200 meters (4,000 feet) along the localizer course centerline.
3.3.8.1 3.3.8.2 3.3.8.3	The U.S. does not require such equipage for aircraft.
PART II	
Chapter 4	
4.1.5.2	In the U.S., the shortage of communications channels, compared with the total operational requirement, has resulted in the geographical separation between facilities working on the same frequency being considerably less (up to 50 percent reduction) than the Standard defined for such separation.
ANNEX 10 − VOLUME II − AERONAUTICAL TELECOMMUNICATIONS	
Chapter 3	
3.3.2	Class B traffic, including reservation messages pertaining to flights scheduled to depart within 72 hours, shall not be acceptable for transmission over U.S. Government operated AFTN circuits, except in those cases where it has been determined by the U.S. that adequate non−government facilities are not available.
Chapter 4	
4.4.2	In the Caribbean Region, U.S. industry−operated AFTN terminals will continue to accept messages in both ICAO and non−ICAO formats. The U.S. now accepts only messages in ICAO format from other states, including the Caribbean Region.
Chapter 5	
5.2.1.3.1.1	The U.S. will use the term ''hundred'' in stating altitude numbers by radiotelephone. Whole hundreds will be spoken as follows: 400 − "Four hundred" 4,500 − "Four thousand five hundred"
5.2.1.3.1.2	The U.S. will use the term "point" in lieu of "decimal" in stating frequencies: 126.55 MHz − "One two six point five five" 8,828.5 MHz − "Eight eight two eight point five"
5.2.1.6.1	Air route traffic control centers will use "center" rather than "control" in their radiotelephone identification. Example: "Washington Center." Approach control service units will use "approach control" or "departure control" rather than "approach" in their radiotelephone identification. Example: "Washington Approach Control" or "Washington Departure Control." Aerodrome control towers will use "ground control" or "clearance delivery" rather than "tower" in their radiotelephone identification, where appropriate, to identify ground control services. Example: "Washington Ground Control" or "Washington Clearance Delivery."
5.2.1.6 5.2.1.6.2.1.1 5.2.1.6.2.2.1	U.S. procedures allow abbreviation of only Type a) call signs and limit abbreviation to not less than **three** characters following the first character of the registration marking or the manufacturer of the aircraft. Also, the U.S. does not use call signs comprised of aircraft operating agency telephony designators in combination with aircraft registration markings (Type b).
Remarks	To facilitate understanding, examples (5.2.1.6) should follow rather than precede corresponding provisions which govern them (5.2.1.6.2.1.1 and 5.2.1.6.2.2.1).

5.2.2.1.1.1 5.2.2.1.1.2	The U.S. Federal Aviation Regulations do not require that a continuous airborne guard on VHF121.5 MHz be maintained.
ANNEX 10 − VOLUME III − AERONAUTICAL TELECOMMUNICATIONS	
PART I	
4.2.1.2 4.2.1.3	In the U.S., AMSS terminals shall have the capability of operating in the frequency bands 1544−1559 MHz and 1645.5−1660.5 MHz bands. (NOTE: Use of the band 1544−1545/1645.5−1646.5 MHz by the mobile satellite service is limited to distress and safety.)
PART II	
2.3.3.1 2.3.3.2 2.3.3.3	The U.S. does not require such equipage for aircraft.
ANNEX 10 − VOLUME IV − AERONAUTICAL TELECOMMUNICATIONS	
4.3.2.2.2 4.3.2.2.2.2 4.3.2.2.2.2.2 4.3.2.2.2.2.3	TCAS II Version 6.04A Enhanced Interference Limiting Algorithms won't comply with these sections of the standards and recommended practices (SARPs). See remark below.
4.3.5.1	TCAS II Version 6.04A Enhanced won't comply because it has a 3−second coordination delay. See remark below.
4.3.5.3	TCAS II Version 6.04A Enhanced does not comply since the section implies a requirement for reversals in some instances in encounters between two TCAS II−equipped aircraft. See remark below.
4.3.5.4	TCAS II Version 6.04A Enhanced does not comply since the section explicitly requires reversal of coordinated resolution advisories (RAs) under some circumstances. See remark below.
4.3.5.5	TCAS II Version 6.04A Enhanced does not comply since it contains a dormancy requirement, does not have 5−second targets, and only has surveillance of $\pm$ 3,000 feet in altitude. See remark below.
4.3.8.4.2.2.1 4.3.8.4.2.2.1.1 4.3.8.4.2.2.1.3 4.3.8.4.2.2.1.4 4.3.8.4.2.2.1.5 4.3.8.4.2.2.1.6 4.3.8.4.2.2.16.1 4.3.8.4.2.2.1.6.2 4.3.8.4.2.2.1.6.3	TCAS II Version 6.04A Enhanced has different RA Report formats in DF = 20, 21 replies. See remark below.
4.3.8.4.2.2.2 4.3.8.4.2.2.3	TCAS Version 6.04 Enhanced has different Data Link Capability format in DF = 20, 21 replies. See remark below.
4.3.8.4.2.3.4 4.3.8.4.2.3.4.1 4.3.8.4.2.3.4.2 4.3.8.4.2.3.4.3 4.3.8.4.2.3.4.4 4.3.8.4.2.3.4.5 4.3.8.4.2.3.4.6	TCAS II Version 6.04A Enhanced RA does not meet the Broadcast format specified in these sections. See remark below.
4.3.8.4.2.4.2.1 4.3.8.4.2.4.2.3 4.3.8.4.2.4.2.4	TCAS II Version 6.04A Enhanced has a different Coordination Reply format in DF = 16 replies. See remark below.
Remark	The U.S. does not require TCAS II Version 7 (ACAS II) equipage in its National Airspace System.

ANNEX 11 − AIR TRAFFIC SERVICES	
Chapter 1	**Definitions**
Air−taxiing	U.S. uses "hover taxi" for this maneuver above 100 feet above ground level (AGL) and "air taxi" below 100 feet AGL.
Airborne collision avoidance	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−1 generates traffic advisories only. TCAS−II generates traffic advisories and resolution (collision avoidance) advisories in the vertical plane.
Chapter 2	**General**
2.6	The Class F airspace is not used in the designation of U.S. airspace.
2.9 2.11 Appendix 1 Appendix 2	Converting the present U.S. system for identifying ATS routes and significant points to conform to the provisions of amended paragraphs 2.9 − 2.9.2, 2.11 − 2.11.3, Appendix 1 and Appendix 2 is an effort of considerable magnitude and complexity. The U.S. has an ongoing program to accomplish the conversion, but it is estimated that a period of 2 to 5 years will be required for full compliance.
Chapter 3	**Air Traffic Control Service**
3.3.3 Exception Clause	Clearances may be issued to conduct flight in VFR conditions without a pilot request if the clearance would result in noise abatement benefits or when a pilot conducts a practice instrument approach.
Chapter 4	**Flight Information Service**
4.2.2 b)	No provision is made for the issuance of collision hazard information to flights operating in Class G airspace.
4.3.4.4 h) 4.3.4.8	The U.S. requires that the current altimeter setting be included in the ATIS broadcast. Information contained in a current ATIS broadcast, the receipt of which has been acknowledged by an aircraft, is not included in a directed transmission to the aircraft unless requested by the pilot.
4.3.5 4.3.6 4.3.7	The order in which information is listed in ATIS broadcast messages is not mandated and certain elements are regarded as optional.
Appendix 1	**Principles Governing the Identification of RNP Types and the Identification of ATS Routes Other Than Standard Departure and Arrival Routes**
	See 2.9, above.
2.2.1	Routes designated to serve aircraft operating from 18,000 MSL up to and including FL 450 are referred to as "jet routes" and are designated with the letter "J" followed by a number of up to three digits.
Appendix 2	**Principles Governing the Establishment and Identification of Significant Points**
	See 2.9, above.
2.1	The U.S. will not comply with this guidance in naming the Missed Approach Point (MAP) located at the landing threshold.
Appendix 4	**ATS Airspace Classifications**
	It should be noted that the term "Class B airspace" as used in the U.S. is more restrictive than that specified by ICAO. Flights within Class B Airspace in the U.S. must be operated in accord with the provisions of 14 CFR Part 91 (Section 91.90).
	Speed restrictions do not necessarily 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. However, in airspace underlying a Class B airspace area designated for an airport, or in a VFR corridor designated through such a Class B airspace area, pilots are expected to comply with the 200 knot speed limit specified in 14 CFR Part 91 (Sections 91.117(c) and 91.703). This difference will allow airspeed adjustments exceeding 250 knots, thereby improving air traffic services, enhancing safety and expediting air traffic movement.

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**
5.12	The full exchange of information is vital to effective accident investigation and prevention. The U.S. supports, in principle, measures that are intended to facilitate the development and sharing of information. The laws of the U.S. require the determination and public reporting of the facts, circumstances, and probable cause of every civil aviation accident. This requirement does not confine the public disclosure of such information to an accident investigation. However, the laws of the U.S. do provide some protection against public dissemination of certain information of a medical or private nature. Also, U.S. law prohibits the disclosure of cockpit voice recordings to the public and limits the disclosure of cockpit voice recording transcript to that specific information which is deemed pertinent and relevant by the investigative authority. However, U.S. Courts can order the disclosure of the foregoing information for other than accident investigation purposes. The standard for determining access to this information does not consider the adverse domestic or international effects on investigations that might result from such access.
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 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**
6.13	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*	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.
3.1.18*	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.
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.
6.2.3*	The maximum dimension of the rectangles in a checkered pattern is 6 meters on a side.

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.
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 2	**Definitions**
Danger area	"Danger area" is not used in reference to areas within the U.S. or in any of its possessions or territories.
Integrated Aeronautical Information Package	The U.S. does not produce the entire information package.
Maneuvering area	This term is not used by the U.S.
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.
Prohibited area Restricted area	The terms "prohibited area" and "restricted area" will be employed substantially in accordance with the definitions established. Additionally, the following terms will be used: 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. Alert areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an alert area are conducted in accordance with Federal Aviation Regulations, and pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance. Controlled firing area. Airspace wherein activities are conducted under conditions so controlled as to eliminate 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. Military operations area (MOA). 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.
Chapter 4	**Aeronautical Information Publications (AIP)**
4.2.8 4.3.4	The U.S. does not publish an aeronautical information regulation and control (AIRAC).
4.4 4.5	The U.S. does not issue AIP supplements. Corrections or changes from the latest amendments to the AIP are carried as NOTAMs.
Chapter 5	**NOTAM**
5.1.1.2	The U.S. does not routinely issue "trigger NOTAMs" referencing published material when an AIP amendment is issued.
5.2.1	The current U.S. system numbers international NOTAMs consecutively by the location in the A field. The U.S. routinely issues over 70,000 outgoing international NOTAMs each year. Only series A is used for international distribution. This precludes numbering the NOTAMs by the originator.
5.2.3	The U.S. periodically issues multipart NOTAMs which are transmitted as multiple telecommunication messages. The nature of the NOTAM material is such that it will not always fit in one message.
5.2.8.1	The monthly checklist of NOTAMs does not specifically reference printed publications, such as AIP amendments.
5.2.8.3	A monthly printed plain language summary of NOTAMs in force is not issued. The International NOTAM publication, issued biweekly, is not inclusive of all U.S. international NOTAMs.
5.3.2	The U.S. does not use the System NOTAM format at this time. The format used is based on the previous ICAO Class I format. See notes on Appendix 6 for details.
Chapter 6	**Aeronautical Information Regulation and Control (AIRAC)**
	See 4.2.8.

Chapter 8	Pre−Flight and Post−Flight Information
8.1.2.1 f)	NOTAMs relating to bird hazards are relayed as local NOTAM information and are not disseminated internationally. The information is available from the local flight service station during preflight briefing.
Appendix 1	**Contents of Aeronautical Information Publication (AIP)**
GEN 2.7	The U.S. does not publish sunrise/sunset tables in the AIP.
GEN 3.1.3 4)	The U.S. does not publish pre−flight information bulletins (PIBs).
Appendix 2	**SNOWTAM Format**
	The U.S. does not use the SNOWTAM for issuance of winter weather information. Snow conditions are reported using our current international NOTAM format (Class I).
Appendix 3	**ASHTAM Format**
1.3	ASHTAM information will continue to be distributed as an International NOTAM.
2.1	The heading will not be entered as stated.
3	ASHTAM information will be distributed in U.S. International NOTAM format.
Appendix 6	**NOTAM Format**
	The U.S. is not prepared to transition to the System NOTAM format. NOTAMs are processed in the previous ICAO Class I format.
1.2 General	Multiple conditions, for a single location, may be reported in a NOTAM.
2 NOTAM numbering	The U.S. numbers NOTAMs consecutively by location, not by country of origin. Due to the volume of international NOTAMs generated by the U.S., the current U.S. numbering scheme is expected to continue.
3 Qualifiers	The current software will not accept the Item Q) qualifiers line.
5 Item B)	Item B) is currently issued as an eight digit date−time group. The U.S. also uses the initials "WIE" (with immediate effect) for NOTAMs that take effect immediately upon issuance. The U.S. does not include an Item B) in NOTAMCs. The assumption is that all cancellations take effect immediately when issued. While this date−time group could be added to NOTAMCs, the U.S. position is that it is unnecessary.
6 Item C)	Item C), like item B), is currently issued as an eight digit date−time group. The U.S. also uses the initials "UFN" (until further notice) for NOTAMs that have an uncertain duration.
8 Item E)	U.S. NOTAMs do not contain Item E) information for NOTAMCs. Remark: Item E) contains the NOTAM Code (Q−code) in addition to plain language and ICAO abbreviations.

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
Adopted by the ICAO Council 6/26/81
Effective Date: 1/1/83
Applicability Date: 1/1/84
(Note: Differences are to be filed with ICAO by 6/1/83).

PANS − OPS − 8168/611	
VOLUME 1	
PART III	
Table III−1−1 and Table III−1−2	The "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. The table listed below shows aircraft categories with an associated maximum airspeed and distance to remain within from the end of runway.

Aircraft Category	Speeds for Circling (Kts)	Circling Area Maximum Radii from Runway Threshold (NM)
A	Speed less than 91 Knots	1.3
B	Speed 91 Knots or more but less than 121 Knots	1.5
C	Speed 121 Knots or more but less than 141 Knots	1.7
D	Speed 141 Knots or more but less than 166 Knots	2.3
E	Speed 166 Knots or more	4.5

PART IV	
1.2.1	The airspeeds contained in ENR 1.5 shall be used in U.S. **CONTROLLED AIRSPACE**.

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 (DOT/FAA Order 7340.1). In addition, various U.S. publications contain abbreviations of terms used therein, particularly those unique to that publication.

GEN 2.2 Abbreviations Used in AIS Publications

NOTE − An "s" may be added for plural. ICAO indicates ICAO usage.

A	
/	and
AAS	airport advisory service
A/C	approach control
ICAO:	AAP − approach control; AC − altocumulus
ACFT	aircraft
ACR	air carrier
ADF	automatic direction finder
AER	approach end runway
AFIS	Automatic Flight Information Service
AFT	after
AGL	above ground level
AHRS	Attitude Heading Reference System
AIM	Aeronautical Information Manual
ALS	approach light system
ALSF−1	standard 2400' high−intensity approach lighting system with sequenced flashers (Category I configuration)
ALSF−2	standard 2400' high−intensity approach lighting system with sequenced flashers (Category II configuration)
ALSTG	altimeter setting
ALT	altitude
ALTM	altimeter
ALTN	alternate
AMDT	amendment
ICAO:	AMD − amendment
APCH	approach
APCHG	approaching
APRX	approximate
APV	approve or approved or approval
ARPT	airport
ICAO:	AD − aerodrome
ARR	arrive or arrival
ARSR	air route surveillance radar
ARTCC	air route traffic control center
ASDE	airport surface detection equipment
ASPH	asphalt
ATCT	air traffic control tower
ATD	along−track distance
ASR	airport surveillance radar
ATIS	automatic terminal information service
AVBL	available
AWY	airway
B	
BC	back course
BCN	beacon
BCST	broadcast
BLDG	building
BRG	bearing
BTN	between
BYD	beyond
C	
CAT	category
ICAO:	CAT − clear air turbulence
CFR	Code of Federal Regulations
CFR	crash fire rescue
CLNC	clearance
ICAO:	CLR − clear/cleared to/clearance
CLSD	close or closed or closing
CMSND	commissioned
CNTR	center
CNTRLN	centerline
ICAO:	CL − centerline
COMLO	compass locator
CONST	construction
CPTY	capacity
CRS	course
CTC	contact
ICAO:	CTR − control zone
D	
ICAO:	D − danger area
ICAO:	D − downward (tendency in RVR during previous 10 minutes)
DALGT	daylight
DCMSND	decommissioned

DDT	runway weight bearing capacity for aircraft with double dual−tandem type landing gear
DEGS	degrees
ICAO:	C − degrees Celsius (Centigrade) F − degrees Fahrenheit
DEP	depart; departure
ICAO:	DEP − depart/departure/departure message
DF	direction finder
ICAO:	DF − I am connecting you to the station you request
DH	decision height
DME	UHF standard (TACAN compatible distance measuring equipment)
ICAO:	DME − distance meaning equipment
DSPLCD	displaced
DSTC	distance
ICAO:	DIST − distance
DT	runway weight bearing capacity for aircraft with dual−tandem type landing gear
DURG	during
ICAO:	DRG − during
DVFR	defense visual flight rule
DW	runway weight bearing capacity for aircraft with dual−wheel type landing gear
E	
E	east
ICAO:	E − east/east longitude
EFAS	en route flight advisory service
ELEV	elevation
EMAS	Engineered Materials Arresting System
EMERG	emergency
EQUIP	equipment
ICAO:	EQPT − equipment
ETA	estimated time of arrival
ETE	estimated time en route
EXCP	except
ICAO:	EXC−except
EXTD	extend or extended
F	
FAF	final approach fix
FAR	Federal Aviation Regulation
FDC	flight data center

FI/P	flight information (permanent)
FI/T	flight information (temporary)
FL	flight level
FM	fan marker
FM	from
ICAO:	FM − from; FM − from (followed by time weather change is forecast to begin)
FREQ	frequency
FRQ	frequent
FSS	Flight Service Station
FT	feet
G	
GOVT	government
GP	glide path
ICAO:	GP − glide path
GS	glide slope
ICAO:	GS − ground speed; GS − small hail and/or snow pellets
GWT	gross weight
H	
HAA	height above airport
HAT	height above touchdown
ICAO:	HGT − height/height above
HIRL	High intensity runway lights
HOL	holiday
HWY	highway
I	
IAF	initial approach fix
IAP	instrument approach procedure
ICAO:	INA − initial approach
IDENT	identification
ICAO:	ID − identifier/identification/identify
IF	intermediate fix
ICAO:	IF − intermediate approach fix
IFR	instrument flight rules
IFSS	international flight service station
ILS	instrument landing system
INFO	information
INOP	inoperative
INS	Inertial Navigation System
INT	intersection
INTL	international
INTST	intensity

IRU	Inertial Reference Unit
ISMLS	interim standard microwave landing system
J	
J−bar	jet runway barrier
K	
KHZ	kilohertz
L	
L	left (used only to designate rwys; e.g., rwy 12L)
ICAO:	L − left/runway identification/locator
LAT	latitude
LB	pounds (weight)
LCTD	located
LDA	localizer type directional aid
ICAO:	LDA − landing distance available LLZ − localizer
LDIN	lead−in lighting system
LGTD	lighted
LMM	compass locator at ILS middle marker
LNDG	landing
ICAO:	LDG − landing
LOC	localizer
ICAO:	LOC−localizer or locally or location or located
LOM	compass locator at ILS outer marker
LONG	longitude
LRCO	limited remote communications outlet
M	
MAA	maximum authorized altitude
MAG	magnetic
MAINT	maintain, maintenance
ICAO:	MNTN − maintain; MAINT − maintenance
MALS	medium intensity approach light system
MALSR	medium intensity approach light system with runway alignment indicator lights
MAP	missed approach point
ICAO:	MAP − aeronautical maps and charts
MAX	maximum
MCA	minimum crossing altitude
MDA	minimum descent altitude
MEA	minimum en route IFR altitude
MHZ	megahertz
MIN	minimum or minute
MIRL	medium intensity runway edge lights
MLS	microwave landing system
MM	middle marker ILS
MOCA	minimum obstruction clearance altitude
MRA	minimum reception altitude
MSA	minimum safe altitude
MSL	mean sea level
MUNI	municipal
N	
N	north
NA	not authorized
NATL	national
NAVAID	navigational aid
NDB	nondirectional radio beacon
NM	nautical mile(s)
NOPT	no procedure turn required
NR	number
O	
OBSTN	obstruction
ODALS	omnidirectional approach lighting system
OM	outer marker ILS
OPER	operate
OPN	operation
ICAO:	OPR − operator/operate/operative/ operating/operational
ORIG	original
OTS	out of service
OVRN	overrun
P	
PAR	precision approach radar
PAT	pattern
PCN	pavement classification number
PERMLY	permanently
POB	persons on board
PPR	prior permission required
PROC	procedure
Q	
QUAD	quadrant
R	
R	right (used only to designate rwys; e.g., rwy 19R)
ICAO:	R − received (acknowledgement of receipt)/red/restricted area (followed by identification)/right (runway identification)

RADAR	radio detection and ranging
RAPCON	radar approach control (USAF)
RCAG	remote communications air/ground
RCLS	runway centerline lights system
ICAO:	RCL − runway centerline
RCO	remote communications outlet
RCV	receive
RCVG	receiving
REIL	runway end identifier lights
REQ	request
RNAV	area navigation
RRP	runway reference point
RSTRD	restricted
RTS	returned to service
RVR	runway visual range
RVRM	runway visual range midpoint
RVRR	runway visual range rollout
RVRT	runway visual range touchdown
RVV	runway visibility values
RWY	runway
ICAO:	RWY−runway
S	
S	runway weight bearing capacity for aircraft with single−wheel type landing gear
S	south
ICAO:	S − south/south latitude
SDF	simplified directional facility
SEC	second
SFC	surface
SFL	sequenced flashing lights
SI	straight−in approach
ICAO:	STA − straight−in approach
SM	statute mile(s)
SR	sunrise
SS	sunset
ICAO:	SS − sandstorm
SSALF	simplified short approach lighting system with sequenced flashers
SSALR	simplified short approach lighting system with runway alignment indicator lights
SSALS	simplified short approach lighting system
STOL	short take−off and landing runway
ICAO:	STOL − short takeoff and landing
SVC	service
ICAO:	SVC − service message
T	
T	true (after a bearing)
ICAO:	T − temperature
TAC	terminal area chart
TACAN	UHF navigational facility − omnidirectioal course and distance information
ICAO:	TACAN − VHF tactical navigational aid
TAS	true air speed
ICAO:	TMA − TERMINAL CONTROL AREA
TCH	threshold crossing height
TFC	traffic
THR	threshold
THRU	through
ICAO:	THRU − through/I am connecting you to another switchboard
TKOF	take−off
TEMPRLY	temporarily
TMPRY	temporary/temporarily
ICAO:	TEMPO − Temporary/temporarily
TPA	traffic pattern altitude
TRACON	terminal radar approach control
TRML	terminal
TRSA	terminal radar service area
TSNT	transient
TWEB	transcribed weather broadcast
TWR	tower
TWY	taxiway
U	
UAS	Unmanned Aircraft System
UAVBL	unavailable
UHF	ultra high frequency
UNLGTD	unlighted
UNMON	unmonitored
UNSKED	unscheduled
UNUSBL	unusable
ICAO:	U/S − unserviceable

9. Advisory and Air Traffic Information Services

9.1 Approach Control Service for VFR Arriving Aircraft

9.1.1 Numerous approach control facilities have established programs for arriving VFR aircraft to contact approach control for landing information. This information includes: wind, runway, and altimeter setting at the airport of intended landing. This information may be omitted if contained in the ATIS broadcast and the pilot states the appropriate ATIS code.

NOTE−
Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast. In addition, the controller will provide traffic advisories on a workload permitting basis.

9.1.2 Such information will be furnished upon initial contact with the concerned approach control facility. The pilot will be requested to change to the tower frequency at a predetermined time or point, to receive further landing information.

9.1.3 Where available, use of this procedure will not hinder the operation of VFR flights by requiring excessive spacing between aircraft or devious routing. Radio contact points will be based on time or distance rather than on landmarks.

9.1.4 Compliance with this procedure is not mandatory, but pilot participation is encouraged. (See ENR 1.1, paragraph 39, Terminal Radar Services for VFR Aircraft.)

NOTE−
Approach control services for VFR aircraft are normally dependent on air traffic control radar. These services are not available during periods of a radar outage. Approach control services for VFR aircraft are limited when Center Radar ARTS Presentation/ Processing (CENRAP) is in use.

9.2 Traffic Advisory Practices at Airports Without Operating Control Towers

9.2.1 Airport Operations Without an Operating Control Tower

9.2.1.1 There is no substitute for alertness while in the vicinity of an airport. It is essential that pilots be alert and look for other traffic and exchange traffic information when approaching or departing an airport without an operating control tower. This is of particular importance since other aircraft may not have communication capability or, in some cases, pilots may not communicate their presence or intentions when operating into or out of such airports. To achieve the greatest degree of safety, it is essential that all radio−equipped aircraft transmit/receive on a common frequency identified for the purpose of airport advisories.

9.2.1.2 An airport may have a full or part−time tower or FSS located on the airport, a full or part−time UNICOM station or no aeronautical station at all. There are three ways for pilots to communicate their intention and obtain airport/traffic information when operating at an airport that does not have an operating tower: by communicating with an FSS, a UNICOM operator, or by making a self−announce broadcast.

9.2.1.3 Many airports are now providing completely automated weather, radio check capability and airport advisory information on an automated UNICOM system. These systems offer a variety of features, typically selectable by microphone clicks, on the UNICOM frequency. Availability of the automated UNICOM will be published in the Airport/Facility Directory and approach charts.

9.2.2 Communicating on a Common Frequency

9.2.2.1 The key to communicating at an airport without an operating control tower is selection of the correct common frequency. The acronym, CTAF, which stands for common traffic advisory frequency, is synonymous with this program. A CTAF is a frequency designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower. The CTAF may be a UNICOM, MULTICOM, FSS, or tower frequency and is identified in appropriate aeronautical publications.

9.2.2.2 The CTAF frequency for a particular airport is contained in the Airport/Facility Directory (A/FD), Alaska Supplement, Alaska Terminal Publication, Instrument Approach Procedure Charts, and Instrument Departure Procedure (DP) charts. Also, the CTAF frequency can be obtained by contacting any FSS. Use of the appropriate CTAF, combined with a visual alertness and application of the following recommended good operating practices, will enhance safety of flight into and out of all uncontrolled airports.

9.2.3 Recommended Traffic Advisory Practices

9.2.3.1 Pilots of inbound aircraft should monitor and communicate on the designated CTAF from 10 miles to landing. Pilots of departing aircraft should monitor/communicate on the appropriate frequency from start−up, during taxi, and until 10 miles from the airport unless the Code of Federal Regulations (CFR) or local procedures require otherwise.

9.2.3.2 Pilots of aircraft conducting other than arriving or departing operations at altitudes normally used by arriving and departing aircraft should monitor/communicate on the appropriate frequency while within 10 miles of the airport unless required to do otherwise by the CFR or local procedures. Such operations include parachute jumping/dropping (see ENR 5.1, paragraph 2.3, Parachute Jump Aircraft Operations), en route, practicing maneuvers, etc.

9.2.4 Airport Advisory/Information Services Provided by a FSS

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

a) Local Airport Advisory (LAA) is 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 Advisory (RAA) is provided at selected very busy GA airports, which do not have an operating control tower. The CTAF for RAA airports is disseminated in the appropriate aeronautical publications. Hours of operation may be changed by NOTAM D.

c) Remote Airport Information Service (RAIS) is provided in support of special events at nontowered airports by request from the airport authority and shall 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

9.2.4.4.1 Alaska FSSs AFIS is the continuous broadcast of recorded noncontrol information at airports in Alaska where a Flight Service Station (FSS) provides local airport advisory service. Its purpose is to improve FSS Specialist efficiency by reducing frequency congestion on the local airport advisory frequency. The AFIS broadcast will automate the repetitive transmission of essential but routine information (weather, favored runway, breaking action, airport NOTAMs, other applicable information). The information is continuously broadcast over a discrete VHF radio frequency (usually the ASOS frequency). 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 the receipt of any official hourly and special weather, worsening braking action reports, and changes in other pertinent data. 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 Flight Service 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."

9.2.4.4.2 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.

9.2.4.4.3 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."

9.2.4.4.4 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.

9.2.6.4 Practice Approaches. Pilots conducting practice instrument approaches should be particularly alert for other aircraft that may be departing in the opposite direction. When conducting any practice approach, regardless of its direction relative to other airport operations, pilots should make announcements on the CTAF as follows:

a) Departing the final approach fix, inbound (nonprecision approach) or departing the outer marker or fix used in lieu of the outer marker, inbound (precision approach).

b) Established on the final approach segment or immediately upon being released by ATC.

c) Upon completion or termination of the approach; and

d) Upon executing the missed approach procedure.

9.2.6.5 Departing aircraft should always be alert for arrival aircraft coming from the opposite direction.

9.2.6.6 Recommended Self−Announce Phraseologies. It should be noted that aircraft operating to or from another nearby airport may be making self−announce broadcasts on the same UNICOM or MULTICOM frequency. To help identify one airport from another, the airport name should be spoken at the beginning and end of each self−announce transmission.

a) Inbound

EXAMPLE−
Strawn traffic, Apache Two Two Five Zulu, (position), (altitude), (descending) or entering downwind/base/ final (as appropriate) runway one seven full stop/touch−and−go, Strawn.

Strawn traffic Apache Two Two Five Zulu clear of runway one seven Strawn.

b) Outbound

EXAMPLE−
Strawn traffic, Queen Air Seven One Five Five Bravo (location on airport) taxiing to runway two six Strawn.

Strawn traffic, Queen Air Seven One Five Five Bravo departing runway two six. "Departing the pattern to the (direction), climbing to (altitude) Strawn."

c) Practice Instrument Approach

EXAMPLE−
Strawn traffic, Cessna Two One Four Three Quebec (position from airport) inbound descending through (altitude) practice (name of approach) approach runway three five Strawn.

Strawn traffic, Cessna Two One Four Three Quebec practice (type) approach completed or terminated runway three five Strawn.

9.2.7 UNICOM Communication Procedures

9.2.7.1 In communicating with a UNICOM station, the following practices will help reduce frequency congestion, facilitate a better understanding of pilot intentions, help identify the location of aircraft in the traffic pattern, and enhance safety of flight:

a) Select the correct UNICOM frequency.

b) State the identification of the UNICOM station you are calling in each transmission.

c) Speak slowly and distinctly.

d) Report approximately 10 miles from the airport, reporting altitude, and state your aircraft type, aircraft identification, location relative to the airport, state whether landing or overflight, and request wind information and runway in use.

e) Report on downwind, base and final approach.

f) Report leaving the runway.

9.2.7.2 Recommended UNICOM Phraseologies:

a) Inbound.

PHRASEOLOGY−
FREDERICK UNICOM CESSNA EIGHT ZERO ONE TANGO FOXTROT 10 MILES SOUTHEAST DESCENDING THROUGH (altitude) LANDING FREDERICK, REQUEST WIND AND RUNWAY INFORMATION FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT ENTERING DOWNWIND/BASE/ FINAL (as appropriate) FOR RUNWAY ONE NINER FULL STOP/TOUCH−AND−GO FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT CLEAR OF RUNWAY ONE NINER FREDERICK.

b) Outbound

PHRASEOLOGY−
FREDERICK UNICOM CESSNA EIGHT ZERO ONE TANGO FOXTROT (location on airport) TAXIING TO RUNWAY ONE NINE, REQUEST WIND AND TRAFFIC INFORMATION FREDERICK.

FREDERICK TRAFFIC CESSNA EIGHT ZERO ONE TANGO FOXTROT DEPARTING RUNWAY ONE NINE. "REMAINING IN THE PATTERN" OR "DEPARTING THE PATTERN TO THE (direction) (as appropriate)" FREDERICK.

9.3 IFR Approaches/Ground Vehicle Operations

9.3.1 IFR Approaches. When operating in accordance with an IFR clearance and ATC approves a change to the advisory frequency, make an expeditious change to the CTAF and employ the recommended traffic advisory procedures.

9.3.2 Ground Vehicle Operation. Airport ground vehicles equipped with radios should monitor the CTAF frequency when operating on the airport movement area and remain clear of runways/taxiways being used by aircraft. Radio transmissions from ground vehicles should be confined to safety−related matters.

9.3.3 Radio Control of Airport Lighting Systems. Whenever possible, the CTAF will be used to control airport lighting systems at airports without operating control towers. This eliminates the need for pilots to change frequencies to turn the lights on and allows a continuous listening watch on a single frequency. The CTAF is published on the instrument approach chart and in other appropriate aeronautical information publications. For further details concerning radio controlled lights, see Advisory Circular 150/5340.27.

TBL GEN 3.3−1
Summary of Recommended Communication Procedures

			COMMUNICATION/BROADCAST PROCEDURES		
	Facility at Airport	**Frequency Use**	**Outbound**	**Inbound**	**Practice Instrument Approach**
1.	UNICOM (No Tower or FSS)	Communicate with UNICOM station on published CTAF frequency (122.7; 122.8; 122.725; 122.975; or 123.0). If unable to contact UNICOM station, use self-announce procedures on CTAF.	Before taxiing and before taxiing onto the runway for departure.	10 miles out; entering downwind, base, and final; leaving the runway.	
2.	No Tower, FSS, or UNICOM	Self-announce on MULTICOM frequency 122.9.	Before taxiing and before taxiing onto the runway for departure.	10 miles out; entering downwind, base, and final; leaving the runway.	Departing final approach fix (name) or on final approach segment inbound.
3.	No Tower in operation, FSS open	Communicate with FSS on CTAF frequency.	Before taxiing and before taxiing onto the runway for departure.	10 miles out; entering downwind, base, and final; leaving the runway.	Approach completed/ terminated.
4.	FSS closed (No Tower)	Self-announce on CTAF.	Before taxiing and before taxiing onto the runway for departure.	10 miles out; entering downwind, base, and final; leaving the runway.	
5.	Tower or FSS not in operation	Self-announce on CTAF.	Before taxiing and before taxiing onto the runway for departure.	10 miles out; entering downwind, base, and final; leaving the runway.	

9.4 Designated UNICOM/MULTICOM Frequencies

9.4.1 Frequency Use

9.4.1.1 TBL GEN 3.3−2 depicts UNICOM and MULTICOM frequency uses as designated by the Federal Communications Commission (FCC).

NOTE−
1. *In some areas of the country, frequency interference may be encountered from nearby airports using the same UNICOM frequency. Where there is a problem, UNICOM operators are encouraged to develop a "least interference" frequency assignment plan for airports concerned using the frequencies designated for airports without operating control towers. UNICOM licensees are encouraged to apply for UNICOM 25 KHz spaced channel frequencies. Due to the extremely limited number of frequencies with 50 KHz channel spacing, 25 KHz channel spacing should be implemented. UNICOM licensees may then request FCC to assign frequencies in accordance with the plan, which FCC will review and consider for approval.*
2. *Wind direction and runway information may not be available on UNICOM frequency 122.950.*

9.4.2.1 TBL GEN 3.3−3 depicts other frequency uses as designated by the FCC.

9.5 Use of UNICOM for ATC purposes

9.5.1 UNICOM service may be used for air traffic control purposes, only under the following circumstances:

9.5.1.1 Revision to proposed departure time.

9.5.1.2 Takeoff, arrival, or flight plan cancellation time.

9.5.1.3 ATC clearance, provided arrangements are made between the ATC facility and the UNICOM licensee to handle such messages.

TBL GEN 3.3−2
UNICOM/MULTICOM Frequency Usage

Use	Frequency
Airports without an operating control tower.	122.700 122.725 122.800 122.975 123.000 123.050 123.075
(MULTICOM FREQUENCY) Activities of a temporary, seasonal, emergency nature or search and rescue, as well as, airports with no tower, FSS, or UNICOM.	122.900
(MULTICOM FREQUENCY) Forestry management and fire suppression, fish and game management and protection, and environmental monitoring and protection.	122.925
Airports with a control tower or FSS on airport.	122.950

TBL GEN 3.3−3
Other Frequency Usage Designated by FCC

Use	Frequency
Air-to-air communication (private fixed wing aircraft).	122.750
Air-to-air communications (general aviation helicopters).	123.025
Aviation instruction, Glider, Hot Air Balloon **(not to be used for advisory service**).	123.300 123.500

PART 2 − EN ROUTE (ENR)

ENR 0.

ENR 0.1 Preface − Not applicable

ENR 0.2 Record of AIP Amendments − See GEN 0.2−1

ENR 0.3 Record of AIP Supplements − Not applicable

ENR 0.4 Checklist of Pages

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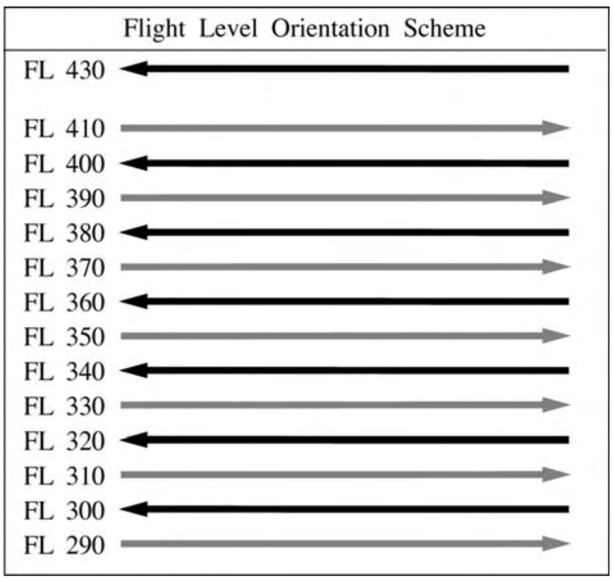
ENR 0.5 List of Hand Amendments to the AIP − Not applicable

38.2 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 1.1−26.

FIG ENR 1.1−26

Flight Level Orientation Scheme



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

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

38.3.1 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. 14 CFR Section 91.180 requires that, prior to conducting RVSM operations within the U.S., the operator obtain authorization from the FAA or from the responsible authority, as appropriate. In addition, it requires that the operator and the operator's aircraft comply with the standards of 14 CFR Part 91 Appendix G (Operations in RVSM Airspace).

38.3.2 Sources of Information. The FAA RVSM Website Homepage can be accessed at: **http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm/**. The "RVSM Documentation" and "Domestic RVSM" webpages are linked to the RVSM Homepage. "RVSM Documentation" contains guidance and direction for an operator to obtain aircraft and operator approval to conduct RVSM operations. It provides information for DRVSM and oceanic and international RVSM airspace. It is recommended that operators planning to operate in Domestic U.S. RVSM airspace first review the following documents to orient themselves to the approval process.

38.3.2.1 Under "Area of Operations Specific Information," the document, "Basic Operator Information on DRVSM Programs," provides an overview of the DRVSM program and the related aircraft and operator approval programs.

38.3.2.2 In the "Getting Started" section, review the "RVSM Approval Checklist − U.S. Operators" or "RVSM Approval Checklist − Non−U.S. Operators" (as applicable). These are job aids or checklists that show aircraft/operator approval process events with references to related RVSM documents published on the website.

38.3.2.3 Under "Documents Applicable to All RVSM Approvals," review "RVSM Area New to the Operator." This document provides a guide for operators that are conducting RVSM operations in one or more areas of operation, but are planning to conduct RVSM operations in an area where they have not previously conducted RVSM operations, such as the U.S.

38.3.3 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.

38.3.4 Aircraft Monitoring. Operators are required to participate in the RVSM aircraft monitoring program. The "Monitoring Requirements and Procedures" section of the RVSM Documentation Webpage contains policies and procedures for participation in the monitoring program. Ground−based and GPS−based monitoring systems are available for the Domestic RVSM program. Monitoring is a quality control program that enables the FAA and other civil aviation authorities to assess the in−service altitude−keeping performance of aircraft and operators.

38.3.5 Registration on RVSM Approvals Databases. The "Registration on RVSM Approvals Database" section of the RVSM Documentation Webpage provides policies/procedures for operator and aircraft registration on RVSM approvals databases.

38.3.5.1 Purpose of RVSM Approvals Databases. ATC does not use RVSM approvals databases to determine whether or not a clearance can be issued into RVSM airspace. RVSM program managers do regularly review the operators and aircraft that operate in RVSM airspace to identify and investigate those aircraft and operators flying in RVSM airspace, but not listed on the RVSM approvals databases.

38.3.5.2 Registration of U.S. Operators. When U.S. operators and aircraft are granted RVSM authority, the FAA Flight Standards office makes an input to the FAA Program Tracking and Reporting Subsystem (PTRS). The Separation Standards Group at the FAA Technical Center obtains PTRS operator and aircraft information to update the FAA maintained U.S. Operator/Aircraft RVSM Approvals Database. Basic database operator and aircraft information can be viewed on the RVSM Documentation Webpage by clicking on the appropriate database icon.

38.3.5.3 Registration of Non−U.S. Operators. Non−U.S. operators can find policy/procedures for registration on the North American Approvals Registry and Monitoring Organization (NAARMO) database in the "Registration on RVSM Approvals Database" section of RVSM Documentation.

38.4 Flight Planning into RVSM Airspace

38.4.1 Operators that do not file the correct aircraft equipment suffix on the FAA or ICAO Flight Plan may be denied clearance into RVSM airspace. Policies for the FAA Flight Plan are detailed in subparagraph 38.4.3 below. Policies for the ICAO Flight Plan are detailed in subparagraph 38.4.4.

38.4.2 The operator will annotate the equipment block of the FAA or ICAO Flight Plan with an aircraft equipment suffix indicating RVSM capability only after the responsible civil aviation authority has determined that both the operator and its aircraft are RVSM−compliant and has issued RVSM authorization to the operator.

38.4.3 General Policies for FAA Flight Plan Equipment Suffix. TBL ENR 1.10−1, Aircraft Suffixes, allows operators to indicate that the aircraft has both RVSM and Advanced Area Navigation (RNAV) capabilities or has only RVSM capability.

38.4.3.1 The operator will annotate the equipment block of the FAA Flight Plan with the appropriate aircraft equipment suffix from TBL ENR 1.10−1.

38.4.3.2 Operators can only file one equipment suffix in block 3 of the FAA Flight Plan. Only this equipment suffix is displayed directly to the controller.

38.4.3.3 Aircraft with RNAV Capability. For flight in RVSM airspace, aircraft with RNAV capability, but not Advanced RNAV capability, will file "/W". Filing "/W" will not preclude such aircraft from filing and flying direct routes in en route airspace.

38.4.4 Policy for ICAO Flight Plan Equipment Suffixes.

38.4.4.1 Operators/aircraft that are RVSM−compliant and that file ICAO flight plans will file "/W" in block 10 (Equipment) to indicate RVSM authorization and will also file the appropriate ICAO Flight Plan suffixes to indicate navigation and communication capabilities. The equipment suffixes in TBL ENR 1.10−1 are for use only in an FAA Flight Plan (FAA Form 7233−1).

38.4.4.2 Operators/aircraft that file ICAO flight plans that include flight in Domestic U.S. RVSM airspace must file "/W" in block 10 to indicate RVSM authorization.

38.4.5 Importance of Flight Plan Equipment Suffixes. The operator must file the appropriate equipment suffix in the equipment block of the FAA Flight Plan (FAA Form 7233−1) or the ICAO Flight Plan. The equipment suffix informs ATC:

38.4.5.1 Whether or not the operator and aircraft are authorized to fly in RVSM airspace.

38.4.5.2 The navigation and/or transponder capability of the aircraft (e.g., advanced RNAV, Transponder with Mode C).

ENR 1.5 Holding, Approach, and Departure Procedures

1. Holding Procedures

1.1 Patterns at the most generally used holding fixes are depicted (charted) on U.S. Government or commercially produced (meeting FAA requirements) Low or High Altitude En route, Area, and STAR charts. Pilots are expected to hold in the pattern depicted unless specifically advised otherwise by ATC. (See ENR 1.1, paragraph 27, ATC Clearances and Aircraft Separations.)

NOTE−
Holding patterns that protect for a maximum holding airspeed other than the standard may be depicted by an icon, unless otherwise depicted. The icon is a standard holding pattern symbol (racetrack) with the airspeed restriction shown in the center. In other cases, the airspeed restriction will be depicted next to the standard holding pattern symbol.

1.2 An ATC clearance requiring an aircraft to hold at a fix where the pattern is not charted will include the following information:

1.2.1 Direction of holding from the fix in terms of the eight cardinal compass points; i.e., N, NE, E, SE, etc.

1.2.2 Holding fix. (The fix may be omitted if it is included at the beginning of the transmission as the clearance limit.)

1.2.3 Radial, course, bearing, airway, or route on which the aircraft is to hold.

1.2.4 Leg length in miles if DME or RNAV is to be used. (Leg length will be specified in minutes on pilot request or if the controller considers it necessary.)

1.2.5 Direction of turn if left turns are to be made, the pilot requests, or the controller considers it necessary.

1.2.6 Time to expect further clearance, and any pertinent additional delay information.

1.3 Typical Holding Pattern Example

1.3.1 When holding at a VOR station, pilots should begin the turn to the outbound leg at the time of the first complete reversal of the "to−from" indicator. See GEN 3.4, paragraph 12, Two−Way Radio Communications Failure, for holding at the approach fix when radio failure occurs.

1.3.2 Holding Pattern Airspace Protection

Holding pattern airspace protection is based on the following procedures.

NOTE−
Holding pattern airspace protection design criteria is contained in FAA Handbook 7130.3, Holding Pattern Criteria.

1.3.2.1 Airspeeds

a) All aircraft may hold at the following altitudes and maximum holding airspeeds:

TBL ENR 1.5−1

Altitude (MSL)	Airspeed (KIAS)
MHA − 6,000'	200
6,001' − 14,000'	230
14,001' and above	265

b) The following are exceptions to the maximum holding airspeeds:

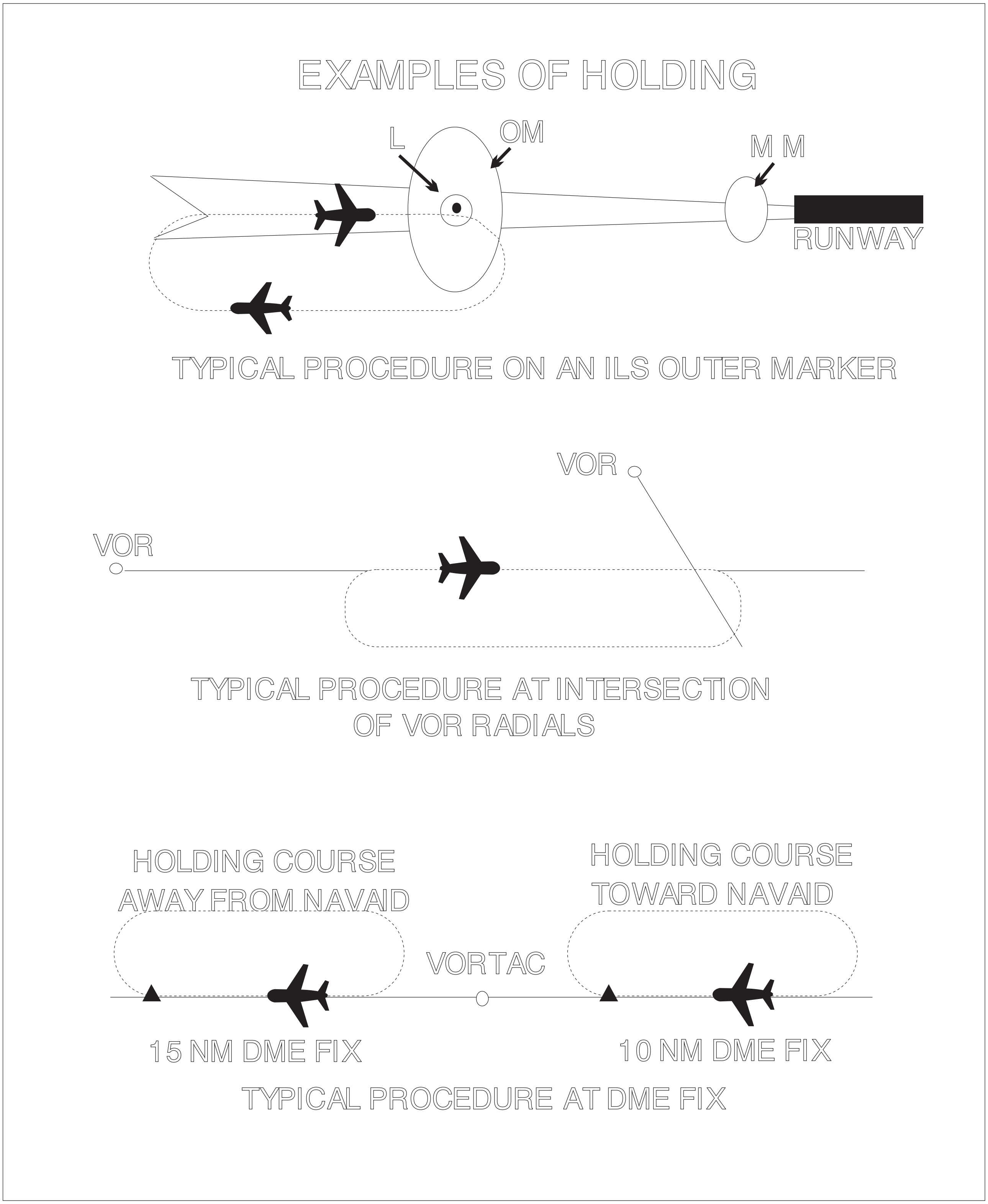
1) Holding patterns from 6,001' to 14,000' may be restricted to a maximum airspeed of 210 KIAS. This nonstandard pattern will be depicted by an icon.

2) Holding patterns may be restricted to a maximum speed. The speed restriction is depicted in parenthesis inside the holding pattern on the chart: e.g., (175). The aircraft should be at or below the maximum speed prior to initially crossing the holding fix to avoid exiting the protected airspace. Pilots unable to comply with the maximum airspeed restriction should notify ATC.

3) Holding patterns at USAF airfields only − 310 KIAS maximum, unless otherwise depicted.

4) Holding patterns at Navy fields only − 230 KIAS maximum, unless otherwise depicted.

FIG ENR 1.5−1
Holding Patterns



7. Landing Priority

7.1 A clearance for a specific type of approach (ILS, MLS, ADF, VOR, or straight−in 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. However, 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.

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. When ATC is radar vectoring to the final approach course or to the intermediate fix, ATC may specify in the approach clearance "CLEARED STRAIGHT−IN (type) APPROACH" to ensure the procedure turn or hold−in−lieu−of−PT is not to be flown. 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 shall immediately request clarification from ATC (14 CFR Section 91.123).*

8.1.1 On U.S. Government charts, a barbed arrow indicates the direction or 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. 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. Some procedure turns are specified by procedural track. These turns must be flown exactly as depicted.

8.1.2 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.

8.1.3 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 shall 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.

8.1.4 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. 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.

NOTE−
Some approach charts have an arrival holding pattern depicted at the IAF using a "thin line" holding symbol. It 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 Air Traffic Control. Holding at the same fix may also be depicted on the enroute chart. A hold−in−lieu of procedure turn is depicted by a "thick line" symbol, and is part of the instrument approach procedure as described in paragraph 8.(See U. S. Terminal Procedures booklets page G1 for both examples.)

8.1.5 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.

8.2 Limitations on Procedure Turns

8.2.1 In the case of a radar initial approach to a final approach fix or position, or a timed approach from a holding fix, or where the procedure specifies NoPT, no pilot may make a procedure turn unless, when final approach clearance is received, the pilot so advises ATC and a clearance is received to executive a procedure turn.

8.2.2 When a teardrop procedure turn is depicted and a course reversal is required, this type turn must be executed.

8.2.3 When a holding pattern replaces a procedure turn, the holding pattern must be followed, except when RADAR VECTORING is provided or when NoPT is shown on the approach course. The recommended entry procedures will ensure the aircraft remains within the holding pattern's protected airspace. As in the procedure turn, the descent from the minimum holding pattern altitude to the final approach fix altitude (when lower) may not commence until the aircraft is established on the inbound course. Where a holding pattern is established in−lieu−of a procedure turn, the maximum holding pattern airspeeds apply.

NOTE−
See paragraph 1.3.2.1, Airspeeds.

8.2.4 The absence of the procedure turn barb in the plan view indicates that a procedure turn is not authorized for that procedure.

9. RNP SAAAR Instrument Approach Procedures

These procedures require authorization analogous to the special authorization required for Category II or III ILS procedures. Special aircraft and aircrew authorization required (SAAAR) procedures are to be conducted by aircrews meeting special training requirements in aircraft that meet the specified performance and functional requirements.

9.1 Unique characteristics of RNP SAAAR Approaches

9.1.1 RNP value. Each published line of minima has an associated RNP value. The indicated value defines the lateral and vertical performance requirements. A minimum RNP type is documented as part of the RNP SAAAR authorization for each operator and may vary depending on aircraft configuration or operational procedures (e.g., GPS inoperative, use of flight director vice autopilot).

9.1.2 Curved path procedures. Some RNP approaches have a curved path, also called a radius−to−a−fix (RF) leg. Since not all aircraft have the capability to fly these arcs, pilots are responsible for knowing if they can conduct an RNP approach with an arc or not. Aircraft speeds, winds and bank angles have been taken into consideration in the development of the procedures.

9.1.3 RNP required for extraction or not. Where required, the missed approach procedure may use RNP values less than RNP−1. The reliability of the navigation system has to be very high in order to conduct these approaches. Operation on these procedures generally requires redundant equipment, as no single point of failure can cause loss of both approach and missed approach navigation.

9.1.4 Non−standard speeds or climb gradients. RNP SAAAR approaches are developed based on standard approach speeds and a 200 ft/NM climb gradient in the missed approach. Any exceptions to these standards will be indicated on the approach procedure, and the operator should ensure they can comply with any published restrictions before conducting the operation.

9.1.5 Temperature Limits. For aircraft using barometric vertical navigation (without temperature compensation) to conduct the approach, low and high−temperature limits are identified on the procedure. Cold temperatures reduce the glidepath angle while high temperatures increase the glidepath angle. Aircraft using baro VNAV with temperature compensation or aircraft using an alternate means for vertical guidance (e.g., SBAS) may disregard the temperature restrictions. The charted temperature limits are evaluated for the final approach segment only. Regardless of charted temperature limits or temperature compensation by the FMS, the pilot may need to manually compensate for cold temperature on minimum altitudes and the decision altitude.

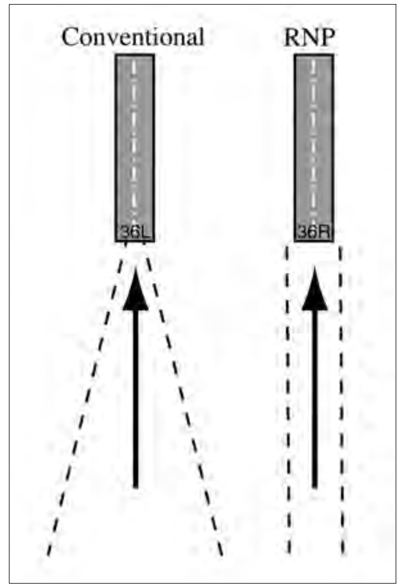
9.1.6 Aircraft size. The achieved minimums may be dependent on aircraft size. Large aircraft may require higher minimums due to gear height and/or wingspan. Approach procedure charts will be annotated with applicable aircraft size restrictions.

9.2 Types of RNP SAAAR Approach Operations

9.2.1 RNP Stand−alone Approach Operations. RNP SAAAR procedures can provide access to runways regardless of the ground−based NAVAID infrastructure, and can be designed to avoid obstacles, terrain, airspace, or resolve environmental constraints.

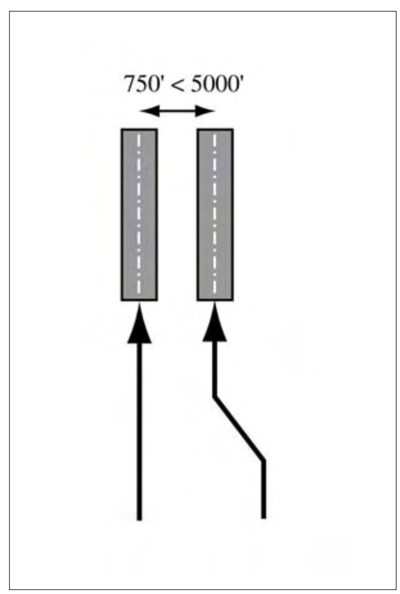
9.2.2 RNP Parallel Approach (RPA) Operations. RNP SAAAR procedures can be used for parallel approaches where the runway separation is adequate (See FIG ENR 1.5−7). Parallel approach procedures can be used either simultaneously or as stand−alone operations. They may be part of either independent or dependent operations depending on the ATC ability to provide radar monitoring.

FIG ENR 1.5−7



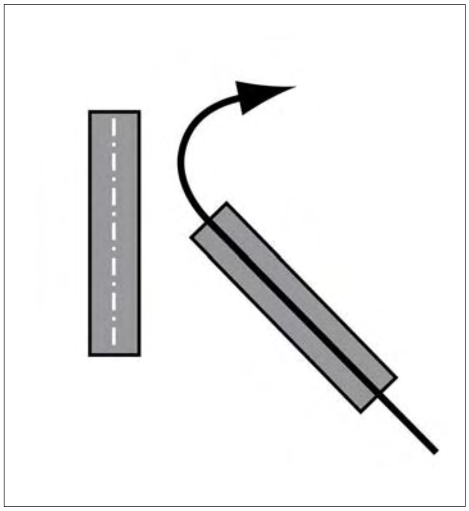
9.2.3 RNP Parallel Approach Runway Transitions (RPAT) Operations. RPAT approaches begin as a parallel IFR approach operation using simultaneous independent or dependent procedures. (See FIG ENR 1.5−8). Visual separation standards are used in the final segment of the approach after the final approach fix, to permit the RPAT aircraft to transition in visual conditions along a predefined lateral and vertical path to align with the runway centerline.

FIG ENR 1.5−8



9.2.4 RNP Converging Runway Operations. At airports where runways converge, but may or may not intersect, an RNP SAAAR approach can provide a precise curved missed approach path that conforms to aircraft separation minimums for simultaneous operations (See FIG ENR 1.5−9). By flying this curved missed approach path with high accuracy and containment provided by RNP, dual runway operations may continue to be used to lower ceiling and visibility values than currently available. This type of operation allows greater capacity at airports where it can be applied.

FIG ENR 1.5−9



10. Side−step Maneuver

10.1 ATC may authorize a standard instrument approach procedure which serves either one of parallel runways that are separated by 1,200 feet or less followed by a straight-in landing on the adjacent runway.

10.2 Aircraft that will execute a side-step maneuver will be cleared for a specified approach procedure and landing on the adjacent parallel runway. Example, "cleared ILS runway 7 left approach, side-step to runway 7 right." Pilots are expected to commence the side-step maneuver as soon as possible after the runway or runway environment is in sight.

NOTE−
Side−stepminima are flown to a Minimum Descent Altitude (MDA) regardless of the approach authorized.

10.3 Landing minimums to the adjacent runway will be based on nonprecision criteria and therefore higher than the precision minimums to the primary runway, but will normally be lower than the published circling minimums.

11. Approach and Landing Minimums

11.1 Landing Minimums. The rules applicable to landing minimums are contained in 14 CFR Section 91.175. TBL ENR 1.5−2 may be used to convert RVR to ground or flight visibility. For converting RVR values that fall between listed values, use the next higher RVR value; do not interpolate. For example, when converting 1800 RVR, use 2400 RVR with the resultant visibility of $^{1}/_{2}$ mile.

TBL ENR 1.5−2
RVR Value Conversions

RVR	Visibility (statute miles)
1600	$^{1}/_{4}$
2400	$^{1}/_{2}$
3200	$^{5}/_{8}$
4000	$^{3}/_{4}$
4500	$^{7}/_{8}$
5000	1
6000	1 $^{1}/_{4}$

11.1.1 Aircraft approach category means a grouping of aircraft based on a speed of $V_{REF,}$ if specified, or if V_{REF} is not specified, 1.3 V_{SO} at the maximum certified landing weight. $V_{REF,}$ $V_{SO,}$ and the maximum certified landing weight are those values as established for the aircraft by the certification authority of the country of registry. A pilot must use the minima corresponding to the category determined during certification or higher. Helicopters may use Category A minima. If it is necessary to operate at a speed in excess of the upper limit of the speed range for an aircraft's category, the minimums for the higher category must be used. For example, an airplane which fits into Category B, but is circling to land at a speed of 145 knots, must use the approach Category D minimums. As an additional example, a Category A airplane (or helicopter) which is operating at 130 knots on a straight−in approach must use the approach Category C minimums. See the following category limits:

11.1.1.1 Category A: Speed less than 91 knots.

11.1.1.2 Category B: Speed 91 knots or more but less than 121 knots.

11.1.1.3 Category C: Speed 121 knots or more but less than 141 knots.

11.1.1.4 Category D: Speed 141 knots or more but less than 166 knots.

11.1.1.5 Category E: Speed 166 knots or more.

NOTE−
V_{REF} in the above definition refers to the speed used in establishing the approved landing distance under the airworthiness regulations constituting the type certification basis of the airplane, regardless of whether that speed for a particular airplane is 1.3 $V_{SO,}$ 1.23 $V_{SR,}$ or some higher speed required for airplane controllability. This speed, at the maximum certificated landing weight, determines the lowest applicable approach category for all approaches regardless of actual landing weight.

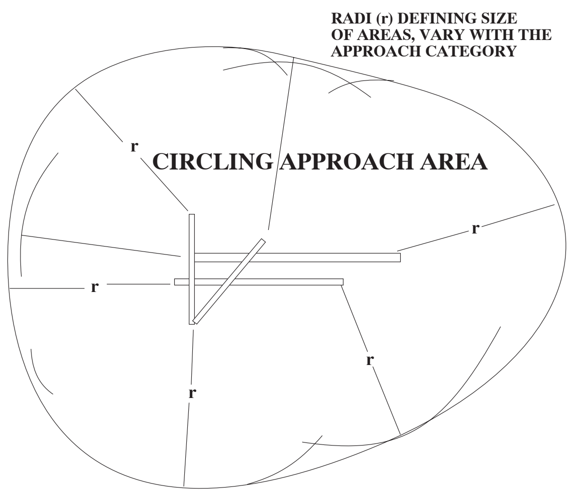
11.2 Published Approach Minimums. Approach minimums are published for different aircraft categories and consist of a minimum altitude (DA, DH, MDA) and required visibility. These minimums are determined by applying the appropriate TERPS criteria. When a fix is incorporated in a nonprecision final segment, two sets of minimums may be published; one for the pilot that is able to identify the fix, and a second for the pilot that cannot. Two sets of minimums may also be published when a second altimeter source is used in the procedure. When a nonprecision procedure incorporates both a step-down fix in the final segment and a second altimeter source, two sets of minimums are published to account for the stepdown fix and a note addresses minimums for the second altimeter source.

FIG ENR 1.5−10

Final Approach Obstacle Clearance

CIRCLING APPROACH AREA RADII

Approach Category	Radius (Miles)
A	1.3
B	1.5
C	1.7
D	2.3
E	4.5



11.3 Obstacle Clearance. Final approach obstacle clearance is provided from the start of the final segment to the runway or missed approach point, whichever occurs last. Side-step obstacle protection is provided by increasing the width of the final approach obstacle clearance area.

11.3.1 Circling approach protected areas are defined by the tangential connection of arcs drawn from each runway end. The arc radii distance differs by aircraft approach category (see FIG ENR 1.5−10). Because of obstacles near the airport, a portion of the circling area may be restricted by a procedural note: e.g., "Circling NA E of RWY 17−35." Obstacle clearance is provided at the published minimums (MDA) for the pilot who makes a straight−in approach, side−steps, or circles. Once below the MDA the pilot must see and avoid obstacles. Executing the missed approach after starting to maneuver usually places the aircraft beyond the MAP. The aircraft is clear of obstacles when at or above the MDA while inside the circling area, but simply joining the missed approach ground track from the circling maneuver may not provide vertical obstacle clearance once the aircraft exits the circling area. Additional climb inside the circling area may be required before joining the missed approach track. See paragraph 26, Missed Approach, for additional considerations when starting a missed approach at other than the MAP.

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** (e.g., VOR or GPS RWY 15).

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 (e.g., 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 (e.g., 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.

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 (e.g., "DME Required" or "RADAR Required"). During the transition period, ILS approaches will still exist without the annotation.

12.1.3.4 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.

12.1.3.5 WAAS (LPV, LNAV/VNAV and LNAV), and GPS (LNAV) approach procedures are charted as RNAV (GPS) RWY (Number) (e.g., RNAV (GPS) RWY 21). VOR/DME RNAV approaches will continue to be identified as VOR/DME RNAV RWY (Number) (e.g., VOR/DME RNAV RWY 21). VOR/DME RNAV procedures which can be flown by GPS will be annotated with "or GPS" (e.g., VOR/DME RNAV or GPS RWY 31).

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 Manhattan altimeter setting; when not available use Salina altimeter setting and increase all MDAs 40 feet. 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.

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 12.8, 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, e.g., $\underline{3000}$.

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, e.g., $\overline{4000}$.

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, e.g., $\overline{\underline{5000}}$.

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

NOTE−
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.

12.3 Minimum Safe/Sector Altitudes (MSA) are published for emergency use on IAP charts. For conventional navigation systems, the MSA is normally based on the primary omnidirectional facility on which the IAP is predicated. The MSA depiction on the approach chart contains the facility identifier of the NAVAID used to determine the MSA altitudes. For RNAV approaches, the MSA is based on the runway waypoint (RWY WP) for straight−in approaches, or the airport waypoint (APT WP) for circling approaches. For GPS approaches, the MSA center will be the missed approach waypoint (MAWP). MSAs are expressed in feet above mean sea level and normally have a 25 NM radius; however, this radius may be expanded to 30 NM if necessary to encompass the airport landing surfaces. Ideally, a single sector altitude is established and depicted on the plan view of approach charts; however, when necessary to obtain relief from obstructions, the area may be further sectored and as many as four MSAs established. When established, sectors may be no less than 90° in spread. MSAs provide 1,000 feet clearance over all obstructions but do not necessarily assure acceptable navigation signal coverage.

12.4 Terminal Arrival Area (TAA)

12.4.1 The objective of the TAA is to provide a seamless transition from the en route structure to the terminal environment for arriving aircraft equipped with Flight Management System (FMS) and/or Global Positioning System (GPS) navigational equipment. The underlying instrument approach procedure is an area navigation (RNAV) procedure described in this section. The TAA provides the pilot and air traffic controller with a very efficient method for routing traffic into the terminal environment with little required air traffic control interface, and with minimum altitudes depicted that provide standard obstacle clearance compatible with the instrument procedure associated with it. The TAA will not be found on all RNAV procedures, particularly in areas of heavy concentration of air traffic. When the TAA is published, it replaces the MSA for that approach procedure. See FIG ENR 1.5−20 for a depiction of a RNAV approach chart with a TAA.

12.4.2 The RNAV procedure underlying the TAA will be the "T" design (also called the "Basic T"), or a modification of the "T." The "T" design incorporates from one to three IAFs; an intermediate fix (IF) that serves as a dual purpose IF (IAF); a final approach fix (FAF), and a missed approach point (MAP) usually located at the runway threshold. The three IAFs are normally aligned in a straight line perpendicular to the intermediate course, which is an extension of the final course leading to the runway, forming a "T." The initial segment is normally from 3−6 NM in length; the intermediate 5−7 NM, and the final segment 5 NM. Specific segment length may be varied to accommodate specific aircraft categories for which the procedure is designed. However, the published segment lengths will reflect the highest category of aircraft normally expected to use the procedure.

12.4.2.1 A standard racetrack holding pattern may be provided at the center IAF, and if present may be necessary for course reversal and for altitude adjustment for entry into the procedure. In the latter case, the pattern provides an extended distance for the descent required by the procedure. Depiction of this pattern in U.S. Government publications will utilize the "hold−in−lieu−of−PT" holding pattern symbol.

12.4.2.2 The published procedure will be annotated to indicate when the course reversal is not necessary when flying within a particular TAA area; e.g., "NoPT." Otherwise, the pilot is expected to execute the course reversal under the provisions of 14 CFR Section 91.175. The pilot may elect to use the course reversal pattern when it is not required by the procedure, but must inform air traffic control and receive clearance to do so. (See FIG ENR 1.5−12, FIG ENR 1.5−13, FIG ENR 1.5−20, and paragraph 8, Procedure Turn and Hold−in−lieu of Procedure Turn.)

FIG ENR 1.5−12
Basic "T" Design

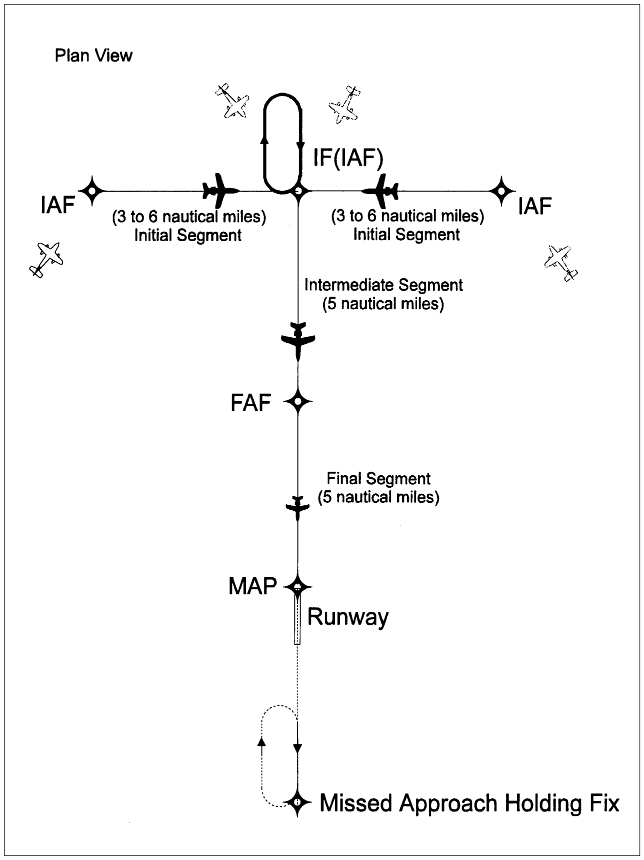
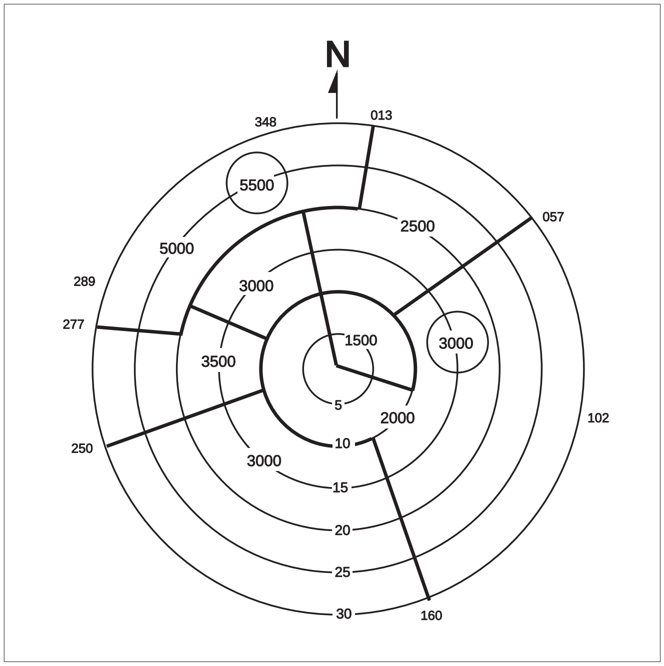


FIG ENR 1.5−24
Minimum Vectoring Altitude Charts



12.5 Minimum Vectoring Altitudes (MVAs) are established for use by ATC when radar ATC is exercised. MVA charts are prepared by air traffic facilities at locations where there are numerous different minimum IFR altitudes. Each MVA chart has sectors large enough to accommodate vectoring of aircraft within the sector at the MVA. Each sector boundary is at least 3 miles from the obstruction determining the MVA. To avoid a large sector with an excessively high MVA due to an isolated prominent obstruction, the obstruction may be enclosed in a buffer area whose boundaries are at least 3 miles from the obstruction. This is done to facilitate vectoring around the obstruction. (See FIG ENR 1.5−24.)

12.5.1 The minimum vectoring altitude in each sector provides 1,000 feet above the highest obstacle in nonmountainous areas and 2,000 feet above the highest obstacle in designated mountainous areas. Where lower MVAs are required in designated mountainous areas to achieve compatibility with terminal routes or to permit vectoring to an IAP, 1,000 feet of obstacle clearance may be authorized with the use of Airport Surveillance Radar (ASR). The minimum vectoring altitude will provide at least 300 feet above the floor of controlled airspace.

NOTE−
OROCA is an off−route altitude which provides obstruction clearance with a 1,000 foot buffer in nonmountainous terrain areas and a 2,000 foot buffer in designated mountainous areas within the U.S. This altitude may not provide signal coverage from ground−based navigational aids, air traffic control radar, or communications coverage.

12.5.2 Because of differences in the areas considered for MVA, and those applied to other minimum altitudes, and the ability to isolate specific obstacles, some MVAs may be lower than the nonradar Minimum En Route Altitudes (MEAs), Minimum Obstruction Clearance Altitudes (MOCAs) or other minimum altitudes depicted on charts for a given location. While being radar vectored, IFR altitude assignments by ATC will be at or above MVA.

12.6 Visual Descent Points (VDPs) are being incorporated in nonprecision approach procedures. The VDP is a defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided visual reference required by 14 CFR Section 91.175(c)(3) is established. The VDP will normally be identified by DME on VOR and LOC procedures and by along track distance to the next waypoint for RNAV procedures. The VDP is identified on the profile view of the approach chart by the symbol: **V**.

12.6.1 VDPs are intended to provide additional guidance where they are implemented. No special technique is required to fly a procedure with a VDP. The pilot should not descend below the MDA prior to reaching the VDP and acquiring the necessary visual reference.

12.6.2 Pilots not equipped to receive the VDP should fly the approach procedure as though no VDP had been provided.

12.7 Visual Portion of the Final Segment. Instrument procedures designers perform a visual area obstruction evaluation off the approach end of each runway authorized for instrument landing, straight−in, or circling. Restrictions to instrument operations are imposed if penetrations of the obstruction clearance surfaces exist. These restrictions vary based on the severity of the penetrations, and may include increasing required visibility, denying VDPs and prohibiting night instrument operations to the runway.

12.8 Charting of Close in Obstacles on Instrument Procedure Charts. Obstacles that are close to the airport may be depicted in either the planview of the instrument approach chart or the airport sketch. Obstacles are charted in only one of the areas, based on space available and distance from the runway. These obstacles could be in the visual segment of the instrument approach procedure. On nonprecision approaches, these obstacles should be considered when determining where to begin descent from the MDA (see "Pilot Operational Considerations When Flying Nonprecision Approaches" in this paragraph).

12.9 Vertical Descent Angle (VDA) on Nonprecision Approaches. FAA policy is to publish VDAs on all nonprecision approaches. Published along with VDA is the threshold crossing height (TCH) that was used to compute the angle. The descent angle may be computed from either the final approach fix (FAF), or a stepdown fix, to the runway threshold at the published TCH. A stepdown fix is only used as the start point when an angle computed from the FAF would place the aircraft below the stepdown fix altitude. The descent angle and TCH information are charted on the profile view of the instrument approach chart following the fix the angle was based on. The optimum descent angle is 3.00 degrees; and whenever possible the approach will be designed using this angle.

12.9.1 The VDA provides the pilot with information not previously available on nonprecision approaches. It provides a means for the pilot to establish a stabilized descent from the FAF or stepdown fix to the MDA. Stabilized descent is a key factor in the reduction of controlled flight into terrain (CFIT) incidents. However, pilots should be aware that **the published angle is for information only −** it is strictly advisory in nature. There is no implicit additional obstacle protection below the MDA. Pilots must still respect the published minimum descent altitude (MDA) unless the visual cues stated 14 CFR Section 91.175 are present and they can visually acquire and avoid obstacles once below the MDA. The presence of a VDA does not guarantee obstacle protection in the visual segment and does not change any of the requirements for flying a nonprecision approach.

12.9.2 Additional protection for the visual segment below the MDA is provided if a VDP is published and descent below the MDA is started at or after the VDP. Protection is also provided, if a Visual Glide Slope Indicator (VGSI); e.g., VASI or PAPI, is installed and the aircraft remains on the VGSI glide path angle from the MDA. In either case, a chart note will indicate if the VDP or VGSI are not coincident with the VDA. On RNAV approach charts, a small shaded arrowhead shaped symbol (see the legend of the U.S. Terminal Procedures books, page H1) from the end of the VDA to the runway indicates that the 34:1 visual surface is clear.

12.9.3 Pilots may use the published angle and estimated/actual groundspeed to find a target rate of descent from the rate of descent table published in the back of the U.S. Terminal Procedures Publication. This rate of descent can be flown with the Vertical Velocity Indicator (VVI) in order to use the VDA as an aid to flying a stabilized descent. No special equipment is required.

12.9.4 Since one of the reasons for publishing a circling only instrument landing procedures is that the descent rate required exceeds the maximum allowed for a straight in approach, circling only procedures may have VDAs which are considerably steeper than the standard 3 degree angle on final. In this case, the VDA provides the crew with information about the descent rate required to land straight in from the FAF or step down fix to the threshold. This is not intended to imply that landing straight ahead is recommended, or even possible, since the descent rate may exceed the capabilities of many aircraft. The pilot must determine how to best maneuver the aircraft within the circling obstacle clearance area in order to land.

12.9.5 In rare cases the LNAV minima may have a lower HAT than minima with a glide path due to the location of the obstacles. This should be a clear indication to the pilot that obstacles exist below the MDA which the pilot must see in order to ensure adequate clearance. In those cases, the glide path may be treated as a VDA and used to descend to the LNAV MDA as long as all the rules for a nonprecision approach are applied at the MDA. However, the pilot must keep in mind the information in this paragraph and in paragraph 12.10.

12.10 Pilot Operational Considerations When Flying Nonprecision Approaches. The missed approach point (MAP) on a nonprecision approach is not designed with any consideration to where the aircraft must begin descent to execute a safe landing. It is developed based on terrain, obstructions, NAVAID location and possibly air traffic considerations. Because the MAP may be located anywhere from well prior to the runway threshold to past the opposite end of the runway, the descent from the Minimum Descent Altitude (MDA) to the runway threshold cannot be determined based on the MAP location. Descent from MDA at the MAP when the MAP is located close to the threshold would require an excessively steep descent gradient to land in the normal touchdown zone. Any turn from the final approach course to the runway heading may also be a factor in when to begin the descent.

12.10.1 Pilots are cautioned that descent to a straight−in landing from the MDA at the MAP may be inadvisable or impossible, on a nonprecision approach, even if current weather conditions meet the published ceiling and visibility. Aircraft speed, height above the runway, descent rate, amount of turn and runway length are some of the factors which must be considered by the pilot to determine if a landing can be accomplished.

12.10.2 Visual descent points (VDPs) provide pilots with a reference for the optimal location to begin descent from the MDA, based on the designed vertical descent angle (VDA) for the approach procedure, assuming required visual references are available. Approaches without VDPs have not been assessed for terrain clearance below the MDA, and may not provide a clear vertical path to the runway at the normally expected descent angle. Therefore, pilots must be especially vigilant when descending below the MDA at locations without VDPs. This does not necessarily prevent flying the normal angle; it only means that obstacle clearance in the visual segment could be less and greater care should be exercised in looking for obstacles in the visual segment. Use of visual glide slope indicator (VGSI) systems can aid the pilot in determining if the aircraft is in a position to make the descent from the MDA. However, when the visibility is close to minimums, the VGSI may not be visible at the start descent point for a "normal" glidepath, due to its location down the runway.

12.10.3 Accordingly, pilots are advised to carefully review approach procedures, prior to initiating the approach, to identify the optimum position(s), and any unacceptable positions, from which a descent to landing can be initiated (in accordance with 14 CFR Section 91.175(c)).

12.11 Area Navigation (RNAV) Instrument Approach Charts. Reliance on RNAV systems for instrument operations is becoming more commonplace as new systems such as GPS and augmented GPS such as the Wide Area Augmentation System (WAAS) are developed and deployed. In order to support full integration of RNAV procedures into the National Airspace System (NAS), the FAA developed a new charting format for IAPs (See FIG ENR 1.5−20). This format avoids unnecessary duplication and proliferation of instrument approach charts. The original stand alone GPS charts, titled simply "GPS," are being converted to the newer format as the procedures are revised. One reason for the revision could be the addition of WAAS based minima to the approach chart. The reformatted approach chart is titled "RNAV (GPS) RWY XX." Up to four lines of minima are included on these charts. GLS (Global Navigation Satellite System [GNSS] Landing System) was a placeholder for future WAAS and LAAS minima, and the minima was always listed as N/A. The GLS minima line has now been replaced by the WAAS LPV (Localizer Performance with Vertical Guidance) minima on most RNAV (GPS) charts. LNAV/VNAV (lateral navigation/vertical navigation) was added to support both WAAS electronic vertical guidance and Barometric VNAV. LPV and LNAV/VNAV are both

APV procedures as described in paragraph 12.1.7. The original GPS minima, titled "S−XX," for straight in runway XX, is retitled LNAV (lateral navigation). Circling minima may also be published. A new type of nonprecision WAAS minima will also be published on this chart and titled LP (localizer performance). LP will be published in locations where vertically guided minima cannot be provided due to terrain and obstacles and therefore, no LPV or LNAV/VNAV minima will be published. Current plans call for LAAS based procedures to be published on a separate chart and for the GLS minima line to be used only for LAAS. ATC clearance for the RNAV procedure authorizes a properly certified pilot to utilize any minimums for which the aircraft is certified: e.g. a WAAS equipped aircraft utilize the LPV or LP minima but a GPS only aircraft may not. The RNAV chart includes information formatted for quick reference by the pilot or flight crew at the top of the chart. This portion of the chart, developed based on a study by the Department of Transportation, Volpe National Transportation System Center, is commonly referred to as the pilot briefing.

12.11.1 The minima lines are:

12.11.1.1 GLS. "GLS" is the acronym for GNSS landing system; GNSS is the ICAO acronym for Global Navigation Satellite System (the international term for all GPS type systems). This line was originally published as a placeholder for both WAAS and LAAS minima and marked as N/A since no minima was published. As the concepts for LAAS and WAAS procedure publication have evolved, GLS will now be used only for LAAS minima, which will be on a separate approach chart. Most RNAV(GPS) approach charts have had the GLS minima line replaced by a WAAS LPV line of minima.

12.11.1.2 LPV. "LPV" is the acronym for localizer performance with vertical guidance. LPV identifies WAAS APV approach minimums with electronic lateral and vertical guidance. The lateral guidance is equivalent to localizer and the protected area for LPV procedures is now the same as for an ILS. The obstacle clearance area is considerably smaller than the LNAV/VNAV protection, allowing lower minima in many cases. Aircraft can fly this minima line with a statement in the Aircraft Flight Manual that the installed equipment supports LPV approaches. This includes Class 3 and 4 TSO−C146 WAAS equipment.

12.11.1.3 LNAV/VNAV. LNAV/VNAV identifies APV minimums developed to accommodate an RNAV IAP with vertical guidance, usually provided by approach certified Baro−VNAV, but with lateral and vertical integrity limits larger than a precision approach or LPV. LNAV stands for Lateral Navigation; VNAV stands for Vertical Navigation. This minima line can be flown by aircraft with a statement in the Aircraft Flight Manual that the installed equipment supports GPS approaches and has an approach−approved barometric VNAV, or if the aircraft has been demonstrated to support LNAV/VNAV approaches. This includes Class 2, 3 and 4 TSO−C146 WAAS equipment. Aircraft using LNAV/VNAV minimums will descend to landing via an internally generated descent path based on satellite or other approach approved VNAV systems. Since electronic vertical guidance is provided, the minima will be published as a DA. Other navigation systems may be specifically authorized to use this line of minima, see Section A, Terms/Landing Minima Data, of the U.S. Terminal Procedures books.

12.11.1.4 LP. "LP" is the acronym for localizer performance. LP identifies nonprecision WAAS procedures which are equivalent to ILS Localizer procedures. LP is intended for use in locations where vertical guidance cannot be provided due to terrain or other obstacles. The protected area is considerably smaller than the area for LNAV lateral protection and will provide a lower MDA in many cases. WAAS equipment may not support LP, even if it supports LPV, if it was approved before TSO C−145B and TSO C−146B. Receivers approved under previous TSOs may require an upgrade by the manufacturer in order to be used to fly to LP minima. Receivers approved for LP must have a statement in the approved Flight Manual or Supplemental Flight Manual including LP as one of the approved approach types. LPV and LP cannot be published as part of the same instrument procedure due to the inability to change integrity limits during an approach.

12.11.1.5 LNAV. This minima is for lateral navigation only, and the approach minimum altitude will be published as a minimum descent altitude (MDA). LNAV provides the same level of service as the present GPS stand alone approaches. LNAV minimums support the following navigation systems: WAAS, when the navigation solution will not support vertical navigation; and, GPS navigation systems which are presently authorized to conduct GPS approaches. Existing GPS approaches continue to be converted to the RNAV (GPS) format as they are revised or reviewed.

NOTE−
GPS receivers approved for approach operations 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, for stand−alone Technical Standard Order (TSO) TSO−C129 Class A(1) systems; or AC 20−130A, Airworthiness Approval of Navigation or Flight Management Systems Integrating Multiple Navigation Sensors, for GPS as part of a multi−sensor system, qualify for this minima. WAAS navigation equipment must be approved in accordance with the requirements specified in TSO−C145 or TSO−C146 and installed in accordance with Advisory Circular AC 20−138A, Airworthiness Approval of Global Navigation Satellite System (GNSS) Equipment.

12.11.2 Other systems may be authorized to utilize these approaches. See the description in Section A of the U.S. Terminal Procedures books for details. These systems may include aircraft equipped with an FMS that can file /E or /F. Operational approval must also be obtained for Baro−VNAV systems to operate to the LNAV/VNAV minimums. Baro−VNAV may not be authorized on some approaches due to other factors, such as no local altimeter source being available. Baro−VNAV is not authorized on LPV procedures. Pilots are directed to their local Flight Standards District Office (FSDO) for additional information.

NOTE−
RNAV and Baro−VNAV systems must have a manufacturer supplied electronic database which shall include the waypoints, altitudes, and vertical data for the procedure to be flown. The system shall also be able to extract the procedure in its entirety, not just as a manually entered series of waypoints.

12.11.3 ILS or RNAV (GPS) charts. Some RNAV (GPS) charts will also contain an ILS line of minima to make use of the ILS precision final in conjunction with the RNAV GPS capabilities for the portions of the procedure prior to the final approach segment and for the missed approach. Obstacle clearance for the portions of the procedure other than the final approach segment is still based on GPS criteria.

NOTE−
*Some GPS receiver installations inhibit GPS navigation whenever **ANY** ILS frequency is tuned. Pilots flying aircraft with receivers installed in this manner must wait until they are on the intermediate segment of the procedure prior to the PFAF (PFAF is the active waypoint) to tune the ILS frequency and must tune the ILS back to a VOR frequency in order to fly the GPS based missed approach.*

12.11.4 Required Navigation Performance (RNP)

12.11.4.1 Pilots are advised to refer to the "TERMS/LANDING MINIMUMS DATA" (Section A) of the U.S. Government Terminal Procedures books for aircraft approach eligibility requirements by specific RNP level requirements.

12.11.4.2 Some aircraft have RNP approval in their AFM without a GPS sensor. The lowest level of sensors that the FAA will support for RNP service is DME/DME. However, necessary DME signal may not be available at the airport of intended operations. For those locations having an RNAV chart published with LNAV/VNAV minimums, a procedure note may be provided such as "DME/DME RNP−0.3 NA." This means that RNP aircraft dependent on DME/DME to achieve RNP−0.3 are not authorized to conduct this approach. Where DME facility availability is a factor, the note may read "DME/DME RNP−0.3 Authorized; ABC and XYZ Required." This means that ABC and XYZ facilities have been determined by flight inspection to be required in the navigation solution to assure RNP−0.3. VOR/DME updating must not be used for approach procedures.

12.11.5 CHART TERMINOLOGY

12.11.5.1 Decision Altitude (DA) replaces the familiar term Decision Height (DH). DA conforms to the international convention where altitudes relate to MSL and heights relate to AGL. DA will eventually be published for other types of instrument approach procedures with vertical guidance, as well. DA indicates to the pilot that the published descent profile is flown to the DA (MSL), where a missed approach will be initiated if visual references for landing are not established. Obstacle clearance is provided to allow a momentary descent below DA while transitioning from the final approach to the missed approach. The aircraft is expected to follow the missed instructions while continuing along the published final approach course to at least the published runway threshold waypoint or MAP (if not at the threshold) before executing any turns.

12.11.5.2 Minimum Descent Altitude (MDA) has been in use for many years, and will continue to be used for the LNAV only and circling procedures.

12.11.5.3 Threshold Crossing Height (TCH) has been traditionally used in "precision" approaches as the height of the glide slope above threshold. With publication of LNAV/VNAV minimums and RNAV descent angles, including graphically depicted descent profiles, TCH also applies to the height of the "descent angle," or glidepath, at the threshold. Unless otherwise required for larger type aircraft which may be using the IAP, the typical TCH is 30 to 50 feet.

12.11.6 The MINIMA FORMAT will also change slightly.

12.11.6.1 Each line of minima on the RNAV IAP is titled to reflect the level of service available; e.g., GLS, LPV, LNAV/VNAV, and LNAV. CIRCLING minima will also be provided.

12.11.6.2 The minima title box indicates the nature of the minimum altitude for the IAP. For example:

a) DA will be published next to the minima line title for minimums supporting vertical guidance such as for GLS, LPV or LNAV/VNAV.

b) MDA will be published where the minima line was designed to support aircraft with only lateral guidance available, such as LNAV. Descent below the MDA, including during the missed approach, is not authorized unless the visual conditions stated in 14 CFR Section 91.175 exist.

c) Where two or more systems, such as LPV and LNAV/VNAV, share the same minima, each line of minima will be displayed separately.

12.11.7 Chart Symbology changed slightly to include:

12.11.7.1 Descent Profile. The published descent profile and a graphical depiction of the vertical path to the runway will be shown. Graphical depiction of the RNAV vertical guidance will differ from the traditional depiction of an ILS glide slope (feather) through the use of a shorter vertical track beginning at the decision altitude.

a) It is FAA policy to design IAPs with minimum altitudes established at fixes/waypoints to achieve optimum stabilized (constant rate) descents within each procedure segment. This design can enhance the safety of the operations and contribute toward reduction in the occurrence of controlled flight into terrain (CFIT) accidents. Additionally, the National Transportation Safety Board (NTSB) recently emphasized that pilots could benefit from publication of the appropriate IAP descent angle for a stabilized descent on final approach. The RNAV IAP format includes the descent angle to the hundredth of a degree; e.g., **3.00 degrees.** The angle will be provided in the graphically depicted descent profile.

b) The stabilized approach may be performed by reference to vertical navigation information provided by WAAS or LNAV/VNAV systems; or for LNAV−only systems, by the pilot determining the appropriate aircraft attitude/groundspeed combination to attain a constant rate descent which best emulates the published angle. To aid the pilot, U.S. Government Terminal Procedures Publication charts publish an expanded Rate of Descent Table on the inside of the back hard cover for use in planning and executing precision descents under known or approximate groundspeed conditions.

12.11.7.2 Visual Descent Point (VDP). A VDP will be published on most RNAV IAPs. VDPs apply only to aircraft utilizing LP or LNAV minima, not LPV or LNAV/VNAV minimums**.**

12.11.7.3 Missed Approach Symbology. In order to make missed approach guidance more readily understood, a method has been developed to display missed approach guidance in the profile view through the use of quick reference icons. Due to limited space in the profile area, only four or fewer icons can be shown. However, the icons may not provide representation of the entire missed approach procedure. The entire set of textual missed approach instructions are provided at the top of the approach chart in the pilot briefing. (See FIG ENR 1.5−20.)

12.11.7.4 Waypoints. All RNAV or GPS stand−alone IAPs are flown using data pertaining to the particular IAP obtained from an onboard database, including the sequence of all WPs used for the approach and missed approach, except that step down waypoints may not be included in some TSO−C−129 receiver databases. Included in the database, in most receivers, is coding that informs the navigation system of which WPs are fly−over (FO) or fly−by (FB). The navigation system may provide guidance appropriately − including leading the turn prior to a fly−by WP; or causing overflight of a fly−over WP. Where the navigation system does not provide such guidance, the pilot must accomplish the turn lead or waypoint overflight manually. Chart symbology for the FB WP provides pilot awareness of expected actions. Refer to the legend of the U.S. Terminal Procedures books.

12.11.7.5 TAAs are described in subparagraph 12.4, Terminal Arrival Area (TAA). When published, the RNAV chart depicts the TAA areas through the use of "icons" representing each TAA area associated with the RNAV procedure (See FIG ENR 1.5−20). These icons are depicted in the plan view of the approach chart, generally arranged on the chart in accordance with their position relative to the aircrafts arrival from the en route structure. The WP, to which navigation is appropriate and expected within each specific TAA area, will be named and depicted on the associated TAA icon. Each depicted named WP is the IAF for arrivals from within that area. TAAs may not be used on all RNAV procedures because of airspace congestion or other reasons.

12.11.7.6 Hot and Cold Temperature Limitations. A minimum and maximum temperature limitation is published on procedures which authorize Baro−VNAV operation. These temperatures represent the airport temperature above or below which Baro−VNAV is not authorized to LNAV/VNAV minimums. As an example, the limitation will read: "Uncompensated Baro−VNAV NA below −8°C (−18°F) or above 47°C (117°F)." This information will be found in the upper left hand box of the pilot briefing. When the temperature is above the high temperature or below the low temperature limit, Baro−VNAV may be used to provide a stabilized descent to the LNAV MDA; however, extra caution should be used in the visual segment to ensure a vertical correction is not required. If the VGSI is aligned with the published glidepath, and the aircraft instruments indicate on glidepath, an above or below glidepath indication on the VGSI may indicate that temperature error is causing deviations to the glidepath. These deviations should be considered if the approach is continued below the MDA.

NOTE−
Many systems which apply Baro−VNAV temperature compensation only correct for cold temperature. In this case, the high temperature limitation still applies. Also, temperature compensation may require activation by maintenance personnel during installation in order to be functional, even though the system has the feature. Some systems may have a temperature correction capability, but correct the Baro−altimeter all the time, rather than just on the final, which would create conflicts with other aircraft if the feature were activated. Pilots should be aware of compensation capabilities of the system prior to disregarding the temperature limitations.

NOTE−
Temperature limitations do not apply to flying the LNAV/VNAV line of minima using approach certified WAAS receivers when LPV or LNAV/VNAV are annunciated to be available.

12.11.7.7 WAAS Channel Number/Approach ID. The WAAS Channel Number is an optional equipment capability that allows the use of a 5−digit number to select a specific final approach segment without using the menu method. The Approach ID is an airport unique 4−character combination for verifying the selection and extraction of the correct final approach segment information from the aircraft database. It is similar to the ILS ident, but displayed visually rather than aurally. The Approach ID consists of the letter W for WAAS, the runway number, and a letter other than L, C or R, which could be confused with Left, Center and Right, e.g., W35A. Approach IDs are assigned in the order that WAAS approaches are built to that runway number at that airport. The WAAS Channel Number and Approach ID are displayed in the upper left corner of the approach procedure pilot briefing.

12.11.7.8 At locations where outages of WAAS vertical guidance may occur daily due to initial system limitations, a negative W symbol (W) will be placed on RNAV (GPS) approach charts. Many of these outages will be very short in duration, but may result in the disruption of the vertical portion of the approach. The W symbol indicates that NOTAMs or Air Traffic advisories are not provided for outages which occur in the WAAS LNAV/VNAV or LPV vertical service. Use LNAV 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 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. As the WAAS coverage is expanded, the W will be removed.

13. Special Instrument Approach Procedures

13.1 Instrument Approach Procedure (IAP) charts reflect the criteria associated with the U.S. Standard for Terminal Instrument [Approach] Procedures (TERPs), which prescribes standardized methods for use in developing IAPs. Standard IAPs are published in the Federal Register (FR) in accordance with

Title 14 of the Code of Federal Regulations, Part 97, and are available for use by appropriately qualified pilots operating properly equipped and airworthy aircraft in accordance with operating rules and procedures acceptable to the FAA. Special IAPs are also developed using TERPS but are not given public notice in the FR. The FAA authorizes only certain individual pilots and/or pilots in individual organizations to use special IAPs, and may require additional crew training and/or aircraft equipment or performance, and may also require the use of landing aids, communications, or weather services not available for public use. Additionally, IAPs that service private use airports or heliports are generally special IAPs.

14. Radar Approaches

14.1 The only airborne radio equipment required for radar approaches is a functioning radio transmitter and receiver. The radar controller vectors the aircraft to align it with the runway centerline. The controller continues the vectors to keep the aircraft on course until the pilot can complete the approach and landing by visual reference to the surface. There are two types of radar approaches, "Precision" (PAR) and "Surveillance" (ASR).

14.2 A radar approach may be given to any aircraft upon request and may be offered to pilots of aircraft in distress or to expedite traffic; however, a surveillance approach might not be approved unless there is an ATC operational requirement, or in an unusual or emergency situation. Acceptance of a precision or surveillance approach by a pilot does not waive the prescribed weather minimums for the airport or for the particular aircraft operator concerned. The decision to make a radar approach when the reported weather is below the established minimums rests with the pilot.

14.3 Precision and surveillance approach minimums are published on separate pages in the Federal Aviation Administration Instrument Approach Procedure charts.

14.3.1 A Precision Approach (PAR) is one in which a controller provides highly accurate navigational guidance in azimuth and elevation to a pilot. Pilots are given headings to fly to direct them to and keep their aircraft aligned with the extended centerline of the landing runway. They are told to anticipate glidepath interception approximately 10 to 30 seconds before it occurs and when to start descent. The published decision height will be given only if the pilot requests it. If the aircraft is observed to deviate above or below the glidepath, the pilot is given the relative amount of deviation by use of terms "slightly" or "well" and is expected to adjust the aircrafts rate of descent to return to the glidepath. Trend information is also issued with respect to the elevation of the aircraft and may be modified by the terms "rapidly" and "slowly"; e.g., "well above glidepath, coming down rapidly." Range from touchdown is given at least once each mile. If an aircraft is observed by the controller to proceed outside of specified safety zone limits in azimuth and/or elevation and continues to operate outside these prescribed limits, the pilot will be directed to execute a missed approach or to fly a specified course unless the pilot has the runway environment (runway, approach lights, etc.) in sight. Navigational guidance in azimuth and elevation is provided the pilot until the aircraft reaches the published decision height (DH). Advisory course and glidepath information is furnished by the controller until the aircraft passes over the landing threshold, at which point the pilot is advised of any deviation from the runway centerline. Radar service is automatically terminated upon completion of the approach.

14.3.2 A Surveillance Approach (ASR) is one in which a controller provides navigational guidance in azimuth only. The pilot is furnished headings to fly to align the aircraft with the extended centerline of the landing runway. Since the radar information used for a surveillance approach is considerably less precise than that used for a precision approach, the accuracy of the approach will not be as great, and higher minimums will apply. Guidance in elevation is not possible but the pilot will be advised when to commence descent to the minimum descent altitude (MDA) or, if appropriate, to an intermediate "step down fix" minimum crossing altitude and subsequently to the prescribed MDA. In addition, the pilot will be advised of the location of the missed approach point (MAP) prescribed for the procedure and the aircrafts position each mile on final from the runway, airport/heliport, or MAP, as appropriate. If requested by the pilot, recommended altitudes will be issued at each mile, based on the descent gradient established for the procedure, down to the last mile that is at or above the MDA. Normally, navigational guidance will be provided until the aircraft reaches the MAP. Controllers will terminate guidance and instruct the pilot to execute a missed approach unless at the MAP the pilot has the runway, airport/heliport in sight or, for a helicopter point−in−space approach, the prescribed visual reference with the surface is established. Also, if at any time during the approach the controller considers that safe guidance for the remainder of the approach cannot be provided, the controller will terminate guidance and instruct the pilot to execute a missed approach. Similarly, guidance termination and missed approach will be effected upon pilot request, and for civil aircraft only, controllers may terminate guidance when the pilot reports the runway, airport/heliport, or visual surface route (point−in−space approach) in sight or otherwise indicates that continued guidance is not required. Radar service is automatically terminated at the completion of a radar approach.

NOTE−
1. *The published MDA for straight−in approaches will be issued to the pilot before beginning descent. When a surveillance approach will terminate in a circle−to−land maneuver, the pilot must furnish the aircraft approach category to the controller. The controller will then provide the pilot with the appropriate MDA.*

2. *ASR approaches are not available when an ATC facility is using center radar arts presentation/ processing (CENRAP).*

14.3.3 A No−Gyro Approach is available to a pilot under radar control who experiences circumstances wherein the directional gyro or other stabilized compass is inoperative or inaccurate. When this occurs, the pilot should so advise ATC and request a No−Gyro vector or approach. Pilots of aircraft not equipped with a directional gyro or other stabilized compass who desire radar handling may also request a No−Gyro vector or approach. The pilot should make all turns at standard rate and should execute the turn immediately upon receipt of instructions. For example, "TURN RIGHT," "STOP TURN." When a surveillance or precision approach is made, the pilot will be advised after the aircraft has been turned onto final approach to make turns at half standard rate.

15. Radar Monitoring of Instrument Approaches

15.1 PAR facilities operated by the FAA and the military services at some joint−use (civil/military) and military installations monitor aircraft on instrument approaches and issue radar advisories to the pilot when weather is below VFR minimum (1,000 and 3), at night, or when requested by a pilot. This service is provided only when the PAR final approach course coincides with the final approach of the navigational aid and only during the operational hours of the PAR. The radar advisories serve only as a secondary aid since the pilot has selected the navigational aid as the primary aid for the approach.

15.2 Prior to starting final approach, the pilot will be advised of the frequency on which the advisories will be transmitted. If, for any reason, radar advisories cannot be furnished, the pilot will be so advised.

15.3 Advisory information, derived from radar observations, includes information on:

15.3.1 Passing the final approach fix inbound (nonprecision approach) or passing the outer marker or the fix used in lieu of the outer marker inbound (precision approach).

15.3.2 Trend advisories with respect to elevation and/or azimuth radar position and movement will be provided.

NOTE−
At this point, the pilot may be requested to report sighting the approach lights or the runway.

NOTE−
Whenever the aircraft nears the PAR safety limit, the pilot will be advised that he/she is well above or below the glidepath or well left or right of course. Glidepath information is given only to those aircraft executing a precision approach, such as ILS or MLS. Altitude information is not transmitted to aircraft executing other than precision approaches because the descent portions of these approaches generally do not coincide with the depicted PAR glidepath. At locations where the MLS glidepath and PAR glidepath are not coincidental, only azimuth monitoring will be provided.

15.3.3 If, after repeated advisories, the aircraft proceeds outside the PAR safety limit or if a radical deviation is observed, the pilot will be advised to execute a missed approach if not visual.

15.4 Radar service is automatically terminated upon completion of the approach.

16. ILS Approach

16.1 Communications should be established with the appropriate FAA control tower or with the FAA FSS where there is no control tower, prior to starting an ILS approach. This is in order to receive advisory information as to the operation of the facility. It is also recommended that the aural signal of the ILS be monitored during an approach as to assure continued reception and receipt of advisory information, when available.

17. ILS/MLS Approaches to Parallel Runways

17.1 ATC procedures permit ILS instrument approach operations to dual or triple parallel runway configurations. ILS/MLS approaches to parallel runways are grouped into three classes: Parallel (dependent) ILS/MLS Approaches; Simultaneous Parallel (independent) ILS/MLS Approaches; and Simultaneous Close Parallel (independent) ILS Precision Runway Monitor (PRM) Approaches. (See FIG ENR 1.5−25.) The classification of a parallel runway approach procedure is dependent on adjacent parallel runway centerline separation, ATC procedures, and airport ATC radar monitoring and communications capabilities. At some airports one or more parallel localizer courses may be offset up to 3 degrees. Offset localizer configurations result in loss of Category II capabilities and an increase in decision height (50 feet).

17.2 Parallel approach operations demand heightened pilot situational awareness. A thorough Approach Procedure Chart review should be conducted with, as a minimum, emphasis on the following approach chart information: name and number of the approach, localizer frequency, inbound localizer/azimuth course, glide slope intercept altitude, decision height, missed approach instructions, special notes/procedures, and the assigned runway location/proximity to adjacent runways. Pilots will be advised that simultaneous ILS/MLS or simultaneous close parallel ILS PRM approaches are in use. This information may be provided through the ATIS.

17.3 The close proximity of adjacent aircraft conducting simultaneous parallel ILS/MLS and simultaneous close parallel ILS 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 ILS/MLS approaches require pilot knowledge of procedures necessary to comply with ATC instructions. Simultaneous parallel ILS/MLS and simultaneous close parallel ILS PRM approaches necessitate precise localizer tracking to minimize final monitor controller intervention, and unwanted No Transgression Zone (NTZ) penetration. In the unlikely event of a breakout, a vector off the approach course prior to the decision altitude (DA), 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.

17.4 Strict radio discipline is mandatory during parallel ILS/MLS 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 by the final monitor controller during simultaneous parallel ILS/MLS and simultaneous close parallel ILS PRM approaches. For additional communications information, pilots should refer to GEN 3.4, paragraph 4.4, Radio Communications Phraseology and Techniques.

17.5 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 1.5−25

Parallel ILS Approaches

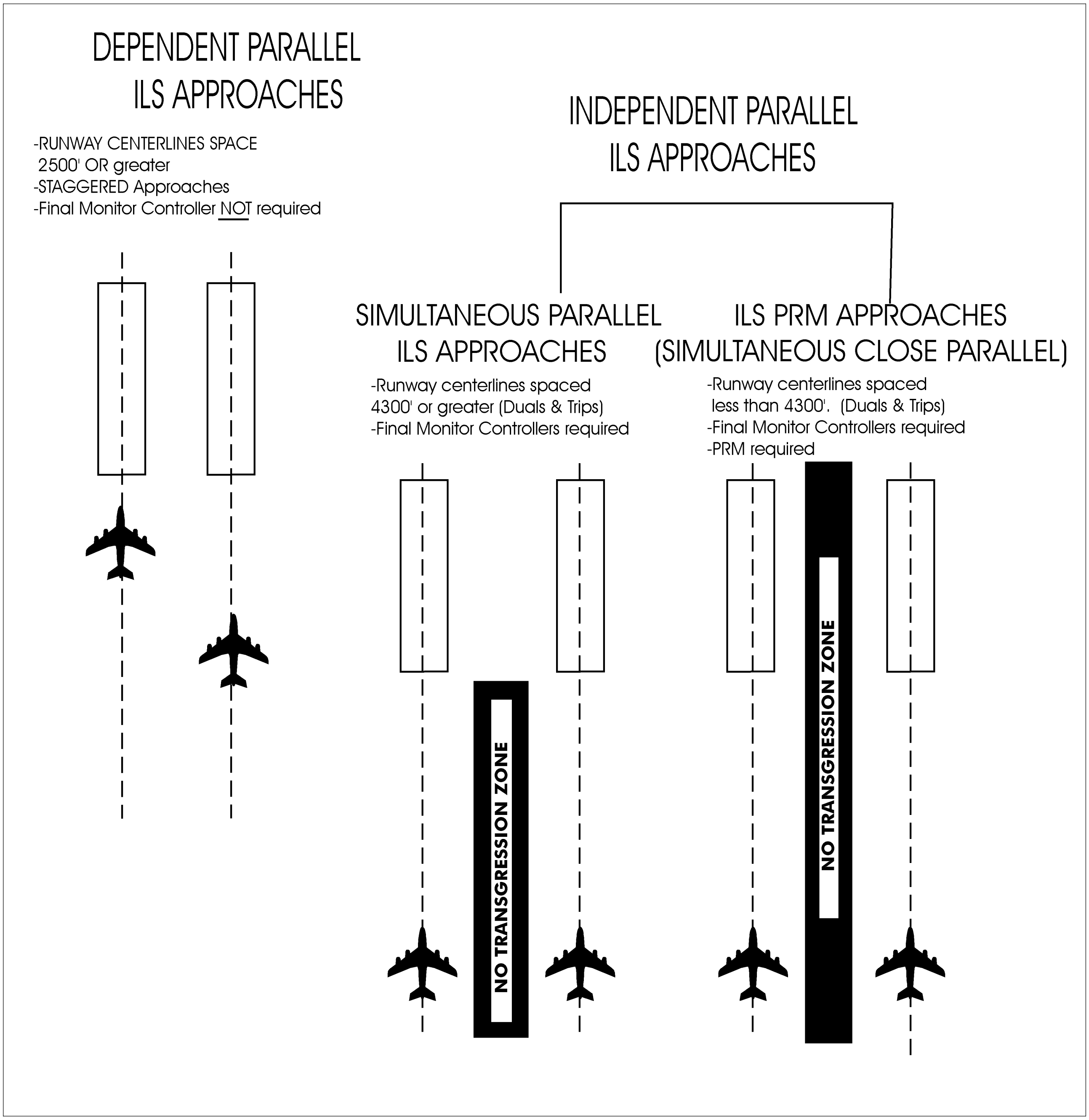
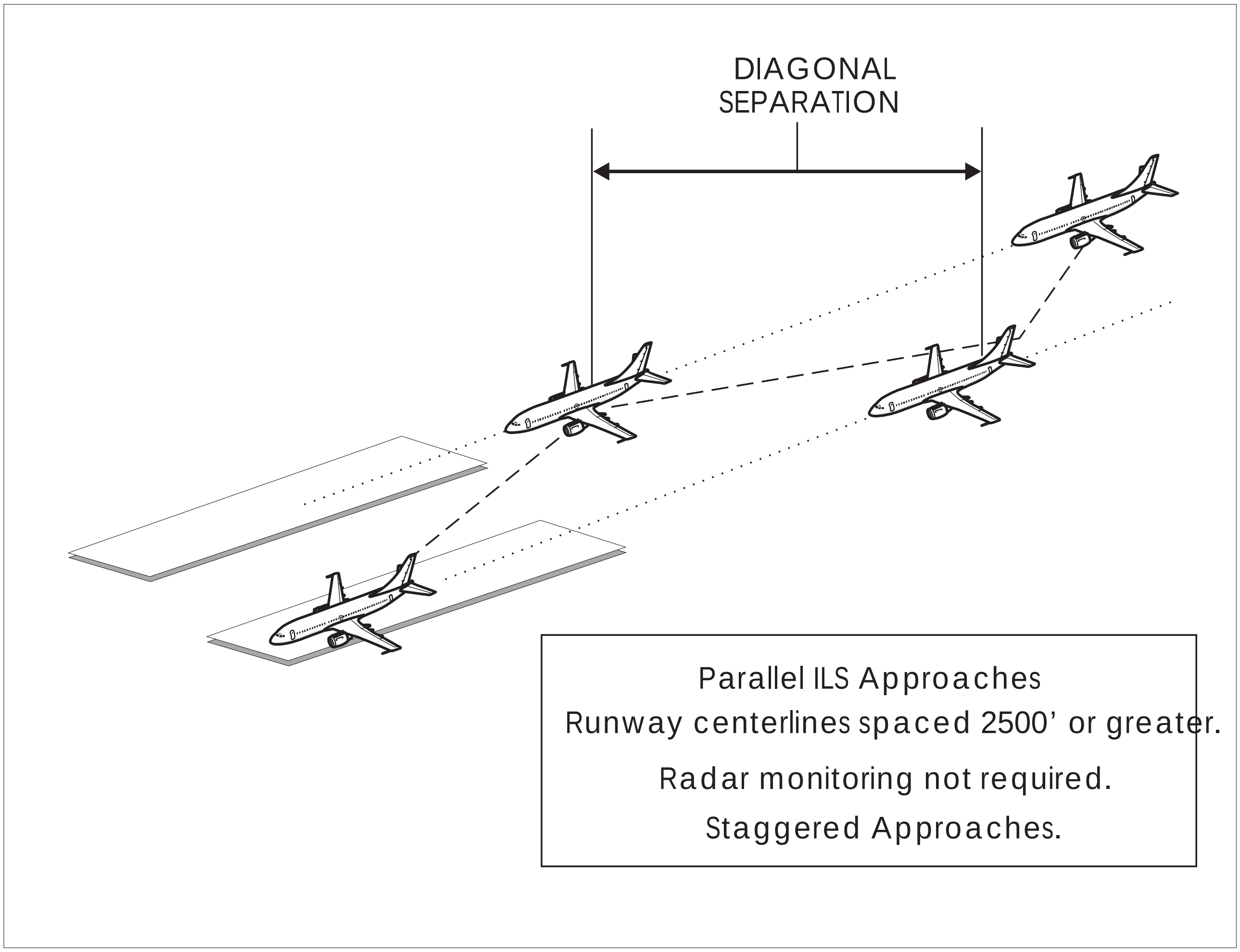


FIG ENR 1.5−26
Staggered ILS Approaches



18. Parallel ILS/MLS Approaches (Dependent) (See FIG ENR 1.5−26)

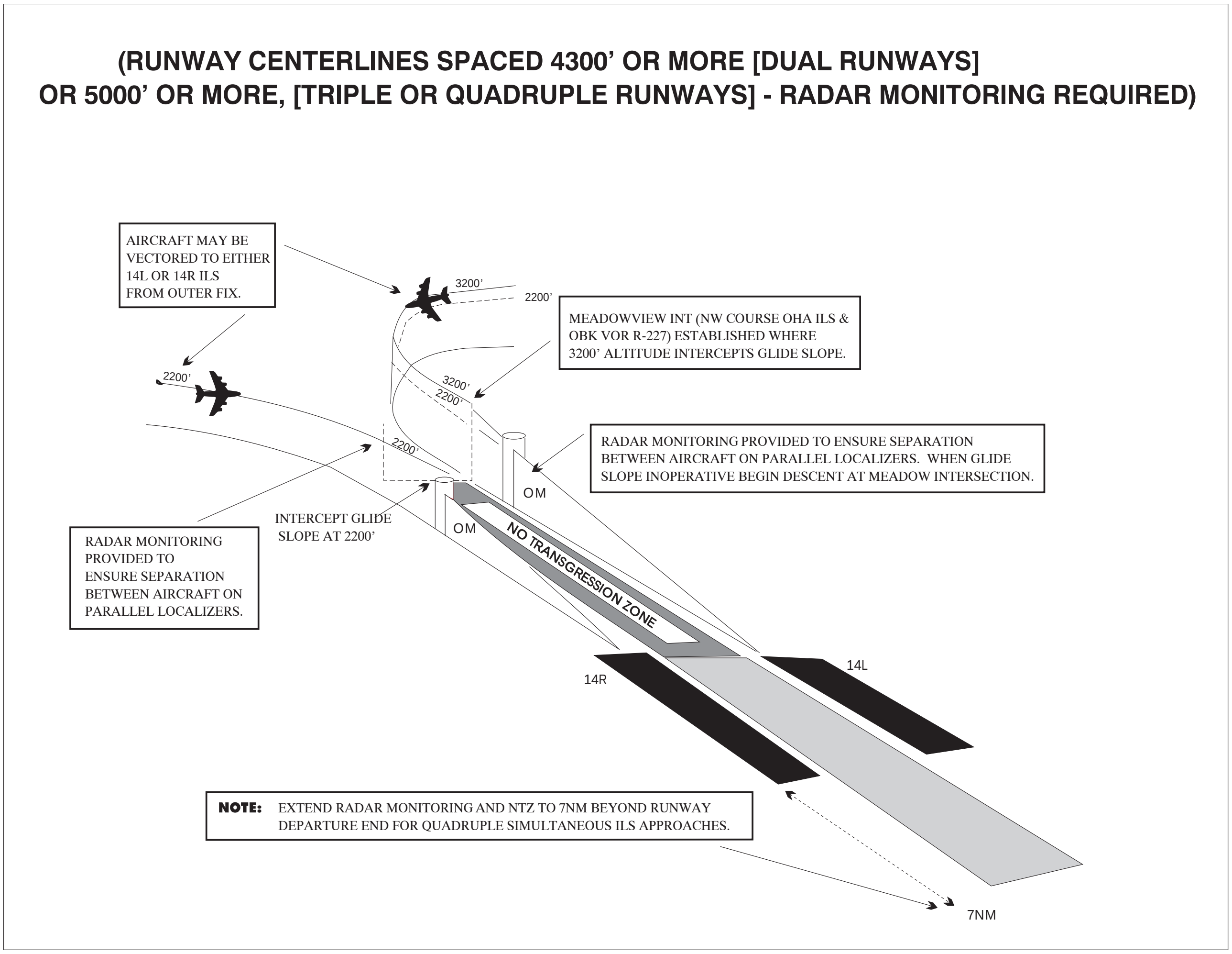
18.1 Parallel approaches are an ATC procedure permitting parallel ILS/MLS approaches to airports having parallel runways separated by at least 2,500 feet between centerlines. Integral parts of a total system are ILS/MLS, radar, communications, ATC procedures, and required airborne equipment.

18.2 A parallel (dependent) approach differs from a simultaneous (independent) approach in that, the minimum distance between parallel runway centerlines is reduced; there is no requirement for radar monitoring or advisories; and a staggered separation of aircraft on the adjacent localizer/azimuth course is required.

18.3 Aircraft are afforded a minimum of 1.5 miles radar separation diagonally between successive aircraft on the adjacent localizer/azimuth course when runway centerlines are at least 2,500 feet but no more than 4,300 feet apart. When runway centerlines are more than 4,300 feet but no more than 9,000 feet apart, a minimum of 2 miles diagonal radar separation is provided. Aircraft on the same localizer/azimuth course within 10 miles of the runway end are provided a minimum of 2.5 miles radar separation. In addition, a minimum of 1,000 feet vertical or a minimum of three miles radar separation is provided between aircraft during turn on to the parallel final approach course.

FIG ENR 1.5−27

Simultaneous Parallel ILS Approaches



18.4 Whenever parallel ILS/MLS approaches are in progress, pilots are informed that approaches to both runways are in use. In addition, the radar controller will have the interphone capability of communicating with the tower controller where separation responsibility has not been delegated to the tower.

19. Simultaneous Parallel ILS/MLS Approaches (Independent) (See FIG ENR 1.5−27)

19.1 System. This approach system permits simultaneous ILS/MLS approaches to parallel runways with centerlines separated by 4,300 to 9,000 feet, and equipped with final monitor controllers. Simultaneous parallel ILS/MLS approaches require radar monitoring to ensure separation between aircraft on the adjacent parallel approach course. Aircraft position is tracked by final monitor controllers who will issue instructions to aircraft observed deviating from the assigned localizer course. Staggered radar separation procedures are not utilized. Integral parts of a total system are ILS/MLS, radar, communications, ATC procedures, and required airborne equipment. The Approach Procedure Chart permitting simultaneous parallel ILS/MLS approaches will contain the note "simultaneous approaches authorized RWYS 14L and 14R," identifying the appropriate runways as the case may be. When advised that simultaneous parallel ILS/MLS approaches are in progress, pilots shall advise approach control immediately of malfunctioning or inoperative receivers, or if a simultaneous parallel ILS/MLS approach is not desired.

19.2 Radar Monitoring. This service is provided for each simultaneous parallel ILS/MLS approach to ensure aircraft do not deviate from the final approach course. Radar monitoring includes instructions if an aircraft nears or penetrates the prescribed NTZ (an area 2,000 feet wide located equidistant between parallel final approach courses). This service will be provided as follows:

19.2.1 During turn on to parallel final approach, aircraft will be provided 3 miles radar separation or a minimum or 1,000 feet vertical separation. The assigned altitude must be maintained until intercepting the glide path, unless cleared otherwise by ATC. Aircraft will not be vectored to intercept the final approach course at an angle greater than thirty degrees.

19.2.2 The final monitor controller will have the capability of overriding the tower controller on the tower frequency.

19.2.3 Pilots will be instructed to monitor the tower frequency to receive advisories and instructions.

19.2.4 Aircraft observed to overshoot the turn−on or to continue on a track which will penetrate the NTZ will be instructed to return to the correct final approach course immediately. The final monitor controller may also issue missed approach or breakout instructions to the deviating aircraft.

PHRASEOLOGY−
"(Aircraft call sign) YOU HAVE CROSSED THE FINAL APPROACH COURSE. TURN (left/right) IMMEDIATELY AND RETURN TO THE LOCALIZER/AZIMUTH COURSE."

or

"(Aircraft call sign) TURN (left/right) AND RETURN TO THE LOCALIZER/AZIMUTH COURSE."

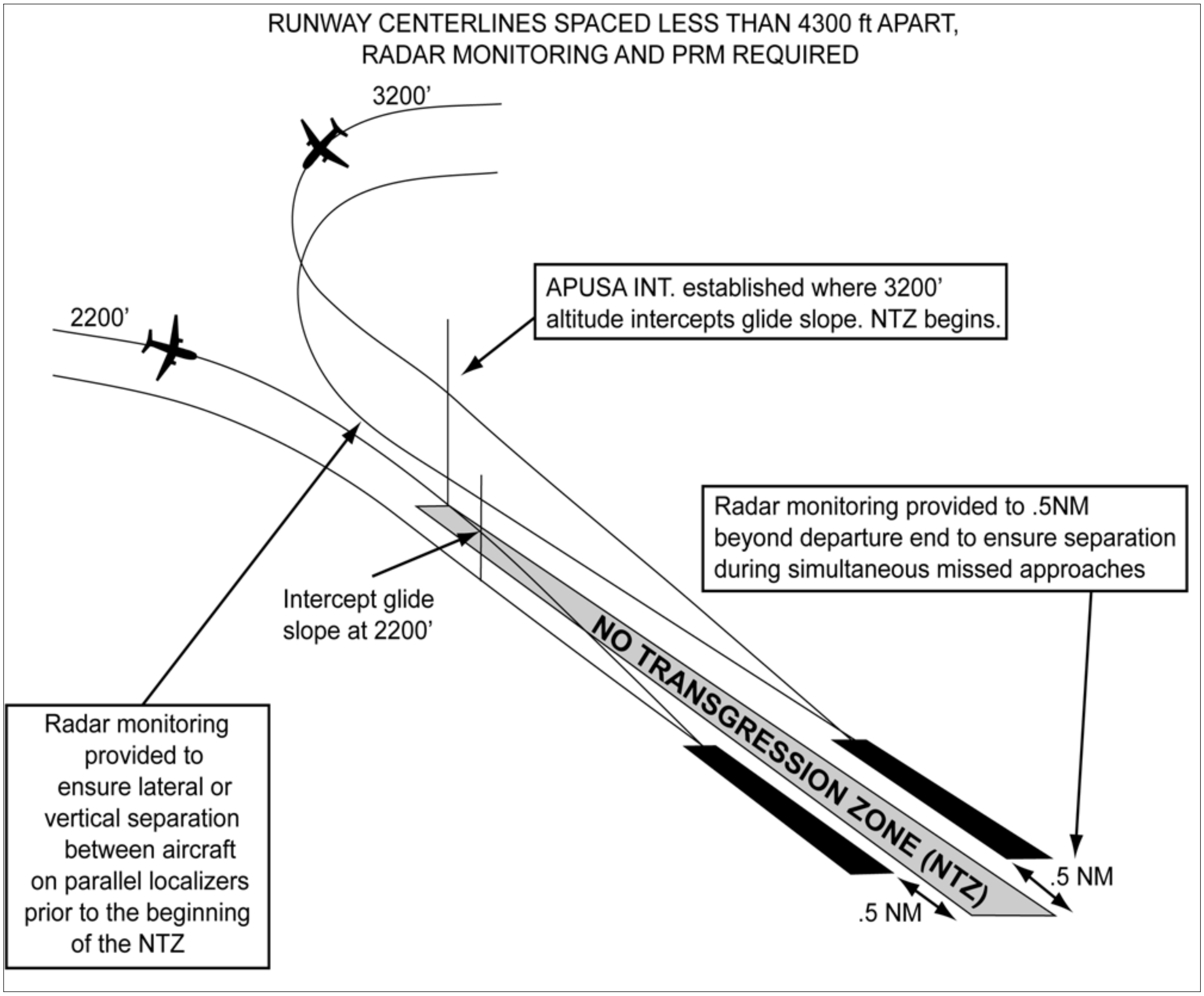
19.2.5 If a deviating aircraft fails to respond to such instructions or is observed penetrating the NTZ, the aircraft on the adjacent final approach course may be instructed to alter course.

PHRASEOLOGY−
"TRAFFIC ALERT (aircraft call sign) TURN (left/right) IMMEDIATELY HEADING (degrees), (climb/descend) AND MAINTAIN (altitude)."

19.2.6 Radar monitoring will automatically be terminated when visual separation is applied, the aircraft reports the approach lights or runway in sight, or the aircraft is 1 mile or less from the runway threshold (for runway centerlines spaced 4,300 feet or greater). Final monitor controllers will not advise pilots when radar monitoring is terminated.

FIG ENR 1.5−28

ILS PRM Approaches
(Simultaneous Close Parallel)



20. Simultaneous Close Parallel ILS PRM Approaches (Independent) and Simultaneous Offset Instrument Approaches (SOIA) (See FIG ENR 1.5−28)

20.1 System

20.1.1 ILS/PRM is an acronym for Instrument Landing System/Precision Runway Monitor.

20.1.1.1 An approach system that permits simultaneous ILS/PRM approaches to dual runways with centerlines separated by **less** than 4,300 feet but at least 3,400 feet for parallel approach courses, and at least 3,000 feet if one ILS if offset by 2.5 to 3.0 degrees. The airspace between the final approach courses contains a No Transgression Zone (NTZ) with surveillance provided by two PRM monitor controllers, one for each approach course. To qualify for reduced lateral runway separation, monitor controllers must be equipped with high update radar and high resolution ATC radar displays, collectively called a PRM system. The PRM system displays almost instantaneous radar information. Automated tracking software provides PRM monitor controllers with aircraft identification, position, speed and a ten−second projected position, as well as visual and aural controller alerts. The PRM system is a supplemental requirement for simultaneous close parallel approaches in addition to the system requirements for simultaneous parallel ILS/MLS approaches described in paragraph 19, Simultaneous Parallel ILS/MLS Approaches (Independent).

20.1.1.2 Simultaneous close parallel ILS/PRM approaches are depicted on a separate Approach Procedure Chart titled ILS/PRM Rwy XXX (Simultaneous Close Parallel).

20.1.2 SOIA is an acronym for Simultaneous Offset Instrument Approach, a procedure used to conduct simultaneous approaches to runways spaced less than 3,000 feet, but at least 750 feet apart. The SOIA procedure utilizes an ILS/PRM approach to one runway and an offset Localizer Type Directional Aid (LDA)/PRM approach with glide slope to the adjacent runway.

20.1.2.1 The ILS/PRM approach plates used in SOIA operations are identical to other ILS/PRM approach plates, with an additional note, which provides the separation between the two runways used for simultaneous approaches. The LDA/PRM approach plate displays the required notations for closely spaced approaches as well as depicting the visual segment of the approach, and a note that provides the separation between the two runways used for simultaneous operations.

20.1.2.2 Controllers monitor the SOIA ILS/PRM and LDA/PRM approaches with a PRM system using high update radar and high−resolution ATC radar displays in exactly the same manner as is done for ILS/PRM approaches. The procedures and system requirements for SOIA ILS/PRM and LDA/PRM approaches are identical with those used for simultaneous close parallel ILS/PRM approaches until near the LDA/PRM approach missed approach point (MAP)−−−where visual acquisition of the ILS aircraft by the LDA aircraft must be accomplished. Since the ILS/PRM and LDA/PRM approaches are identical except for the visual segment in the SOIA concept, an understanding of the procedures for conducting ILS/PRM approaches is essential before conducting a SOIA ILS/PRM or LDA/PRM operation.

20.1.2.3 In SOIA, the approach course separation (instead of the runway separation) meets established close parallel approach criteria. Refer to FIG ENR 1.5−28 for the generic SOIA approach geometry. A visual segment of the LDA/PRM approach is established between the LDA MAP and the runway threshold. Aircraft transition in visual conditions from the LDA course, beginning at the LDA MAP, to align with the runway and can be stabilized by 500 feet above ground level (AGL) on the extended runway centerline. Aircraft will be "paired" in SOIA operations, with the ILS aircraft ahead of the LDA aircraft prior to the LDA aircraft reaching the LDA MAP. A cloud ceiling for the approach is established so that the LDA aircraft has nominally 30 seconds to acquire the leading ILS aircraft prior to the LDA aircraft reaching the LDA MAP. If visual acquisition is not accomplished, a missed approach must be executed.

20.2 Requirements.

20.2.1 Besides system requirements as identified in subpara 20.1 above all pilots must have completed special training before accepting a clearance to conduct ILS/PRM or LDA/PRM Simultaneous Close Parallel Approaches.

20.2.1.1 Pilot Training Requirement. Pilots must complete special pilot training, as outlined below, before accepting a clearance for a simultaneous close parallel ILS/PRM or LDA/PRM approach.

a) For operations under 14 CFR Parts 121, 129, and 135 pilots must comply with FAA approved company training as identified in their Operations Specifications. Training, at a minimum, must require pilots to view the FAA video "ILS PRM AND SOIA APPROACHES: INFORMATION FOR AIR CARRIER PILOTS." Refer to **http://www.faa.gov** for additional information and to view or download the video.

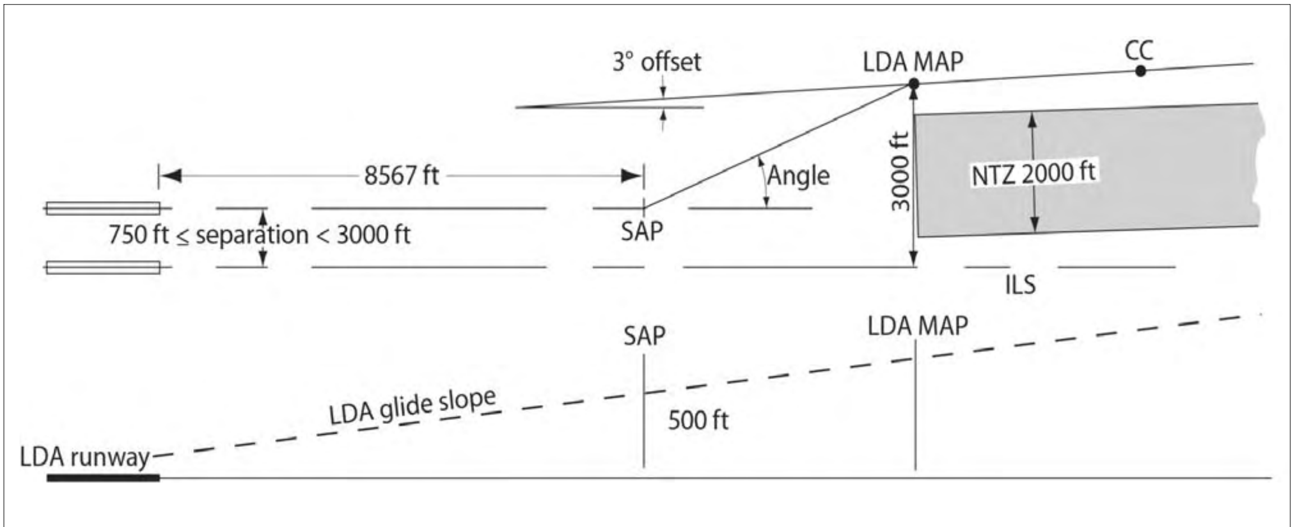
b) For operations under Part 91:

1) Pilots operating transport category aircraft must be familiar with PRM operations as contained in this section of the Aeronautical Information Publication (AIP). In addition, pilots operating transport category aircraft must view the FAA video "ILS PRM AND SOIA APPROACHES: INFORMATION FOR AIR CARRIER PILOTS." Refer to **http://www.faa.gov** for additional information and to view or download the video.

2) Pilots *not* operating transport category aircraft must be familiar with PRM and SOIA operations as contained in this section of the AIP. The FAA strongly recommends that pilots *not* involved in transport category aircraft operations view the FAA video, "ILS PRM AND SOIA APPROACHES: INFORMATION FOR GENERAL AVIATION PILOTS." Refer to **http://www.faa.gov** for additional information and to view or download the video.

FIG ENR 1.5−29

SOIA Approach Geometry



NOTE−

SAP	*The SAP is a design point along the extended centerline of the intended landing runway on the glide slope at 500 feet above the landing threshold. It is used to verify a sufficient distance is provided for the visual maneuver after the missed approach point (MAP) to permit the pilots to conform to approved, stabilized approach criteria.*
MAP	*The point along the LDA where the course separation with the adjacent ILS reaches 3,000 feet. The altitude of the glide slope at that point determines the approach minimum descent altitude and is where the NTZ terminates. Maneuvering inside the MAP is done in visual conditions.*
Angle	*Angle formed at the intersection of the extended LDA runway centerline and a line drawn between the LDA MAP and the SAP. The size of the angle is determined by the FAA SOIA computer design program, and is dependent on whether Heavy aircraft use the LDA and the spacing between the runways.*
Visibility	*Distance from MAP to runway threshold in statute miles (light credit applies).*
Procedure	*LDA aircraft must see the runway landing environment and, if less than standard radar separation exists between the aircraft on the adjacent ILS course, the LDA aircraft must visually acquire the ILS aircraft and report it in sight to ATC prior to the LDA MAP.*
CC	*Clear Clouds.*

20.2.1.2 ATC Directed Breakout. An ATC directed "breakout" is defined as a vector off the ILS or LDA approach course in response to another aircraft penetrating the NTZ, the 2,000 foot wide area located equidistance between the two approach courses that is monitored by the PRM monitor controllers.

20.2.1.3 Dual Communications. The aircraft flying the ILS/PRM or LDA/PRM approach must have the capability of enabling the pilot/s to listen to two communications frequencies simultaneously.

20.3 Radar Monitoring. Simultaneous close parallel ILS/PRM and LDA/PRM approaches require that final monitor controllers utilize the PRM system to ensure prescribed separation standards are met. Procedures and communications phraseology are also described in paragraph 19, Simultaneous Parallel ILS/MLS Approaches (Independent). A minimum of 3 miles radar separation or 1,000 feet vertical separation will be provided during the turn−on to close parallel final approach courses. To ensure separation is maintained, and in order to avoid an imminent situation during simultaneous close parallel ILS/PRM or SOIA ILS/PRM and LDA/PRM approaches, pilots must immediately comply with PRM monitor controller instructions. In the event of a missed approach, radar monitoring is provided to one−half mile beyond the most distant of the two runway departure ends for ILS/RPM approaches. In SOIA, PRM radar monitoring terminates at the LDA MAP. Final monitor controllers will **not** notify pilots when radar monitoring is terminated.

20.4 Attention All Users Page (AAUP). ILS/PRM and LDA/PRM approach charts have an AAUP associated with them that must be referred to in preparation for conducting the approach. This page contains the following instructions that must be followed if the pilot is unable to accept an ILS/PRM or LDA/PRM approach.

20.4.1 At airports that conduct PRM operations, (ILS/PRM or, in the case of airports where SOIAs are conducted, ILS/PRM and LDA/PRM approaches) pilots not qualified to except PRM approaches must contact the FAA Command Center prior to departure (1−800−333−4286) to obtain an arrival reservation (see FAA Advisory Circular 90−98, Simultaneous Closely Spaced Parallel Operations at Airports Using Precision Runway Monitor (PRM) Systems). Arriving flights that are unable to participate in ILS/PRM or LDA/PRM approaches and have not received an arrival reservation are subject to diversion to another airport or delays. Pilots en route to a PRM airport designated as an alternate, unable to reach their filed destination, and who are not qualified to participate in ILS/PRM or LDA/PRM approaches must advise ATC as soon as practical that they are unable to participate. Pilots who are qualified to participate but experience an en route equipment failure that would preclude participation in PRM approaches should notify ATC as soon as practical.

20.4.2 The AAUP covers the following operational topics:

20.4.2.1 ATIS. When the ATIS broadcast advises ILS/PRM approaches are in progress (or ILS PRM and LDA PRM approaches in the case of SOIA), pilots should brief to fly the ILS/PRM or LDA/PRM approach. If later advised to expect the ILS or LDA approach (should one be published), the ILS/PRM or LDA/PRM chart may be used after completing the following briefing items:

a) Minimums and missed approach procedures are unchanged.

b) PRM Monitor frequency no longer required.

c) ATC may assign a lower altitude for glide slope intercept.

NOTE−
In the case of the LDA/PRM approach, this briefing procedure only applies if an LDA approach is also published.

In the case of the SOIA ILS/PRM and LDA/PRM procedure, the AAUP describes the weather conditions in which simultaneous approaches are authorized:

Simultaneous approach weather minimums are X,XXX feet (ceiling), x miles (visibility).

20.4.2.2 Dual VHF Communications Required. To avoid blocked transmissions, each runway will have two frequencies, a primary and a monitor frequency. The tower controller will transmit on both frequencies. The monitor controller's transmissions, if needed, will override both frequencies. Pilots will ONLY transmit on the tower controller's frequency, but will listen to both frequencies. Begin to monitor the PRM monitor controller when instructed by ATC to contact the tower. The volume levels should be set about the same on both radios so that the pilots will be able to hear transmissions on at least one frequency if the other is blocked. Site specific procedures take precedence over the general information presented in this paragraph. Refer to the AAUP for applicable procedures at specific airports.

20.4.2.3 Breakouts. Breakouts differ from other types of abandoned approaches in that they can happen anywhere and unexpectedly. Pilots directed by ATC to break off an approach must assume that an aircraft is blundering toward them and a breakout must be initiated **immediately**.

a) Hand−fly breakouts. All breakouts are to be hand−flown to ensure the maneuver is accomplished in the shortest amount of time.

b) ATC Directed "Breakouts." ATC directed breakouts will consist of a turn and a climb or descent. Pilots must always initiate the breakout in response to an air traffic controller's instruction. Controllers will give a descending breakout only when there are no other reasonable options available, but in no case will the descent be below the minimum vectoring altitude (MVA) which provides at least 1,000 feet required obstruction clearance. The AAUP provides the MVA in the final approach segment as X,XXX feet at (Name) Airport.

NOTE−
"TRAFFIC ALERT." If an aircraft enters the "NO TRANSGRESSION ZONE" (NTZ), the controller will breakout the threatened aircraft on the adjacent approach. The phraseology for the breakout will be:

PHRASEOLOGY−
TRAFFIC ALERT, (aircraft call sign) TURN (left/right) IMMEDIATELY, HEADING (degrees), CLIMB/ DESCEND AND MAINTAIN (altitude).

20.4.2.4 ILS/PRM Navigation. The pilot may find crossing altitudes along the final approach course. The pilot is advised that descending on the ILS glideslope ensures complying with any charted crossing restrictions.

20.4.2.5 SOIA AAUP differences from ILS PRM AAUP

a) ILS/PRM LDA Traffic (only published on ILS/PRM AAUP when the ILS PRM approach is used in conjunctions with an LDA/PRM approach to the adjacent runway). To provide better situational awareness, and because traffic on the LDA may be visible on the ILS aircraft's TCAS, pilots are reminded of the fact that aircraft will be maneuvering behind them to align with the adjacent runway. While conducting the ILS/PRM approach to Runway XXX, other aircraft may be conducting the offset LDA/PRM approach to Runway XXX. These aircraft will approach from the (left/right)−rear and will realign with runway XXX after making visual contact with the ILS traffic. Under normal circumstances these aircraft will not pass the ILS traffic.

b) SOIA LDA/PRM AAUP Items. The AAUP for the SOIA LDA/PRM approach contains most information found on ILS/PRM AAUPs. It replaces certain information as seen below and provides pilots with the procedures to be used in the visual segment of the LDA/PRM approach, from the time the ILS aircraft is visually acquired until landing.

c) SOIA LDA/PRM Navigation (replaces ILS/ PRM 20.4.2.4 and 20.4.2.5a) above). The pilot may find crossing altitudes along the final approach course. The pilot is advised that descending on the LDA glideslope ensures complying with any charted crossing restrictions. Remain on the LDA course until passing XXXXX (LDA MAP name) intersection prior to maneuvering to align with the centerline of runway XXX.

d) SOIA (Name) Airport Visual Segment (replaces ILS/PRM 20.4.2.5a) above). Pilot procedures for navigating beyond the LDA MAP are spelled out. If ATC advises that there is traffic on the adjacent ILS, pilots are authorized to continue past the LDA MAP to align with runway centerline when:

1) the ILS traffic is in sight and is expected to remain in sight,

2) ATC has been advised that "traffic is in sight."

3) the runway environment is in sight.

Otherwise, a missed approach must be executed. Between the LDA MAP and the runway threshold, pilots of the LDA aircraft are responsible for separating themselves visually from traffic on the ILS approach, which means maneuvering the aircraft as necessary to avoid the ILS traffic until landing, and providing wake turbulence avoidance, if applicable. Pilots should advise ATC, as soon as practical, if visual contact with the ILS traffic is lost and execute a missed approach unless otherwise instructed by ATC.

20.5 SOIA LDA Approach Wake Turbulence. Pilots are responsible for wake turbulence avoidance when maneuvering between the LDA missed approach point and the runway threshold.

20.6 Differences between ILS and ILS/PRM approaches of importance to the pilot.

20.6.1 Runway Spacing. Prior to ILS/PRM and LDA/PRM approaches, most ATC directed breakouts were the result of two aircraft in−trail on the same final approach course getting too close together. Two aircraft going in the same direction did not mandate quick reaction times. With PRM approaches, two aircraft could be along side each other, navigating on courses that are separated by less than 4,300 feet. In the unlikely event that an aircraft "blunders" off its course and makes a worst case turn of 30 degrees toward the adjacent final approach course, closing speeds of 135 feet per second could occur that constitute the need for quick reaction. A blunder has to be recognized by the monitor controller, and breakout instructions issued to the endangered aircraft. The pilot will not have any warning that a breakout is eminent because the blundering aircraft will be on another frequency. It is important that, when a pilot receives breakout instructions, he/she assumes that a blundering aircraft is about to or has penetrated the NTZ and is heading toward his/her approach course. The pilot must initiate a breakout as soon as safety allows. While conducting PRM approaches, pilots must maintain an increased sense of awareness in order to immediately react to an ATC instruction (**breakout**) and maneuver as instructed by ATC, away from a blundering aircraft.

20.6.2 Communications. To help in avoiding communication problems caused by stuck microphones and two parties talking at the same time, two frequencies for each runway will be in use during ILS/PRM and LDA/PRM approach operations, the primary tower frequency and the PRM monitor frequency. The tower controller transmits and receives in a normal fashion on the primary frequency and also transmits on the PRM monitor frequency. The monitor controller's transmissions override on both frequencies. The pilots flying the approach will listen to both frequencies but only transmit on the primary tower frequency. If the PRM monitor controller initiates a breakout and the primary frequency is blocked by another transmission, the breakout instruction will still be heard on the PRM monitor frequency.

20.6.3 Hand−flown Breakouts. The use of the autopilot is encouraged while flying an ILS/PRM or LDA/PRM approach, but the autopilot must be disengaged in the rare event that a breakout is issued. Simulation studies of breakouts have shown that a hand−flown breakout can be initiated consistently faster than a breakout performed using the autopilot.

20.6.4 TCAS. The ATC breakout instruction is the primary means of conflict resolution. TCAS, if installed, provides another form of conflict resolution in the unlikely event other separation standards would fail. TCAS is not required to conduct a closely spaced approach.

The TCAS provides only vertical resolution of aircraft conflicts, while the ATC breakout instruction provides both vertical and horizontal guidance for conflict resolutions. Pilots should always immediately follow the TCAS Resolution Advisory (RA), whenever it is received. Should a TCAS RA be received before, during, or after an ATC breakout instruction is issued, the pilot should follow the RA, even if it conflicts with the climb/descent portion of the breakout maneuver. If following an RA requires deviating from an ATC clearance, the pilot shall advise ATC as soon as practical. While following an RA, it is extremely important that the pilot also comply with the turn portion of the ATC breakout instruction unless the pilot determines safety to be factor. Adhering to these procedures assures the pilot that acceptable "breakout" separation margins will always be provided, even in the face of a normal procedural or system failure.

20.6.5 Breakouts. The probability is extremely low that an aircraft will "blunder" from its assigned approach course and enter the NTZ, causing ATC to "breakout" the aircraft approaching on the adjacent ILS course. However, because of the close proximity of the final approach courses, it is essential that pilots follow the ATC breakout instructions precisely and expeditiously. The controller's "breakout" instructions provide conflict resolution for the threatened aircraft, with the turn portion of the "breakout" being the single most important element in achieving maximum protection. A descending breakout will only be issued when it is the only controller option. In no case will the controller descend an aircraft below the MVA, which will provide at least 1,000 feet clearance above obstacles. The pilot is not expected to exceed 1,000 feet per minute rate of descent in the event a descending breakout is issued.

21. Simultaneous Converging Instrument Approaches

21.1 ATC may conduct instrument approaches simultaneously to converging runways; i.e., runways having an included angle from 15 to 100 degrees, at airports where a program has been specifically approved to do so.

21.2 The basic concept requires that dedicated, separate standard instrument approach procedures be developed for each converging runway included. Missed approach points must be at least 3 miles apart and missed approach procedures ensure that missed approach protected airspace does not overlap.

21.3 Other requirements are: radar availability, nonintersecting final approach courses, precision (ILS/MLS) approach systems on each runway, and if runways intersect, controllers must be able to apply visual separation as well as intersecting runway separation criteria. Intersecting runways also require minimums of at least 700−foot ceilings and 2 miles visibility. Straight−in approaches and landings must be made.

21.4 Whenever simultaneous converging approaches are in progress, aircraft will be informed by the controller as soon as feasible after initial contact or via ATIS. Additionally, the radar controller will have direct communications capability with the tower controller where separation responsibility has not been delegated to the tower.

22. Timed Approaches From a Holding Fix

22.1 Timed approaches may be conducted when the following conditions are met:

22.1.1 A control tower is in operation at the airport where the approaches are conducted.

22.1.2 Direct communications are maintained between the pilot and the center/approach controller until the pilot is instructed to contact the tower.

22.1.3 If more than one missed approach procedure is available, none requires a course reversal.

22.1.4 If only one missed approach procedure is available, the following conditions are met.

22.1.4.1 Course reversal is not required.

22.1.4.2 Reported ceiling and visibility are equal to or greater than the highest prescribed circling minimums for the instrument approach procedure.

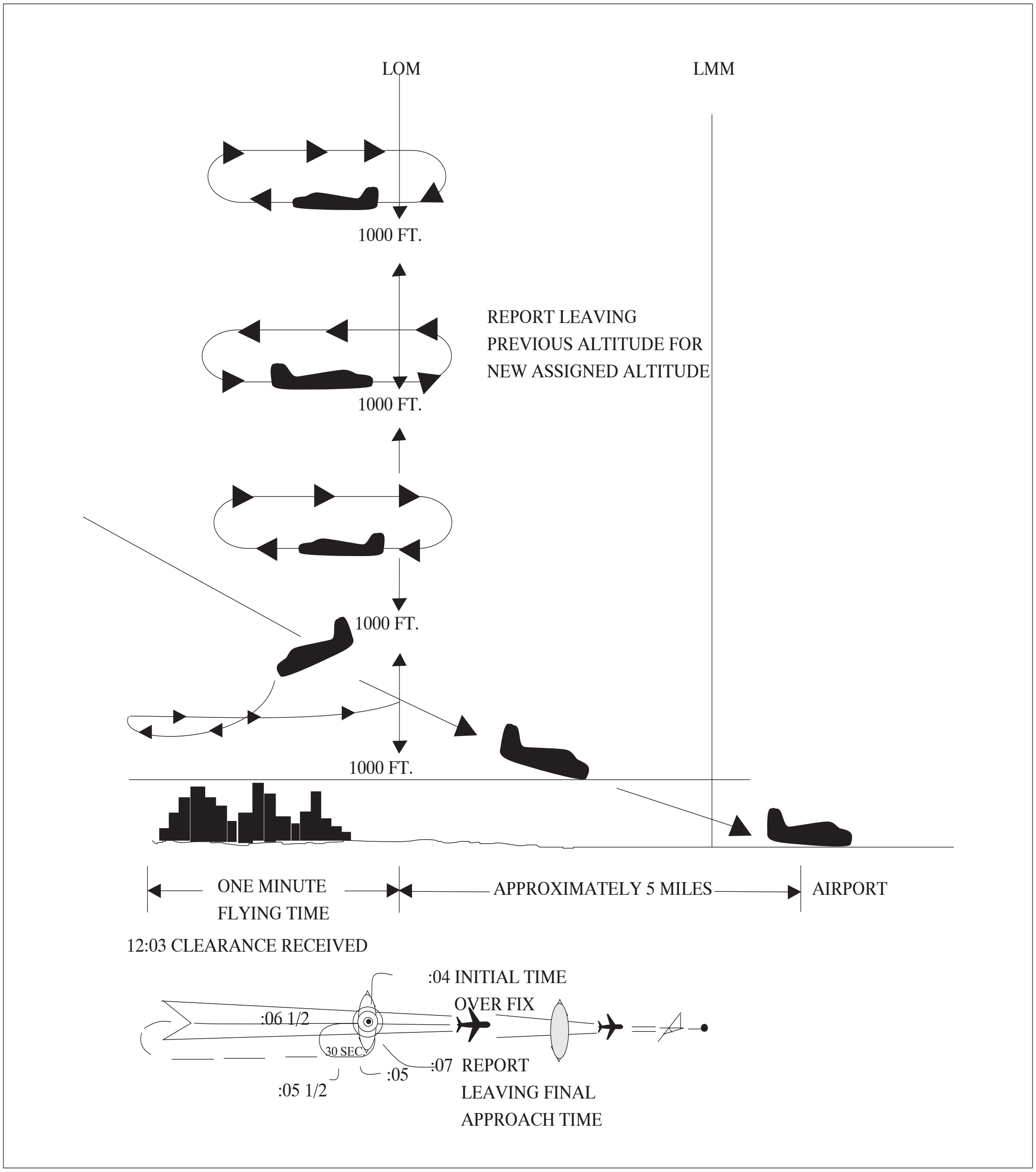
22.1.5 When cleared for the approach, pilots shall not execute a procedure turn. (See 14 CFR Section 91.175j.)

22.2 Although the controller will not specifically state that "timed approaches are in progress," the assigning a time to depart the final approach fix inbound (nonprecision approach) or the outer marker or the fix used in lieu of the outer marker inbound (precision approach) is indicative that timed approach procedures are being utilized, or in lieu of holding, the controller may use radar vectors to the final approach course to establish a mileage interval between aircraft that will insure the appropriate time sequence between the final approach fix/outer marker or the fix used in lieu of the outer marker and the airport.

22.3 Each pilot in an approach sequence will be given advance notice as to the time he/she should leave the holding point on approach to the airport. When a time to leave the holding point has been received, the pilot should adjust his/her flight path to leave the fix as closely as possible to the designated time. (See FIG ENR 1.5−30.)

FIG ENR 1.5−30

Timed Approaches from a Holding Fix



EXAMPLE−

At 12:03 local time, in the example shown, a pilot holding, receives instructions to leave the fix inbound at 12:07. These instructions are received just as the pilot has completed turn at the outbound end of the holding pattern and is proceeding inbound toward the fix. Arriving back over the fix, the pilot notes that the time is 12:04 and that there are 3 minutes to lose in order to leave the fix at the assigned time. Since the time remaining is more than two minutes, the pilot plans to fly a race track pattern rather than a 360 degree turn, which would use up 2 minutes. The turns at the ends of the race track pattern will consume approximately 2 minutes. Three minutes to go, minus 2 minutes required for the turns, leaves 1 minute for level flight. Since two portions of level flight will be required to get back to the fix inbound, the pilot halves the 1 minute remaining *and plans to fly level for 30 seconds outbound before starting the turn back to the fix on final approach. If the winds were negligible at flight altitude, this procedure would bring the pilot inbound across the fix precisely at the specified time of 12:07. However, if expecting headwind on final approach, the pilot should shorten the 30 second outbound course somewhat, knowing that the wind will carry the aircraft away from the fix faster while outbound and decrease the ground speed while returning to the fix. On the other hand, compensating for a tailwind on final approach, the pilot should lengthen the calculated 30 second outbound heading somewhat, knowing that the wind would tend to hold the aircraft closer to the fix while outbound and increase the ground speed while returning to the fix.*

23. Contact Approach

23.1 Pilots operating in accordance with an IFR flight plan, provided they are clear of clouds and have at least 1 mile flight visibility and can reasonably expect to continue to the destination airport in those conditions, may request ATC authorization for a "contact approach."

23.2 Controllers may authorize a "contact approach" provided:

23.2.1 The contact approach is specifically requested by the pilot. ATC cannot initiate this approach.

EXAMPLE−
Request contact approach.

23.2.2 The reported ground visibility at the destination airport is at least 1 statute mile.

23.2.3 The contact approach will be made to an airport having a standard or special instrument approach procedure.

23.2.4 Approved separation is applied between aircraft so cleared and between these aircraft and other IFR or special VFR aircraft.

EXAMPLE−
Cleared contact approach (and if required) at or below (altitude) (routing) if not possible (alternative procedures) and advise.

23.3 A contact approach is an approach procedure that may be used by a pilot (with prior authorization from ATC) in lieu of conducting a standard or special instrument approach procedure (IAP) to an airport. It is not intended for use by a pilot on an IFR flight clearance to operate to an airport not having a published and functioning IAP. Nor is it intended for an aircraft to conduct an instrument approach to one airport and then, when "in the clear," discontinue that approach and proceed to another airport. In the execution of a contact approach, the pilot assumes the responsibility for obstruction clearance. If radar service is being received, it will automatically terminate when the pilot is instructed to change to advisory frequency.

24. Visual Approach

24.1 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 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.

24.2 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.).

24.3 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. When operating to airports with parallel runways separated by less than 2,500 feet, the succeeding aircraft must report sighting the preceding aircraft unless standard separation is being provided by ATC. When operating to parallel runways separated by at least 2,500 feet but less than 4,300 feet, controllers will clear/vector aircraft to the final at an angle not greater than 30 degrees unless radar, vertical, or visual separation is provided during the turn−on. The purpose 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. Once the aircraft are established within 30 degrees of final, or on the final, these operations may be conducted simultaneously. When the parallel runways are separated by 4,300 feet or more, or intersecting/converging runways are in use, 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.

24.4 Separation Responsibilities. If the pilot has the airport in sight but cannot see the preceding aircraft, 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.

24.5 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 advisory/clearance/instruction by the tower. 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.

24.6 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.

24.7 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.

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

25. Charted Visual Flight Procedures (CVFPs)

25.1 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.

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

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

25.4 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.

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

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

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

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

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

25.10 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.

25.11 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. Missed Approach

26.1 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.

26.2 Obstacle protection for missed approach is predicated on the missed approach being initiated at the decision altitude/height (DA/H) 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.

26.3 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 26.8 concerning vertical obstruction clearance when starting a missed approach at other than the MAP. (See FIG ENR 1.5−31.)

FIG ENR 1.5−31
Circling and Missed Approach Obstruction Clearance Areas

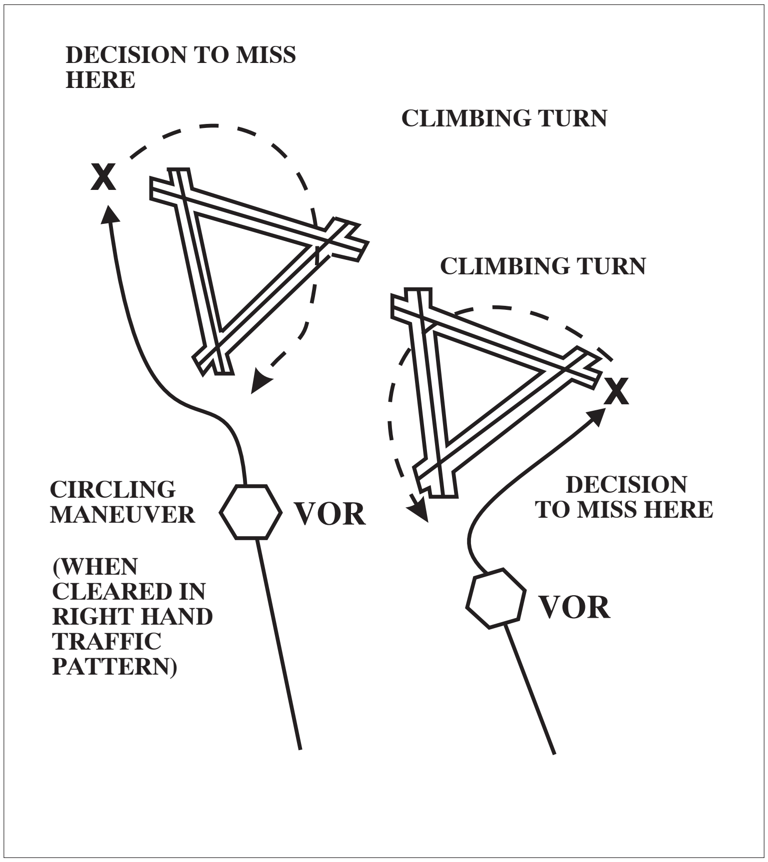


FIG ENR 1.5−32

Missed Approach

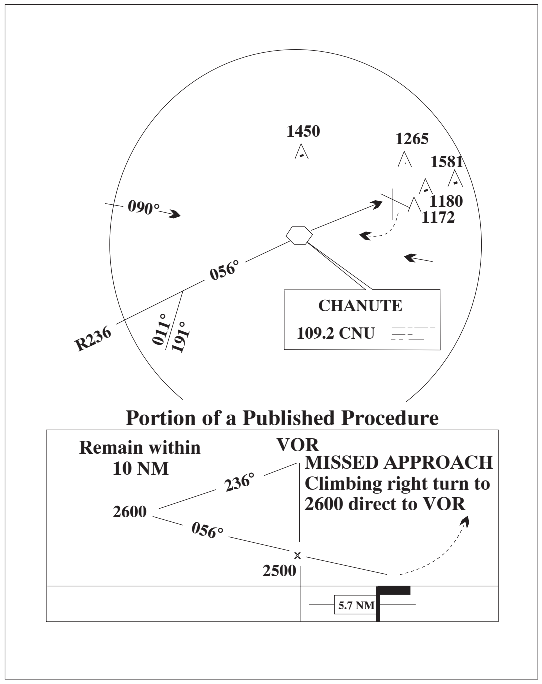
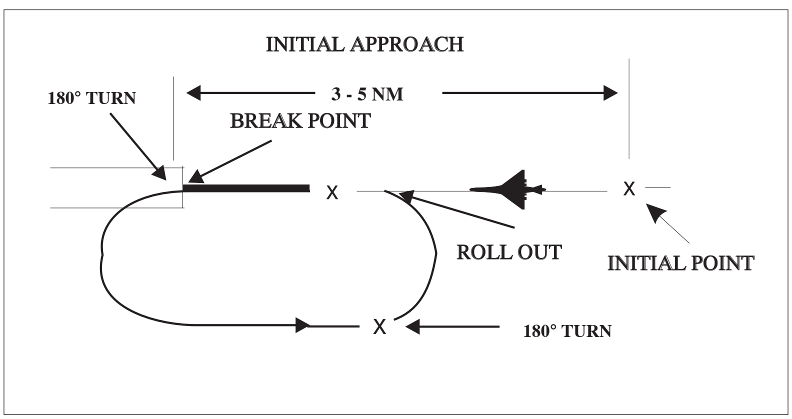


FIG ENR 1.5−33

Overhead Maneuver



26.4 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.

26.5 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 approach is issued after beginning the approach. However, when the alternate missed approach is issued prior to beginning the approach the pilot must either accept the entire procedure (including the alternate missed approach), request a different approach procedure, or coordinate with ATC for alternative action to be taken, i.e., proceed to an alternate airport, etc.

26.6 When the approach has been missed, request a clearance for specific action; i.e., to alternative airport, another approach, etc.

26.7 Pilots must ensure that they have climbed to a safe altitude prior to proceeding off the published missed approach, especially in nonradar environments. Abandoning the missed approach prior to reaching the published altitude may not provide adequate terrain clearance. Additional climb may be required after reaching the holding pattern before proceeding back to the IAF or to an alternate.

26.8 Missed approach obstacle clearance is predicated on beginning the missed approach procedure at the Missed Approach Point (MAP) from MDA or DA and then climbing 200 feet/NM or greater. Initiating a go−around after passing the published MAP may result in total loss of obstacle clearance. To compensate for the possibility of reduced obstacle clearance during a go−around, a pilot should apply procedures used in takeoff planning. Pilots should refer to airport obstacle and departure data prior to initiating an instrument approach procedure. Such information may be found in the "TAKE−OFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES" section of the U.S. TERMINAL PROCEDURES publication.

27. Overhead Approach Maneuver

27.1 Pilots operating in accordance with an IFR flight plan in Visual Meteorological Conditions (VMC) may request ATC authorization for an overhead maneuver. An overhead maneuver is not an instrument approach procedure. Overhead maneuver patterns are developed at airports where aircraft have an operational need to conduct the maneuver. An aircraft conducting an overhead maneuver is considered to be VFR and the IFR flight plan is cancelled when the aircraft reaches the initial point on the initial approach portion of the maneuver. (See FIG ENR 1.5−33.) The existence of a standard overhead maneuver pattern does not eliminate the possible requirement for an aircraft to conform to conventional rectangular patterns if an overhead maneuver cannot be approved. Aircraft operating to an airport without a functioning control tower must initiate cancellation of an IFR flight plan prior to executing the overhead maneuver. Cancellation of the IFR flight plan must be accomplished after crossing the landing threshold on the initial portion of the maneuver or after landing. Controllers may authorize an overhead maneuver and issue the following to arriving aircraft:

27.1.1 Pattern altitude and direction of traffic. This information may be omitted if either is standard.

PHRASEOLOGY−
PATTERN ALTITUDE (altitude). RIGHT TURNS.

27.1.2 Request for a report on initial approach.

PHRASEOLOGY−
REPORT INITIAL.

27.1.3 "Break" information and a request for the pilot to report. The "Break Point" will be specified if nonstandard. Pilots may be requested to report "break" if required for traffic or other reasons.

PHRASEOLOGY−
BREAK AT (specified point).
REPORT BREAK.

28. Departure Procedures

28.1 Pre−Taxi Clearance Procedures

28.1.1 Locations where these procedures are in effect are indicated in the Airport/Facility Directory.

28.1.2 Certain airports have established programs whereby pilots of departing IFR aircraft may elect to receive their IFR clearances before they start taxiing for takeoff. The following provisions are included in such procedures:

28.1.2.1 Pilot participation is not mandatory.

28.1.2.2 Participating pilots call clearance delivery/ground control not more than 10 minutes before proposed taxi time.

28.1.2.3 IFR clearance (or delay information, if clearance cannot be obtained) is issued at the time of this initial call−up.

28.1.2.4 When the IFR clearance is received on clearance delivery frequency, pilots call ground control when ready to taxi.

28.1.2.5 Normally, pilots need not inform ground control that they have received IFR clearance on clearance delivery frequency. Certain locations may, however, require that the pilot inform ground control of a portion of the routing or that the IFR clearance has been received.

28.1.2.6 If a pilot cannot establish contact on clearance delivery frequency or has not received an IFR clearance before ready to taxi, the pilot should contact ground control and inform the controller accordingly.

29. Pre−departure Clearance Procedures

29.1 Many airports in the National Airspace System are equipped with the Tower Data Link System (TDLS) that includes the Pre−departure Clearance (PDC) function. The PDC function automates the Clearance Delivery operations in the ATCT for participating users. The PDC function displays IFR clearances from the ARTCC to the ATCT. The Clearance Delivery controller in the ATCT can append local departure information and transmit the clearance via data link to participating airline/service provider computers. The airline/service provider will then deliver the clearance via the Aircraft Communications Addressing and Reporting System (ACARS) or a similar data link system or, for nondata link equipped aircraft, via a printer located at the departure gate. PDC reduces frequency congestion, controller workload and is intended to mitigate delivery/readback errors. Also, information from participating users indicates a reduction in pilot workload.

29.2 PDC is available only to participating aircraft that have subscribed to the service through an approved service provider.

29.3 Due to technical reasons, the following limitations currently exist in the PDC program:

29.3.1 Aircraft filing multiple flight plans are limited to one PDC clearance per departure airport within a 24−hour period. Additional clearances will be delivered verbally.

29.3.2 If the clearance is revised or modified prior to delivery, it will be rejected from PDC and the clearance will need to be delivered verbally.

29.4 No acknowledgment of receipt or readback is required for a PDC.

29.5 In all situations, the pilot is encouraged to contact clearance delivery if a question or concern exists regarding an automated clearance.

30. Taxi Clearance

30.1 Pilots on IFR flight plans should communicate with the control tower on the appropriate ground control/clearance delivery frequency prior to starting engines to receive engine start time, taxi, and/or clearance information.

31. Taxi into Position and Hold (TIPH)

31.1 Taxi into position and hold is an air traffic control (ATC) procedure designed to position an aircraft onto the runway for an imminent departure. The ATC instruction "POSITION AND HOLD" is used to instruct a pilot to taxi onto the departure runway in takeoff position and hold.

EXAMPLE−
Tower: "N234AR Runway 24L, position and hold."

31.2 This ATC instruction is not an authorization to takeoff. In instances where the pilot has been instructed to "position and hold" and has been advised of a reason/condition (wake turbulence, traffic on an intersecting runway, etc.) or the reason/condition is clearly visible (another aircraft that has landed on or is taking off on the same runway), and the reason/condition is satisfied, the pilot should expect an imminent takeoff clearance, unless advised of a delay. If you are uncertain about any ATC instruction or clearance, contact ATC immediately.

31.3 If a takeoff clearance is not received within a reasonable amount of time after clearance to position and hold, ATC should be contacted.

EXAMPLE−
Aircraft: Cessna 234AR holding in position Runway 24L.

Aircraft: Cessna 234AR holding in position Runway 24L at Bravo.

NOTE−
FAA analysis of accidents and incidents involving aircraft holding in position indicate that two minutes or more elapsed between the time the instruction was issued to "position and hold" and the resulting event (e.g., landover or go−around). Pilots should consider the length of time that they have been holding in position whenever they HAVE NOT been advised of any expected delay to determine when it is appropriate to query the controller.

REFERENCE−
Advisory Circulars 91−73A, Part 91 and Part 135 Single−Pilot Procedures during Taxi Operations, and 120−74A, Parts 91, 121, 125, and 135 Flightcrew Procedures during Taxi Operations.

31.4 Situational awareness during position and hold operations is enhanced by monitoring ATC instructions/clearances issued to other aircraft. Pilots should listen carefully if another aircraft is on frequency that has a similar call sign and pay close attention to communications between ATC and other aircraft. If you are uncertain of an ATC instruction or clearance, query ATC immediately. Care should be taken to not inadvertently execute a clearance/instruction for another aircraft.

31.5 Pilots should be especially vigilant when conducting "position and hold" operations at night or during reduced visibility conditions. They should scan the full length of the runway and look for aircraft on final approach or landing roll out when taxiing onto a runway. ATC should be contacted anytime there is a concern about a potential conflict.

31.6 When two or more runways are active, aircraft may be instructed to "POSITION AND HOLD" on two or more runways. When multiple runway operations are being conducted, it is important to listen closely for your call sign and runway. Be alert for similar sounding call signs and acknowledge all instructions with your call sign. When you are holding in position and are not sure if the takeoff clearance was for you, ask ATC before you begin takeoff roll. ATC prefers that you confirm a takeoff clearance rather than mistake another aircraft's clearance for your own.

31.7 When ATC issues intersection "position and hold" and takeoff clearances, the intersection designator will be used. If ATC omits the intersection designator, call ATC for clarification.

EXAMPLE−
Aircraft: "Cherokee 234AR, Runway 24L at November 4, position and hold."

31.8 If landing traffic is a factor during position and hold operations, ATC will inform the aircraft in position of the closest traffic that has requested a full−stop, touch−and−go, stop−and−go, or an unrestricted low approach to the same runway. Pilots should take care to note the position of landing traffic. ATC will also advise the landing traffic when an aircraft is authorized to "position and hold" on the same runway.

EXAMPLE−
Tower: "Cessna 234AR, Runway 24L, position and hold. Traffic a Boeing 737, six mile final."

Tower: "Delta 1011, continue, traffic a Cessna 210 position and hold Runway 24L."

NOTE−
ATC will normally withhold landing clearance to arrival aircraft when another aircraft is in position and holding on the runway.

31.9 Never land on a runway that is occupied by another aircraft, even if a landing clearance was issued. Do not hesitate to ask the controller about the traffic on the runway and be prepared to execute a go−around.

NOTE−
Always clarify any misunderstanding or confusion concerning ATC instructions or clearances. ATC should be advised immediately if there is any uncertainty about the ability to comply with any of their instructions.

32. Departure Restrictions, Clearance Void Times, Hold for Release, and Release Times

32.1 ATC may assign departure restrictions, clearance void times, hold for release, and release times, when necessary, to separate departures from other traffic or to restrict or regulate the departure flow.

32.1.1 Clearance Void Times. A pilot may receive a clearance, when operating from an airport without a control tower, which contains a provision for the clearance to be void if not airborne by a specific time. A pilot who does not depart prior to the clearance void time must advise ATC as soon as possible of his or her intentions. ATC will normally advise the pilot of the time allotted to notify ATC that the aircraft did not depart prior to the clearance void time. This time cannot exceed 30 minutes. Failure of an aircraft to contact ATC within 30 minutes after the clearance void time will result in the aircraft being considered overdue and search and rescue procedures initiated.

NOTE−
1. *Other IFR traffic for the airport where the clearance is issued is suspended until the aircraft has contacted ATC or until 30 minutes after the clearance void time or 30 minutes after the clearance release time if no clearance void time is issued.*

2. *Pilots who depart at or after their clearance void time are not afforded IFR separation and may be in violation of 14 CFR Section 91.173 which requires that pilots receive an appropriate ATC clearance before operating IFR in Class A, B, C, D, and E airspace.*

EXAMPLE−
Clearance void if not off by (clearance void time) and, if required, if not off by (clearance void time) advise (facility) not later than (time) of intentions.

32.1.2 Hold for Release. ATC may issue "hold for release" instructions in a clearance to delay an aircrafts departure for traffic management reasons (i.e., weather, traffic volume, etc.). When ATC states in the clearance, "hold for release," the pilot may not depart utilizing that IFR clearance until a release time or additional instructions are issued by ATC. This does not preclude the pilot from cancelling the IFR clearance with ATC and departing under VFR; but an IFR clearance may not be available after departure. In addition, ATC will include departure delay information in conjunction with "hold for release" instructions.

EXAMPLE−
(Aircraft identification) cleared to (destination) airport as filed, maintain (altitude), and, if required (additional instructions or information), hold for release, expect (time in hours and/or minutes) departure delay.

32.1.3 Release Times. A "release time" is a departure restriction issued to a pilot by ATC, specifying the earliest time an aircraft may depart. ATC will use "release times" in conjunction with traffic management procedures and/or to separate a departing aircraft from other traffic.

EXAMPLE−
(Aircraft identification) released for departure at (time in hours and/or minutes).

32.1.4 Expect Departure Clearance Time (EDCT). The EDCT is the runway release time assigned to an aircraft included in traffic management programs. Aircraft are expected to depart no earlier than 5 minutes before, and no later than 5 minutes after the EDCT.

32.2 If practical, pilots departing uncontrolled airports should obtain IFR clearances prior to becoming airborne when two−way communication with the controlling ATC facility is available.

33. Departure Control

33.1 Departure Control is an approach control function responsible for ensuring separation between departures. So as to expedite the handling of departures, Departure Control may suggest a takeoff direction other than that which may normally have been used under VFR handling. Many times it is preferred to offer the pilot a runway that will require the fewest turns after takeoff to place the pilot on course or selected departure route as quickly as possible. At many locations particular attention is paid to the use of preferential runways for local noise abatement programs, and route departures away from congested areas.

33.2 Departure Control utilizing radar will normally clear aircraft out of the terminal area using instrument departure procedures (DPs) via radio navigation aids. When a departure is to be vectored immediately following takeoff, the pilot will be advised prior to takeoff of the initial heading to be flown but may not be advised of the purpose of the heading. Pilots operating in a radar environment are expected to associate departure headings with vectors to their planned route of flight. When given a vector taking the aircraft off a previously assigned nonradar route, the pilot will be advised briefly what the vector is to achieve. Thereafter, radar service will be provided until the aircraft has been reestablished "on−course" using an appropriate navigation aid and the pilot has been advised of the aircraft's position; or, a handoff is made to another radar controller with further surveillance capabilities.

33.3 Controllers will inform pilots of the departure control frequencies and, if appropriate, the transponder code before takeoff. Pilots should not operate their transponder until ready to start the takeoff roll, except at ASDE−X facilities where transponders should be transmitting "on" with altitude reporting continuously while operating on the airport surface if so equipped. Pilots should not change to the departure control frequency until requested. Controllers may omit the departure control frequency if a DP has or will be assigned and the departure control frequency is published on the DP.

34. Abbreviated IFR Departure Clearance (Cleared . . . as Filed) Procedures

34.1 ATC facilities will issue an abbreviated IFR departure clearance based on the ROUTE of flight filed in the IFR flight plan, provided the filed route can be approved with little or no revision. These abbreviated clearance procedures are based on the following conditions:

34.1.1 The aircraft is on the ground or it has departed VFR and the pilot is requesting IFR clearance while airborne.

34.1.2 That a pilot will not accept an abbreviated clearance if the route or destination of a flight plan filed with ATC has been changed by him/her or the company or the operations officer before departure.

34.1.3 That it is the responsibility of the company or operations office to inform the pilot when they make a change to the filed flight plan.

34.1.4 That it is the responsibility of the pilot to inform ATC in the initial call−up (for clearance) when the filed flight plan has been either:

34.1.4.1 Amended.

34.1.4.2 Canceled and replaced with a new filed flight plan.

NOTE−
The facility issuing a clearance may not have received the revised route or the revised flight plan by the time a pilot requests clearance.

34.2 Controllers will issue a detailed clearance when they know that the original filed flight plan has been changed or when the pilot requests a full route clearance.

34.3 The clearance as issued will include the destination airport filed in the flight plan.

34.4 ATC procedures now require the controller to state the DP name, the current number and the DP Transition name after the phrase "Cleared to (destination) airport," and prior to the phrase, "then as filed," for ALL departure clearances when the DP or DP Transition is to be flown. The procedure applies whether or not the DP is filed in the flight plan.

34.5 Standard Terminal Arrivals (STARs), when filed in a flight plan, are considered a part of the filed route of flight and will not normally be stated in an initial departure clearance. If the ARTCC's jurisdictional airspace includes both the departure airport and the fix where a STAR or STAR Transition begins, the STAR name, the current number, and the STAR Transition name MAY be stated in the initial clearance.

34.6 "Cleared to (destination) airport as filed" does NOT include the en route altitude filed in a flight plan. An en route altitude will be stated in the clearance or the pilot will be advised to expect an assigned/filed altitude within a given time frame or at a certain point after departure. This may be done verbally in the departure instructions or stated in the DP.

34.7 In a radar and a nonradar environment, the controller will state "Cleared to (destination) airport as filed" or:

34.7.1 If a DP or DP Transition is to be flown, specify the DP name, the current DP number, the DP Transition name, the assigned altitude/flight level, and any additional instructions (departure control frequency, beacon code assignment, etc.) necessary to clear a departing aircraft via the DP/DP Transition and the route filed.

EXAMPLE−
National Seven Twenty cleared to Miami Airport Intercontinental one departure, Lake Charles transition then as filed, maintain Flight Level two seven zero.

34.7.2 When there is no DP or when the pilot cannot accept a DP, specify the assigned altitude/flight level, and any additional instructions necessary to clear a departing aircraft via an appropriate departure routing and the route filed.

NOTE−
A detailed departure route description or a radar vector may be used to achieve the desired departure routing.

34.7.3 If necessary to make a minor revision to the filed route, specify the assigned DP/DP Transition (or departure routing), the revision to the filed route, the assigned altitude/flight level, and any additional instructions necessary to clear a departing aircraft.

EXAMPLE−
Jet Star One Four Two Four cleared to Atlanta Airport, South Boston two departure then as filed except change route to read South Boston Victor 20 Greensboro, maintain one seven thousand.

34.7.4 Additionally, in a nonradar environment, specify one or more fixes as necessary to identify the initial route of flight.

EXAMPLE−
Cessna Three One Six Zero Foxtrot cleared to Charlotte Airport as filed via Brooke, maintain seven thousand.

34.8 To ensure success of the program, pilots should:

34.8.1 Avoid making changes to a filed flight plan just prior to departure.

34.8.2 State the following information in the initial call−up to the facility when no change has been made to the filed flight plan: Aircraft call sign, location, type operation (IFR), and the name of the airport (or fix) to which you expect clearance.

EXAMPLE−
"Washington clearance delivery (or ground control if appropriate) American Seventy Six at gate one, IFR Los Angeles."

34.8.3 If the flight plan has been changed, state the change and request a full route clearance.

EXAMPLE−
"Washington clearance delivery, American Seventy Six at gate one. IFR San Francisco. My flight plan route has been amended (or destination changed). Request full route clearance."

34.8.4 Request verification or clarification from ATC if ANY portion of the clearance is not clearly understood.

34.8.5 When requesting clearance for the IFR portion of a VFR−IFR flight, request such clearance prior to the fix where IFR operation is proposed to commence in sufficient time to avoid delay. Use the following phraseology:

EXAMPLE−
"Los Angeles center, Apache Six One Papa, VFR estimating Paso Robles VOR at three two, one thousand five hundred, request IFR to Bakersfield."

35. Instrument Departure Procedures (DP) – Obstacle Departure Procedures (ODP) and Standard Instrument Departures (SID)

35.1 Instrument departure procedures are preplanned instrument flight rule (IFR) procedures which provide obstruction clearance from the terminal area to the appropriate en route structure. There are two types of DPs, Obstacle Departure Procedures (ODPs), printed either textually or graphically, and Standard Instrument Departures (SIDs), always printed graphically. All DPs, either textual or graphic may be designed using either conventional or RNAV criteria. RNAV procedures will have RNAV printed in the title, e.g., SHEAD TWO DEPARTURE (RNAV). ODPs provide obstruction clearance via the least onerous route from the terminal area to the appropriate en route structure. ODPs are recommended for obstruction clearance and may be flown without ATC clearance unless an alternate departure procedure (SID or radar vector) has been specifically assigned by ATC. Graphic ODPs will have (OBSTACLE) printed in the procedure title, e.g., GEYSR THREE DEPARTURE (OBSTACLE), or, CROWN ONE DEPARTURE (RNAV)(OBSTACLE). Standard Instrument Departures are air traffic control (ATC) procedures printed for pilot/controller use in graphic form to provide obstruction clearance and a transition from the terminal area to the appropriate en route structure. SIDs are primarily designed for system enhancement and to reduce pilot/controller workload. ATC clearance must be received prior to flying a SID. All DPs provide the pilot with a way to depart the airport and transition to the en route structure safely. 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.

35.2 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 35.3.2) 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:

35.2.1 Establish a steeper than normal climb gradient; or

35.2.2 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

35.2.3 Design and publish a specific departure route; or

35.2.4 A combination or all of the above.

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

35.3.1 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."

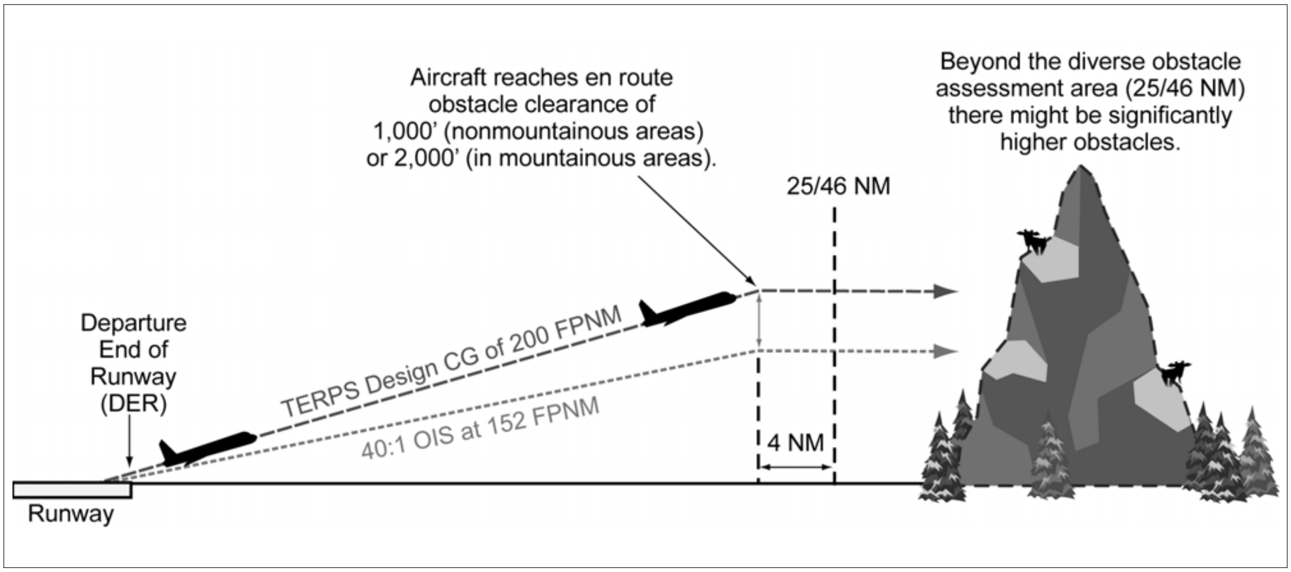
35.3.2 The 40:1 obstacle identification surface (OIS) begins at the departure end of runway (DER) and slopes upward at 152 FPNM until reaching the minimum IFR altitude or entering the en route structure. This assessment area is limited to 25 NM from the airport in nonmountainous areas and 46 NM in designated 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 1.5−34. (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.

35.3.3 Obstacles that are located within 1 NM of the DER and penetrate the 40:1 OCS are referred to as "low, close−in obstacles." The standard required obstacle clearance (ROC) of 48 feet per NM to clear these obstacles would require a climb gradient greater than 200 feet per NM for a very short distance, only until the aircraft was 200 feet above the DER. To eliminate publishing an excessive climb gradient, the obstacle AGL/MSL height and location relative to the DER is noted in the "Take−off Minimums and (OBSTACLE) Departure Procedures" section of a given Terminal Procedures Publication (TPP) booklet. The purpose of this note is to identify the obstacle(s) and alert the pilot to the height and location of the obstacle(s) so they can be avoided. This can be accomplished in a variety of ways, e.g., the pilot may be able to see the obstruction and maneuver around the obstacle(s) if necessary; 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, preflight planning should take into account what turns or other maneuver may be necessary immediately after takeoff to avoid the obstruction(s).

FIG ENR 1.5−34

Diverse Departure Obstacle Assessment to 25/46 NM



35.3.4 Climb gradients greater than 200 FPNM are specified when required for obstacle clearance and/or ATC required crossing restrictions.

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.

35.3.5 Climb gradients may be specified only to an altitude/fix, above which the normal gradient applies.

EXAMPLE−
"Minimum climb 340 FPNM to ALPHA." The pilot climbs at least 340 FPNM to ALPHA, then at least 200 FPNM to MIA.

35.3.6 Some DPs established solely for obstacle avoidance require a climb in visual conditions to cross the airport or an on−airport NAVAID in a specified direction, at or above a specified altitude. These procedures are called Visual Climb Over the Airport (VCOA).

EXAMPLE−
"Climb in visual conditions so as to cross the McElory Airport southbound, at or above 6000, then climb via Keemmling radial zero three three to Keemmling VORTAC."

35.4 Who is responsible for obstacle clearance? DPs are designed so that adherence to the procedure by the pilot will ensure obstacle protection. Additionally:

35.4.1 Obstacle clearance responsibility also rests with the pilot when he/she chooses to climb in visual conditions in lieu of flying a DP and/or depart under increased takeoff minima rather than fly the climb gradient. Standard takeoff minima are one statute mile for aircraft having two engines or less and one−half statute mile for aircraft having more than two engines. Specified ceiling and visibility minima (VCOA or increased takeoff minima) will allow visual avoidance of obstacles until the pilot enters the standard obstacle protection area. Obstacle avoidance is not guaranteed if the pilot maneuvers farther from the airport than the specified visibility minimum prior to reaching the specified altitude. DPs may also contain what are called Low Close in Obstacles. These obstacles are less than 200 feet above the departure end of runway elevation and within one NM of the runway end, and do not require increased takeoff minimums. These obstacles are identified on the SID chart or in the Take−off Minimums and (Obstacle) Departure Procedures section of the U. S. Terminal Procedure booklet. These 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. Pilots should also consider drift following lift−off to ensure sufficient clearance from these obstacles. That segment of the procedure that requires the pilot to see and avoid obstacles ends when the aircraft crosses the specified point at the required altitude. 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 foot per nautical mile during the departure until reaching the minimum enroute altitude, unless specified otherwise.

35.4.2 ATC may assume responsibility for obstacle clearance by vectoring the aircraft prior to reaching the minimum vectoring altitude by using a Diverse Vector Area (DVA). The DVA has been assessed for departures which do not follow a specific ground track. ATC may also vector an aircraft off a previously assigned DP. In all cases, the 200 FPNM climb gradient is assumed and obstacle clearance is not provided by ATC until the controller begins to provide navigational guidance in the form of radar vectors.

NOTE−
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.

35.4.3 Pilots must preplan to determine if the aircraft can meet the climb gradient (expressed in feet per nautical mile) required by the departure procedure, and be aware that flying at a higher than anticipated ground speed increases the climb rate requirement in feet per minute. Higher than standard climb gradients are specified by a note on the departure procedure chart for graphic DPs, or in the Take−Off Minimums and (Obstacle) Departure Procedures section of the U.S. Terminal Procedures booklet for textual ODPs. The required climb gradient, or higher, must be maintained to the specified altitude or fix, then the standard climb gradient of 200 ft/NM can be resumed. A table for the conversion of climb gradient (feet per nautical mile) to climb rate (feet per minute), at a given ground speed, is included on page D1 of the U.S. Terminal Procedures booklets.

35.5 Where are DPs located? DPs will be listed by airport in the IFR Takeoff Minimums and (Obstacle) Departure Procedures Section, Section C, of the Terminal Procedures Publications (TPPs). If the DP is textual, it will be described in TPP Section C. SIDs and complex ODPs will be published graphically and named. The name will be listed by airport name and runway in Section C. Graphic ODPs will also have the term "(OBSTACLE)" printed in the charted procedure title, differentiating them from SIDs.

35.5.1 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.

35.6 Responsibilities

35.6.1 Each pilot, prior to departing an airport on an IFR flight should consider the type of terrain and other obstacles on or in the vicinity of the departure airport; and:

35.6.2 Determine whether an ODP is available; and

35.6.3 Determine if obstacle avoidance can be maintained visually or if the ODP should be flown; and

35.6.4 Consider the effect of degraded climb performance and the actions to take in the event of an engine loss during the departure.

35.6.5 After an aircraft is established on an ODP/SID and subsequently vectored or cleared off of the ODP or SID transition, pilots shall consider the ODP/SID canceled, unless the controller adds "expect to resume ODP/SID."

35.6.6 Aircraft instructed to resume a procedure which contains restrictions, such as a DP, shall be issued/reissued all applicable restrictions or shall be advised to comply with those restrictions.

35.6.7 If an altitude to "maintain" is restated, whether prior to or after departure, previously issued "ATC" altitude restrictions are cancelled. All minimum crossing altitudes which are not identified on the chart as ATC restrictions are still mandatory for obstacle clearance. If an assigned altitude will not allow the aircraft to cross a fix at the minimum crossing altitude, the pilot should request a higher altitude in time to climb to the crossing restriction or request an alternate routing. ATC altitude restrictions are only published on SIDs and are identified on the chart with "(ATC)" following the altitude. When an obstruction clearance minimum crossing altitude is also to be published at the same fix, it is identified by the term "(MCA)."

35.6.8 Pilots of civil aircraft operating from locations where SIDs are established may expect ATC clearances containing a SID. Use of a SID requires pilot possession of the textual description or graphic depiction of the approved current SID, as appropriate. RNAV SIDs must be retrievable by the procedure name from the aircraft database and conform to charted procedure. ATC must be immediately advised if the pilot does not possess the assigned SID, or the aircraft is not capable of flying the SID. Notification may be accomplished by filing "NO SID" in the remarks section of the filed flight plan or by the less desirable method of verbally advising ATC. Adherence to all restrictions on the SID is required unless clearance to deviate is received.

35.6.9 Controllers may omit the departure control frequency if a SID clearance is issued and the departure control frequency is published on the SID.

35.7 RNAV Departure Procedures

35.7.1 All public RNAV SIDs and graphic ODPs are RNAV 1. These procedures generally start with an initial RNAV or heading leg near the departure runway end. In addition, these procedures require system performance currently met by GPS 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. RNAV 1 procedures require the aircraft's total system error remain bounded by $\pm$1 NM for 95% of the total flight time.

TBL ENR 1.12−2

RNP Levels Supported for International Operations

RNP Level	Typical Application
4	Projected for oceanic/remote areas where 30 NM horizontal separation is applied
10	Oceanic/remote areas where 50 NM lateral separation is applied

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 TBL ENR 1.12−2.)

2.4 Aircraft and Airborne Equipment Eligibility for RNP Operations. Aircraft meeting RNP criteria will have an appropriate entry including special conditions and limitations in its Aircraft Flight Manual (AFM), or supplement. Operators of aircraft not having specific AFM−RNP certification may be issued operational approval including special conditions and limitations for specific RNP levels.

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).

3. Use of Suitable Area Navigation (RNAV) Systems on Conventional Procedures and Routes

3.1 Discussion. This paragraph sets forth policy concerning the operational use of RNAV systems for the following applications within the U.S. National Airspace System (NAS):

3.1.1 When a very−high frequency omni−directional range (VOR), DME, tactical air navigation (TACAN), VORTAC, VOR/DME, nondirectional 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 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. This category of use is referred to as "substitute means of navigation."

3.1.2 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 RNAV equipment but not monitor the VOR. This category of use is referred to as "alternate means of navigation."

NOTE−
1. *Additional information and associated requirements are available via a 90−series Advisory Circular 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.*

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 (including all revisions (AR)) equipment, installed in accordance with AC 20−138 (including AR) or AC 20−130A, 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.

NOTE−
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, NAVAID, or fix. 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 Allowable Operations. Operators may use a suitable RNAV system in the following ways.

3.3.1 Determine aircraft position over or distance from a VOR (see NOTE 4 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.

These operations are allowable even when a facility is explicitly identified as required on a procedure (e.g., "Note ADF required").

These operations do not include navigation on localizer−based courses (including localizer back−course guidance).

NOTE−
1. *These allowances apply only to operations conducted within the NAS.*

2. *The allowances defined in paragraph 3.3 apply even when a facility is explicitly identified as required on a procedure (e.g., "Note ADF required"). 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.*

3. *ADF equipment need not be installed and operational, although operators of aircraft without an ADF will be bound by the operational requirements defined in paragraph 3.3 and not have access to some procedures.*

4. *For the purpose of paragraph 3.3, "VOR" includes VOR, VOR/DME, and VORTAC facilities and "compass locator" includes locator outer marker and locator middle marker.*

3.4 General Operational Requirements

3.4.1 Pilots must comply with the guidelines contained in their AFM, AFM supplement, operating manual, or pilot's guide when operating their aircraft navigation system.

3.4.2 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.

3.4.3 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.

3.4.4 Pilots must ensure their onboard navigation data is current, appropriate for the region of intended operation, and includes the navigation aids, way-points, 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. Traditionally, this has been accomplished by verifying electronic data against paper products. One acceptable means is to compare aeronautical charts (new and old) to verify navigation fixes prior to departure. If an amended chart is published for the procedure, the operator must not use the database to conduct the operation.

3.4.5 Pilots must extract procedures, waypoints, navaids, or fixes by name from the onboard navigation database and comply with the charted procedure or route.

3.4.6 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.

3.5 Operational Requirements for Departure and Arrival Procedures

3.5.1 Pilots of aircraft with standalone GPS receivers must ensure that CDI scaling (full−scale deflection) is either $\pm$1.0 NM or 0.3 NM.

3.5.2 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.

3.6 Operational Requirements for Instrument Approach Procedures

3.6.1 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.

3.6.2 Pilots of aircraft with standalone GPS receivers must ensure that CDI sensitivity is $\pm$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.

3.7 Operational Requirements for Specific Inputs to RNAV Systems:

3.7.1 GPS

3.7.1.1 RNAV systems using GPS input may be used as an alternate means of navigation guidance without restriction if appropriate RAIM is available.

3.7.1.2 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.

3.7.1.3 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.

3.7.2 WAAS

3.7.2.1 RNAV systems using WAAS input may be used as an alternate means of navigation guidance without restriction.

3.7.2.2 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.

3.7.3 DME/DME/IRU

3.7.3.1 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.

19.2.2 A new type of APV approach procedure, in addition to LNAV/VNAV, is being implemented to take 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. The resulting approach procedure minima, titled LPV (localizer performance with vertical guidance), 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).

19.2.3 A new nonprecision WAAS approach, called Localizer Performance (LP) is being added in locations where the terrain or obstructions do not allow publication of vertically guided LPV procedures. This new approach 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 C−145b and TSO C−146b, 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 Flight Manual 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.

19.2.4 WAAS provides a level of service that supports all phases of flight, including LNAV, LP, LNAV/VNAV and LPV approaches, within system coverage. Some locations close to the edge of the coverage may have a lower availability of vertical guidance.

19.3 General Requirements

19.3.1 WAAS avionics must be certified in accordance with Technical Standard Order (TSO) C−145A, Airborne Navigation Sensors Using the (GPS) Augmented by the Wide Area Augmentation System (WAAS); or TSO−146A, 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) 20−130A, Airworthiness Approval of Navigation or Flight Management Systems Integrating Multiple Navigation Sensors, or AC 20−138A, Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment for Use as a VFR and IFR Navigation System.

19.3.2 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.

19.3.3 GPS/WAAS equipment is inherently capable of supporting oceanic and remote operations if the operator obtains a fault detection and exclusion (FDE) prediction program.

19.3.4 Air carrier and commercial operators must meet the appropriate provisions of their approved operations specifications.

19.3.5 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.

19.3.5.1 The term UNRELIABLE is used in conjunction with GPS and WAAS NOTAMs. The term UNRELIABLE is an advisory to pilots indicating the expected level of WAAS service (LNAV/VNAV, LPV) may not be available; e.g., **!BOS BOS WAAS LPV AND LNAV/VNAV MNM UNREL WEF 0305231700 − 0305231815**. WAAS UNRELIABLE NOTAMs are predictive in nature and published for flight planning purposes. Upon commencing an approach at locations NOTAMed WAAS UNRELIABLE, 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 may be required.

a) Area−wide WAAS UNAVAILABLE 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 UNAVAILABLE NOTAMs if not contained in the ATIS broadcast.

b) Site−specific WAAS UNRELIABLE NOTAMs indicate an expected level of service, e.g., LNAV/VNAV 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 UNRELIABLE NOTAMs.

c) When the approach chart is annotated with the W symbol, site−specific WAAS UNRELIABLE 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 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 UNAVAILABLE NOTAMs apply to all airports in the WAAS UNAVAILABLE area designated in the NOTAM, including approaches at airports where an approach chart is annotated with the W symbol.

19.3.6 GPS/WAAS was developed to be used within SBAS GEO coverage (WAAS or other interoperable system) without the need for other radio navigation equipment appropriate to the route of flight to be flown. Outside the SBAS 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.

19.3.7 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.

19.3.7.1 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 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 A **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 A **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 A **NA** from RNAV (GPS) and GPS procedures will take some time.

19.4 Flying procedures with WAAS

19.4.1 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'.

19.4.2 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.

19.4.3 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.

19.4.4 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.

19.4.5 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 requests 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 cause the DA to be raised.

19.4.6 A new method has been added for selecting the final approach segment of an instrument approach. Along with the current method used by most receivers using 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.

19.4.7 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 until the ATD reaches 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.

20. GNSS Landing System (GLS)

20.1 General

20.1.1 The GLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides differential augmentation to the Global Navigation Satellite System (GNSS).

20.1.2 The U.S. plans to provide augmentation services to the GPS for the first phase of GNSS. This section will be revised and updated to reflect international standards and GLS services as they are provided.

21. Precision Approach Systems Other Than ILS, GLS, and MLS

21.1 General

Approval and use of precision approach systems other than ILS, GLS, and MLS require the issuance of special instrument approach procedures.

21.2 Special Instrument Approach Procedure

21.2.1 Special instrument approach procedures must be issued to the aircraft operator if pilot training, aircraft equipment, and/or aircraft performance is different than published procedures. Special instrument approach procedures are not distributed for general public use. These procedures are issued to an aircraft operator when the conditions for operations approval are satisfied.

21.2.2 General aviation operators requesting approval for special procedures should contact the local Flight Standards District Office to obtain a letter of authorization. Air carrier operators requesting approval for use of special procedures should contact their Certificate Holding District Office for authorization through their Operations Specification.

21.3 Transponder Landing System (TLS)

21.3.1 The TLS is designed to provide approach guidance utilizing existing airborne ILS localizer, glide slope, and transponder equipment.

21.3.2 Ground equipment consists of a transponder interrogator, sensor arrays to detect lateral and vertical position, and ILS frequency transmitters. The TLS detects the aircraft's position by interrogating its transponder. It then broadcasts ILS frequency signals to guide the aircraft along the desired approach path.

21.3.3 TLS instrument approach procedures are designated Special Instrument Approach Procedures. Special aircrew training is required. TLS ground equipment provides approach guidance for only one aircraft at a time. Even though the TLS signal is received using the ILS receiver, no fixed course or glidepath is generated. The concept of operation is very similar to an air traffic controller providing radar vectors, and just as with radar vectors, the guidance is valid only for the intended aircraft. The TLS ground equipment tracks one aircraft, based on its transponder code, and provides correction signals to course and glidepath based on the position of the tracked aircraft. Flying the TLS corrections computed for another aircraft will not provide guidance relative to the approach; therefore, aircrews must not use the TLS signal for navigation unless they have received approach clearance and completed the required coordination with the TLS ground equipment operator. Navigation fixes based on conventional NAVAIDs or GPS are provided in the special instrument approach procedure to allow aircrews to verify the TLS guidance.

21.4 Special Category I Differential GPS (SCAT−I DGPS)

21.4.1 The SCAT−I DGPS is designed to provide approach guidance by broadcasting differential correction to GPS.

21.4.2 SCAT−I DGPS procedures require aircraft equipment and pilot training.

21.4.3 Ground equipment consists of GPS receivers and a VHF digital radio transmitter. The SCAT−I DGPS detects the position of GPS satellites relative to GPS receiver equipment and broadcasts differential corrections over the VHF digital radio.

21.4.4 Category I Ground Based Augmentation System (GBAS) will displace SCAT−I DGPS as the public−use service.

22. Area Navigation

22.1 General

22.1.1 Area Navigation (RNAV) provides enhanced navigational capability to the pilot. RNAV equipment can compute the airplane position, actual track and ground speed and then provide meaningful information relative to a route of flight selected by the pilot. Typical equipment will provide the pilot with distance, time, bearing and crosstrack error relative to the selected "TO" or "active" waypoint and the selected route. Several navigational systems with different navigational performance characteristics are capable of providing area navigational functions. Present day RNAV includes INS, LORAN, VOR/DME, and GPS systems. Modern multi−sensor systems can integrate one or more of the above systems to provide a more accurate and reliable navigational system. Due to the different levels of performance, area navigational capabilities can satisfy different levels of required navigation performance (RNP).

22.2 RNAV Operations Incorporating RNP

22.2.1 During the past four decades, domestic and international air navigation have been conducted using a system of airways and instrument procedures based upon ground−based navigational systems such as NDB, VOR, and ILS. Reliance on ground−based navigational systems has served the aviation community well, but often results in less than optimal routes or instrument procedures and an inefficient use of airspace. With the widespread deployment of RNAV systems and the advent of GPS−based navigation, greater flexibility in defining routes, procedures, and airspace design is now possible with an associated increase in flight safety. To capitalize on the potential of RNAV systems, both the FAA and International Civil Aviation Organization (ICAO) are affecting a shift toward a new standard of navigation and airspace management called RNP.

22.2.2 Navigational systems are typically described as being sensor specific, such as a VOR or ILS system. By specifying airspace requirements as RNP, various navigation systems or combination of systems may be used as long as the aircraft can achieve the RNP. RNP is intended to provide a single performance standard that can be used and applied by aircraft and aircraft equipment manufacturers, airspace planners, aircraft certification and operations, pilots and controllers, and international aviation authorities. RNP can be applied to obstacle clearance or aircraft separation requirements to ensure a consistent application level.

22.2.3 ICAO has defined RNP values for the four typical navigation phases of flight: oceanic, en route, terminal, and approach. The RNP applicable to a selected airspace, route, or procedure is designated by it's RNP Level or Type. As defined in the Pilot/Controller Glossary, the RNP Level or Type is a value typically expressed as a distance, in nautical miles, from the procedure, route or path within which an aircraft would typically operate. RNP applications also provide performance to protect against larger errors at some multiple of RNP level (e.g., twice the RNP level).

22.3 Standard RNP Levels

22.3.1 U.S. standard values supporting typical RNP airspace are as specified in TBL ENR 4.1−6 below. Other RNP levels as identified by ICAO, other states and the FAA may also be used.

TBL ENR 4.1−6

U.S. Standard RNP Levels

RNP Level	Typical Application
.3	Approach
1	Departure, Terminal
2	En Route

22.3.1.1 Application of Standard RNP Levels. U.S. standard levels of RNP 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. New RNAV routes and procedures will be FAA's first public use procedures to include a specified RNP level. These procedures are being developed based on earth referenced navigation and do not rely on conventional ground−based navigational aids. Unless otherwise noted on affected charts or procedures, depiction of a specified RNP level will not preclude the use of other airborne RNAV navigational systems.

22.3.1.2 Depiction of Standard RNP Levels. The applicable RNP level will be depicted on affected charts and procedures. For example, an RNAV departure procedure may contain a notation referring to eligible aircraft by equipment suffix and a phrase "or RNP−1.0." A typical RNAV approach procedure may include a notation referring to eligible aircraft by specific navigation sensor(s), equipment suffix, and a phrase "or RNP−0.3." Specific guidelines for the depiction of RNP levels will be provided through chart bulletins and accompany affected charting changes.

22.4 Aircraft and Airborne Equipment Eligibility for RNP Operations. Aircraft meeting RNP criteria will have an appropriate entry including special conditions and limitations, if any, in its Aircraft/Rotorcraft Flight Manual (AFM), or supplement. RNAV installations with AFM−RNP certification based on GPS or systems integrating GPS are considered to meet U.S. standard RNP levels for all phases of flight. Aircraft with AFM−RNP certification without GPS may be limited to certain RNP levels, or phases of flight. For example, RNP based on DME/DME without other augmentation may not be appropriate for phases of flight outside the certified DME service volume. Operators of aircraft not having specific AFM−RNP certification may be issued operational approval including special conditions and limitations, if any, for specific RNP levels. Aircraft navigation systems eligible for RNP airspace will be indicated on charts, or announced through other FAA media such as NOTAMs and chart bulletins.

22.5 Understanding RNP Operations. Pilots should have a clear understanding of the aircraft requirements for operation in a given RNP environment, and advise ATC if an equipment failure or other malfunction causes the aircraft to lose its ability to continue operating in the designated RNP airspace. When a pilot determines a specified RNP level cannot be achieved, he/she should be prepared to revise the route, or delay the operation until an appropriate RNP level can be ensured. Some airborne systems use terms other than RNP to indicate the current level of performance. Depending on the airborne system implementation, this may be displayed, and referred to, as actual navigation performance (ANP), estimate of position error (EPE), or other.

22.6 Other RNP Applications Outside the U.S. The FAA, in cooperation with ICAO member states has 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. Additionally, the FAA has assisted those U.S. air carriers operating in Europe where the routes have been designated as RNP−5. TBL ENR 4.1−7 below, shows examples of current and future RNP levels of airspace.

TBL ENR 4.1−7

RNP Levels Supported for International Operations

RNP Level	Typical Application
4	Projected for oceanic/remote areas where 30 NM horizontal separation is applied
5	European Basic RNAV (B−RNAV)
10	Oceanic/remote areas where 50 NM horizontal separation is applied

22.7 RNAV and RNP Operations

22.7.1 Pilot

22.7.1.1 If unable to comply with the requirements of an RNAV or RNP procedure, pilots must advise air traffic control as soon as possible. For example, "N1234, failure of GPS system, unable RNAV, request amended clearance."

22.7.1.2 Pilots are not authorized to fly a published RNAV or RNP procedure (instrument approach, departure, or arrival procedure) unless it is retrievable by the procedure name from the aircraft navigation database and conforms to the charted procedure.

22.7.1.3 Whenever possible, RNAV routes (Q− or T−route) should be extracted from the database in their entirety, rather than loading RNAV route waypoints from the database into the flight plan individually. However, selecting and inserting individual, named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted.

22.7.1.4 Pilots must not change any database waypoint type from a fly−by to fly−over, or vice versa. No other modification of database waypoints or the creation of user−defined waypoints on published RNAV or RNP procedures is permitted, except to:

a) Change altitude and/or airspeed waypoint constraints to comply with an ATC clearance/instruction.

b) Insert a waypoint along the published route to assist in complying with ATC instruction, example, "Descend via the WILMS arrival except cross 30 north of BRUCE at/or below FL 210." This is limited only to systems that allow along−track waypoint construction.

22.7.1.5 Pilots of FMS−equipped aircraft, who are assigned an RNAV DP or STAR procedure and subsequently receive a change of runway, transition or procedure, shall verify that the appropriate changes are loaded and available for navigation.

22.7.1.6 For RNAV 1 DPs and STARs, pilots must use a CDI, flight director and/or autopilot, in lateral navigation mode. Other methods providing an equivalent level of performance may also be acceptable.

22.7.1.7 For RNAV 1 DPs and STARs, pilots of aircraft without GPS, using DME/DME/IRU, must ensure the 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. Other methods providing an equivalent level of performance may also be acceptable.

22.7.1.8 For procedures or routes requiring the use of GPS, if the navigation system does not automatically alert the flight crew of a loss of GPS, the operator must develop procedures to verify correct GPS operation.

22.7.1.9 RNAV terminal procedures (DP and STAR) may be amended by ATC issuing radar vectors and/or clearances direct to a waypoint. Pilots should avoid premature manual deletion of waypoints from their active "legs" page to allow for rejoining procedures.

23. NAVAID Identifier Removal During Maintenance

23.1 During periods of routine or emergency maintenance, coded identification (or code and voice, where applicable) is removed from certain FAA NAVAIDs. Removal of the identification serves as warning to pilots that the facility is officially off the air for tune−up or repair and may be unreliable even though intermittent or constant signals are received.

NOTE−
During periods of maintenance, VHF ranges may radiate a T−E−S−T code (− ● ●●● −).

NOTE−
DO NOT attempt to fly a procedure that is NOTAMed out of service even if the identification is present. In certain cases, the identification may be transmitted for short periods as part of the testing.

24. User Reports on NAVAID Performance

24.1 Users of the National Airspace System can render valuable assistance in the early correction of NAVAID malfunctions by reporting their observation of undesirable performance. Although NAVAIDs are monitored by electronic detectors adverse effects of electronic interference, new obstructions or changes in terrain near the NAVAID can exist without detection by the ground monitors. Some of the characteristics of malfunction or deteriorating performance which should be reported are: erratic course or bearing indications; intermittent, or full, flag alarm; garbled, missing or obviously improper coded identification; poor quality communications reception; or, in the case of frequency interference, an audible hum or tone accompanying radio communications or navaid identification.

24.2 Reporters should identify the NAVAID, location of the aircraft, time of the observation, type of aircraft and describe the condition observed; the type of receivers in use will also be useful information. Reports can be made in any of the following ways:

24.2.1 Immediately, by radio communication to the controlling Air Route Traffic Control Center, Control Tower, or Flight Service Station. This provides the quickest result.

24.2.2 By telephone to the nearest FAA facility.

24.2.3 By FAA Form 8000−7, Safety Improvement Report, a postage−paid card designed for this purpose. These cards may be obtained at FAA Flight Service Stations, Flight Standards District Offices, and General Aviation Fixed Base Operations.

24.3 In aircraft that have more than one receiver, there are many combinations of possible interference between units. This can cause either erroneous navigation indications or, complete or partial blanking out of the communications. Pilots should be familiar enough with the radio installation of particular airplanes they fly to recognize this type of interference.

25. Radio Communications and Navigation Facilities

25.1 A complete listing of air traffic radio communications facilities and frequencies and radio navigation facilities and frequencies are contained in the Airport/Facility Directory. Similar information for the Pacific and Alaskan areas is contained in the Pacific and Alaskan Supplements.

ENR 5.7 Potential Flight Hazards

1. Accident Causal Factors

1.1 The ten most frequent cause factors for General Aviation Accidents in 1992 that involve the pilot in command are:

1.1.1 Inadequate preflight preparation and/or planning.

1.1.2 Failure to obtain/maintain flying speed.

1.1.3 Failure to obtain/maintain flying speed.

1.1.4 Failure to maintain direction control.

1.1.5 Improper level off.

1.1.6 Failure to see and avoid objects or obstructions.

1.1.7 Mismanagement of fuel.

1.1.8 Improper in−flight decisions or planning.

1.1.9 Misjudgment of distance and speed.

1.1.10 Selection of unsuitable terrain.

1.1.11 Improper operation of flight controls.

1.2 The above factors have continued to plague General Aviation pilots over the years. This list remains relatively stable and points out the need for continued refresher training to establish a higher level of flight proficiency for all pilots. A part of the FAA's continuing effort to promote increased aviation safety is the Aviation Safety Program. For information on the FAA's Aviation Safety Program, readers can contact their nearest Flight Standards District Office's Safety Program Manager.

1.3 Be alert at all times, especially when the weather is good. Most pilots pay attention to business when they are operating in full IFR weather conditions, but strangely, air collisions almost invariably have occurred under ideal weather conditions. Unlimited visibility appears to encourage a sense of security which is not at all justified. Considerable information of value may be obtained by listening to advisories being issued in the terminal area, even though controller workload may prevent a pilot from obtaining individual service.

1.4 If you think another aircraft is too close to you, give way instead of waiting for the other pilot to respect the right−of−way to which you may be entitled. It is a lot safer to pursue the right−of−way angle after you have completed your flight.

2. VFR In Congested Area

2.1 A high percentage of near midair collisions occur below 8,000 feet AGL and within 30 miles of an airport. When operating VFR in highly congested areas, whether you intend to land at an airport within the area or are just flying through, it is recommended that extra vigilance be maintained and that you monitor an appropriate control frequency. Normally the appropriate frequency is an approach control frequency. By such monitoring action you can "get the picture" of the traffic in your area. When the approach controller has radar, traffic advisories may be given to VFR pilots who request them, subject to the provisions included in ENR 1.1, paragraph 37.10.4, Radar Traffic Information Service (RTIS).

3. Obstructions to Flight

3.1 General

3.1.1 Many structures exist that could significantly affect the safety of your flight when operating below 500 feet above ground level (AGL), and particularly below 200 feet AGL. While 14 CFR Section 91.119 allows flight below 500 AGL when over sparsely populated areas or open water, such operations are very dangerous. At and below 200 feet AGL there are numerous power lines, antenna towers, etc., that are not marked and lighted 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.

3.2 Antenna Towers

3.2.1 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. Additionally, new towers may not be on your current chart because the information was not received prior to the printing of the chart.

3.3 Overhead Wires

3.3.1 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 high voltage/power lines or the supporting structures of these lines may not always be readily visible and the wires may be virtually impossible to see under certain conditions. 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. However, many power lines do not require notice to the FAA and, therefore, are not marked and/or lighted. Many of those that do require notice 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 these power lines or 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.

3.4 Other Objects/Structures

3.4.1 There are other objects or structures that could adversely affect your flight such as 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.

4. Avoid Flight Beneath Unmanned Balloons

4.1 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.

4.2 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.

5. Unmanned Aircraft

5.1 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.

5.2 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 coordination with an ATC facility, and typically require the issuance of a NOTAM describing the operation to be conducted. UAS approvals also require observers to provide “see−and−avoid” capability to the UAS crew and to provide the necessary compliance with 14 CFR Section 91.113. For UAS operations approved at or above FL180, UAS operate under the same requirements as that of manned aircraft (i.e., flights are operated under instrument flight rules, are in communication with ATC, and are appropriately equipped).

5.3 UAS operations may be approved at either controlled or uncontrolled airports and are typically disseminated by NOTAM. In all cases, approved UAS operations shall comply with all applicable regulations and/or special provisions specified in the COA or in the operating limitations of the special airworthiness certificate. At uncontrolled airports, UAS operations are advised to operate well clear of all known manned aircraft operations. Pilots of manned aircraft are advised to follow normal operating procedures and are urged to monitor the CTAF for any potential UAS activity. At controlled airports, local ATC procedures may be in place to handle UAS operations and should not require any special procedures from manned aircraft entering or departing the traffic pattern or operating in the vicinity of the airport.

5.4 In addition to approved UAS operations described above, a recently approved agreement between the FAA and the Department of Defense authorizes small UAS operations wholly contained within Class G airspace, and in no instance, greater than 1200 feet AGL over military owned or leased property. These operations do not require any special authorization as long as the UA remains within the lateral boundaries of the military installation as well as other provisions including the issuance of a NOTAM. Unlike special use airspace, these areas may not be depicted on an aeronautical chart.

5.5 There are several factors a pilot should consider regarding UAS activity in an effort to reduce potential flight hazards. Pilots are urged to exercise increased vigilance when operating in the vicinity of restricted or other special use airspace, military operations areas, and any military installation. Areas with a preponderance of UAS activity are typically noted on sectional charts advising pilots of this activity. Since the size of a UA can be very small, they may be difficult to see and track. If a UA is encountered during flight, as with manned aircraft, never assume that the pilot or crew of the UAS can see you, maintain increased vigilance with the UA and always be prepared for evasive action if necessary. Always check NOTAMs for potential UAS activity along the intended route of flight and exercise increased vigilance in areas specified in the NOTAM.

6. Mountain Flying

6.1 Your first experience of flying over mountainous terrain (particularly if most of your flight time has been over the flatlands of the midwest) could be a *never-to-be-forgotten nightmare* if proper planning is not done and if you are not aware of the potential hazards awaiting. Those familiar section lines are not present in the mountains; those flat, level fields for forced landings are practically nonexistent; abrupt changes in wind direction and velocity occur; severe updrafts and downdrafts are common, particularly near or above abrupt changes of terrain such as cliffs or rugged areas; even the clouds look different and can build up with startling rapidity. Mountain flying need not be hazardous if you follow the recommendations below:

6.1.1 File a Flight Plan. Plan your route to avoid topography which would prevent a safe forced landing. The route should be over populated areas and well known mountain passes. Sufficient altitude should be maintained to permit gliding to a safe landing in the event of engine failure.

6.1.2 Don't fly a light aircraft when the winds aloft, at your proposed altitude, exceed 35 miles per hour. Expect the winds to be of much greater velocity over mountain passes than reported a few miles from them. Approach mountain passes with as much altitude as possible. Downdrafts of from 1,500 to 2,000 feet per minute are not uncommon on the leeward side.

6.1.3 Don't fly near or above abrupt changes in terrain. Severe turbulence can be expected, especially in high wind conditions.

6.1.4 Understand Mountain Obscuration. The term Mountain Obscuration (MTOS) is used to describe a visibility condition that is distinguished from IFR because ceilings, by definition, are described as "above ground level" (AGL). In mountainous terrain clouds can form at altitudes significantly higher than the weather reporting station and at the same time nearby mountaintops may be obscured by low visibility. In these areas the ground level can also vary greatly over a small area. Beware if operating VFR−on−top. You could be operating closer to the terrain than you think because

the tops of mountains are hidden in a cloud deck below. MTOS areas are identified daily on The Aviation Weather Center located at:
http://www.aviationweather.gov.

6.2 Some canyons run into a dead end. Don't fly so far up a canyon that you get trapped. ALWAYS BE ABLE TO MAKE A 180 DEGREE TURN.

6.3 VFR flight operations may be conducted at night in mountainous terrain with the application of sound judgment and common sense. Proper pre−flight planning, giving ample consideration to winds and weather, knowledge of the terrain and pilot experience in mountain flying are prerequisites for safety of flight. Continuous visual contact with the surface and obstructions is a major concern and flight operations under an overcast or in the vicinity of clouds should be approached with extreme caution.

6.4 When landing at a high altitude field, the same indicated airspeed should be used as at low elevation fields. Remember: that due to the less dense air at altitude, this same indicated airspeed actually results in a higher true airspeed, a faster landing speed, and more important, a longer landing distance. During gusty wind conditions which often prevail at high altitude fields, a power approach and power landing is recommended. Additionally, due to the faster groundspeed, your takeoff distance will increase considerably over that required at low altitudes.

6.5 Effects of Density Altitude. Performance figures in the aircraft owner's handbook for length of takeoff run, horsepower, rate of climb, etc., are generally based on standard atmosphere conditions (59°F, pressure 29.92 inches of mercury) at sea level. However, inexperienced pilots as well as experienced pilots may run into trouble when they encounter an altogether different set of conditions. This is particularly true in hot weather and at higher elevations. Aircraft operations at altitudes above sea level and at higher than standard temperatures are commonplace in mountainous area. Such operations quite often result in a drastic reduction of aircraft performance capabilities because of the changing air density. Density altitude is a measure of air density. It is not to be confused with pressure altitude − true altitude or absolute altitude. It is not to be used as a height reference, but as a determining criteria in the performance capability of an aircraft. Air density decreases with altitude. As air density decreases, density altitude increases. The further effects of high temperature and high humidity are cumulative, resulting in an increasing high density altitude condition. High density altitude reduces all aircraft performance parameters. To the pilot, this means that the normal horsepower output is reduced, propeller efficiency is reduced and a higher true airspeed is required to sustain the aircraft throughout its operating parameters. It means an increase in runway length requirements for takeoff and landings, and a decreased rate of climb. An average small airplane, for example, requiring 1,000 feet for takeoff at sea level under standard atmospheric conditions will require a takeoff run of approximately 2,000 at an operational altitude of 5,000 feet.

NOTE−
A turbo−charged aircraft engine provides some slight advantage in that it provides sea level horsepower up to a specified altitude above sea level.

6.6 Density Altitude Advisories. At airports with elevations of 2,000 feet and higher, control towers and FSSs will broadcast the advisory "Check Density Altitude" when the temperature reaches a predetermined level. These advisories will be broadcast on appropriate tower frequencies or, where available, ATIS. FSSs will broadcast these advisories as a part of Airport Advisory Service, and on TWEB.

6.6.1 These advisories are provided by air traffic facilities, as a reminder to pilots that high temperatures and high field elevations will cause significant changes in aircraft characteristics. The pilot retains the responsibility to compute density altitude, when appropriate, as a part of preflight duties.

NOTE−
All FSSs will compute the current density altitude upon request.

7. Use of Runway Half−way Signs at Unimproved Airports

7.1 When installed, runway half−way signs provide the pilot with a reference point to judge takeoff acceleration trends. Assuming that the runway length is appropriate for takeoff (considering runway condition and slope, elevation, aircraft weight, wind, and temperature), typical takeoff acceleration should allow the airplane to reach 70 percent of lift−off airspeed by the midpoint of the runway. The "rule of thumb" is that should airplane acceleration not allow the airspeed to reach this value by the midpoint, the takeoff should be aborted, as it may not be possible to liftoff in the remaining runway.

7.2 Several points are important when considering using this "rule of thumb":

7.2.1 Airspeed indicators in small airplanes are not required to be evaluated at speeds below stalling, and may not be usable at 70 percent of liftoff airspeed.

7.2.2 This "rule of thumb" is based on a uniform surface condition. Puddles, soft spots, areas of tall and/or wet grass, loose gravel, etc., may impede acceleration or even cause deceleration. Even if the airplane achieves 70 percent of liftoff airspeed by the midpoint, the condition of the remainder of the runway may not allow further acceleration. The entire length of the runway should be inspected prior to takeoff to ensure a usable surface.

7.2.3 This "rule of thumb" applies only to runway required for actual liftoff. In the event that obstacles affect the takeoff climb path, appropriate distance must be available after liftoff to accelerate to best angle of climb speed and to clear the obstacles. This will, in effect, require the airplane to accelerate to a higher speed by midpoint, particularly if the obstacles are close to the end of the runway. In addition, this technique does not take into account the effects of upslope or tailwinds on takeoff performance. These factors will also require greater acceleration than normal and, under some circumstances, prevent takeoff entirely.

7.2.4 Use of this "rule of thumb" does not alleviate the pilot's responsibility to comply with applicable Federal Aviation Regulations, the limitations and performance data provided in the FAA approved Airplane Flight Manual (AFM), or, in the absence of an FAA approved AFM, other data provided by the aircraft manufacturer.

7.3 In addition to their use during takeoff, runway half−way signs offer the pilot increased awareness of his or her position along the runway during landing operations.

NOTE−
No FAA standard exists for the appearance of the runway half−way sign. FIG ENR 5.7−1 shows a graphical depiction of a typical runway half−way sign.

FIG ENR 5.7−1

Typical Runway Half−way Sign

8. Mountain Wave

8.1 Many pilots go all their lives without understanding what a mountain wave is. Quite a few have lost their lives because of this lack of understanding. One need not be a licensed meteorologist to understand the mountain wave phenomenon.

8.2 Mountain waves occur when air is being blown over a mountain range or even the ridge of a sharp bluff area. As the air hits the upwind side of the range, it starts to climb, thus creating what is generally a smooth updraft which turns into a turbulent downdraft as the air passes the crest of the ridge. From this point, for many miles downwind, there will be a series of downdrafts and updrafts. Satellite photos of the Rockies have shown mountain waves extending as far as 700 miles downwind of the range. Along the east coast area, such photos of the Appalachian chain have picked up the mountain wave phenomenon over a hundred miles eastward. All it takes to form a mountain wave is wind blowing across the range at 15 knots or better at an intersection angle of not less than 30 degrees.

8.3 Pilots from flatland areas should understand a few things about mountain waves in order to stay out of trouble. Approaching a mountain range from the upwind side (generally the west), there will usually be a smooth updraft; therefore, it is not quite as dangerous an area as the lee of the range. From the leeward side, it is always a good idea to add an extra thousand feet or so of altitude because downdrafts can exceed the climb capability of the aircraft. Never expect an updraft when approaching a mountain chain from the leeward. Always be prepared to cope with a downdraft and turbulence.

8.4 When approaching a mountain ridge from the downwind side, it is recommended that the ridge be approached at approximately a 45° angle to the horizontal direction of the ridge. This permits a safer retreat from the ridge with less stress on the aircraft should severe turbulence and downdraft be experienced. If severe turbulence is encountered, simultaneously reduce power and adjust pitch until aircraft approaches maneuvering speed, then adjust power and trim to maintain maneuvering speed and fly away from the turbulent area.

9. Seaplane Safety

9.1 Acquiring a seaplane class rating affords access to many areas not available to landplane pilots. Adding a seaplane class rating to your pilot certificate can be relatively uncomplicated and inexpensive. However, more effort is required to become a safe, efficient, competent "bush" pilot. The natural hazards of the backwoods have given way to modern man−made hazards. Except for the far north, the available bodies of water are no longer the exclusive domain of the airman. Seaplane pilots must be vigilant for hazards such as electric power lines, power, sail and rowboats, rafts, mooring lines, water skiers, swimmers, etc.

9.2 Seaplane pilots must have a thorough understanding of the right−of−way rules as they apply to aircraft versus other vessels. Seaplane pilots are expected to know and adhere to both the United States Coast Guard's (USCG) Navigation Rules, International−Inland, and Title 14 Code of Federal Regulations (CFR) Section 91.115, Right of Way Rules; Water Operations. The navigation rules of the road are a set of collision avoidance rules as they apply to aircraft on the water. A seaplane is considered a vessel when on the water for the purposes of these collision avoidance rules. In general, a seaplane on the water shall keep well clear of all vessels and avoid impeding their navigation. The CFR requires, in part, that aircraft operating on the water ". . . shall, insofar as possible, keep clear of all vessels and avoid impeding their navigation and shall give way to any vessel or other aircraft that is given the right of way . . . ." This means that a seaplane should avoid boats and commercial shipping when on the water. If on a collision course, the seaplane should slow, stop, or maneuver to the right, away from the bow of the oncoming vessel. Also, while on the surface with an engine running, an aircraft must give way to all nonpowered vessels. Since a seaplane in the water may not be as maneuverable as one in the air, the aircraft on the water has right−of−way over one in the air, and one taking off has right−of−way over one landing. A seaplane is exempt from the USCG safety equipment requirements, including the requirements for Personal Floatation Devices (PFD). Requiring seaplanes on the water to comply with USCG equipment requirements in addition to the FAA equipment requirements would be an unnecessary burden on seaplane owners and operators.

9.3 Unless they are under Federal jurisdiction, navigable bodies of water are under the jurisdiction of the state, or in a few cases, privately owned. Unless they are specifically restricted, aircraft have as much right to operate on these bodies of water as other vessels. To avoid problems, check with Federal or local officials in advance of operating on unfamiliar waters. In addition to the agencies listed in TBL ENR 5.7−1, the nearest Flight Standards District Office can usually offer some practical suggestions as well as regulatory information. If you land on a restricted body of water because of an inflight emergency, or in ignorance of the restrictions you have violated, report as quickly as practical to the nearest local official having jurisdiction and explain your situation.

TBL ENR 5.7−1

Jurisdictions Controlling Navigable Bodies of Water

AUTHORITY TO CONSULT FOR USE OF A BODY OF WATER		
Location	**Authority**	**Contact**
Wilderness Area	U.S. Department of Agriculture, Forest Service	Local forest ranger
National Forest	USDA Forest Service	Local forest ranger
National Park	U.S. Department of the Interior, National Park Service	Local park ranger
Indian Reservation	USDI, Bureau of Indian Affairs	Local Bureau office
State Park	State government or state forestry or park service	Local state aviation office for further information
Canadian National and Provincial Parks	Supervised and restricted on an individual basis from province to province and by different departments of the Canadian government; consult Canadian Flight Information Manual and/or Water Aerodrome Supplement	Park Superintendent in an emergency

9.4 When operating a seaplane over or into remote areas, appropriate attention should be given to survival gear. Minimum kits are recommended for summer and winter, and are required by law for flight into sparsely settled areas of Canada and Alaska. Alaska State Department of Transportation and Canadian Ministry of Transport officials can provide specific information on survival gear requirements. The kit should be assembled in one container and be easily reachable and preferably floatable.

9.5 The FAA recommends that each seaplane owner or operator provide flotation gear for occupants any time a seaplane operates on or near water. 14 CFR Section 91.205(b)(12) requires approved flotation gear for aircraft operated for hire over water and beyond power−off gliding distance from shore. FAA−approved gear differs from that required for navigable waterways under USCG rules. FAA−approved life vests are inflatable designs as compared to the USCG's noninflatable PFDs that may consist of solid, bulky material. Such USCG PFDs are impractical for seaplanes and other aircraft because they may block passage through the relatively narrow exits available to pilots and passengers. Life vests approved under Technical Standard Order (TSO) C−13E contain fully inflatable compartments. The wearer inflates the compartments (AFTER exiting the aircraft) primarily by independent CO_2 cartridges, with an oral inflation tube as a backup. The flotation gear also contains a water−activated, self−illuminating signal light. The fact that pilots and passengers can easily don and wear inflatable life vests (when not inflated) provides maximum effectiveness and allows for unrestricted movement. It is imperative that passengers are briefed on the location and proper use of available PFDs prior to leaving the dock.

9.6 The FAA recommends that seaplane owners and operators obtain Advisory Circular (AC) 91−69, Seaplane Safety for 14 CFR Part 91 Operations, free from:

U.S. Department of Transportation
Subsequent Distribution Office, SVC−121.23
Ardmore East Business Center
3341 Q 75th Avenue
Landover, MD 20785
FAX: (301) 386−5394

The USCG Navigation Rules International−Inland (COMDTINST M16672.2B) is available for a fee from the Government Printing Office by facsimile request to (202) 512−2250. It can be ordered using Mastercard or Visa.

10. Flight Operations in Volcanic Ash

10.1 Severe volcanic eruptions which send ash into the upper atmosphere occur somewhere around the world several times each year. Flying into a volcanic ash cloud can be exceedingly dangerous. A B747−200 lost all four engines after such an encounter, and a B747−400 had the same nearly catastrophic experience. Piston−powered aircraft are less likely to lose power but severe damage is almost certain to ensue after an encounter with a volcanic ash cloud which is only a few hours old.

10.2 Most important is to avoid any encounter with volcanic ash. The ash plume may not be visible, especially in instrument conditions or at night; and even if visible, it is difficult to distinguish visually between an ash cloud and an ordinary weather cloud. Volcanic ash clouds are not displayed on airborne or ATC radar. The pilot must rely on reports from air traffic controllers and other pilots to determine the location of the ash cloud and use that information to remain well clear of the area. Every attempt should be made to remain on the upwind side of the volcano.

10.3 It is recommended that pilots encountering an ash cloud should immediately reduce thrust to idle (altitude permitting), and reverse course in order to escape from the cloud. Ash clouds may extend for hundreds of miles, and pilots should not attempt to fly through or climb out of the cloud. In addition, the following procedures are recommended:

10.3.1 Disengage the autothrottle if engaged. This will prevent the autothrottle from increasing engine thrust.

10.3.2 Turn on continuous ignition.

10.3.3 Turn on all accessory airbleeds including all air conditioning packs, nacelles, and wing anti−ice. This will provide an additional engine stall margin by reducing engine pressure.

10.4 The following has been reported by flight crews who have experienced encounters with volcanic dust clouds.

10.4.1 Smoke or dust appearing in the cockpit.

10.4.2 An acrid odor similar to electrical smoke.

10.4.3 Multiple engine malfunctions, such as compressor stalls, increasing EGT, torching from tailpipe, and flameouts.

10.4.4 At night, St. Elmo's fire or other static discharges accompanied by a bright orange glow in the engine inlets.

10.4.5 A fire warning in the forward cargo area.

10.5 It may become necessary to shut down and then restart engines to prevent exceeding EGT limits. Volcanic ash may block the pitot system and result in unreliable airspeed indications.

10.6 If you see a volcanic eruption and have not been previously notified of it, you may have been the first person to observe it. In this case, immediately contact ATC and alert them to the existence of the eruption. If possible, use the Volcanic Activity Reporting Form (VAR) depicted at the end of GEN 3.5. Items 1 through 8 of the VAR should be transmitted immediately. The information requested in items 9 through 16 should be passed after landing. If a VAR form is not immediately available, relay enough information to identify the position and nature of the volcanic activity. Do not become unnecessarily alarmed if there is merely steam or very low−level eruptions of ash.

10.7 When landing at airports where volcanic ash has been deposited on the runway, be aware that even a thin layer of dry ash can be detrimental to braking action. Wet ash on the runway may also reduce effectiveness of braking. It is recommended that reverse thrust be limited to a minimum practical to reduce the possibility of reduced visibility and engine ingestion of airborne ash.

10.8 When departing from airports where volcanic ash has been deposited it is recommended that pilots avoid operating in visible airborne ash. Allow ash to settle before initiating takeoff roll. It is also recommended that flap extension be delayed until initiating the takeoff checklist and that a rolling takeoff be executed to avoid blowing ash back into the air.

11. Emergency Airborne Inspection of Other Aircraft

11.1 Providing airborne assistance to another aircraft may involve flying in very close proximity to that aircraft. Most pilots receive little, if any, formal training or instruction in this type of flying activity. Close proximity flying without sufficient time to plan (i.e., in an emergency situation), coupled with the stress involved in a perceived emergency can be hazardous.

11.2 The pilot in the best position to assess the situation should take the responsibility of coordinating the airborne intercept and inspection, taking into account the unique flight characteristics and differences of the category(s) of aircraft involved.

11.3 Some of the safety considerations are:

11.3.1 Area, direction, and speed of the intercept.

11.3.2 Aerodynamic effects (i.e., rotorcraft downwash) which may also affect.

11.3.3 Minimum safe separation distances.

11.3.4 Communications requirements, lost communications procedures, coordination with ATC.

11.3.5 Suitability of diverting the distressed aircraft to the nearest safe airport.

11.3.6 Emergency actions to terminate the intercept.

11.4 Close proximity, inflight inspection of another aircraft is uniquely hazardous. The pilot in command of the aircraft experiencing the problem/emergency must not relinquish his/her control of the situation and jeopardize the safety of his/her aircraft. The maneuver must be accomplished with minimum risk to both aircraft.

12. Precipitation Static

12.1 Precipitation static is caused by aircraft in flight coming in contact with uncharged particles. These particles can be rain, snow, fog, sleet, hail, volcanic ash, dust, any solid or liquid particles. When the aircraft strikes these neutral particles, the positive element of the particle is reflected away from the aircraft and the negative particle adheres to the skin of the aircraft. In a very short period of time a substantial negative charge will develop on the skin of the aircraft. If the aircraft is not equipped with static dischargers, or has an ineffective static discharger system, when a sufficient negative voltage level is reached, the aircraft may go into "CORONA." That is, it will discharge the static electricity from the extremities of the aircraft, such as the wing tips, horizontal stabilizer, vertical stabilizer, antenna, propeller tips, etc. This discharge of static electricity is what you will hear in your headphones and is what we call P−static.

12.2 A review of pilot reports often shows different symptoms with each problem that is encountered. The following list of problems is a summary of many pilot reports from many different aircraft. Each problem was caused by P−static:

12.2.1 Complete loss of VHF communications.

12.2.2 Erroneous magnetic compass readings (30% in error).

12.2.3 High pitched squeal on audio.

12.2.4 Motor boat sound on audio.

12.2.5 Loss of all avionics in clouds.

12.2.6 VLF navigation system inoperative most of the time.

12.2.7 Erratic instrument readouts.

12.2.8 Weak transmissions and poor receptivity of radios.

12.2.9 "St. Elmo's Fire" on windshield.

12.3 Each of these symptoms is caused by one general problem on the airframe. This problem is the inability of the accumulated charge to flow easily to the wing tips and tail of the airframe, and properly discharge to the airstream.

12.4 Static dischargers work on the principle of creating a relatively easy path for discharging negative charges that develop on the aircraft by using a discharger with fine metal points, carbon coated rods, or carbon wicks rather than wait until a large charge is developed and discharged off the trailing edges of the aircraft that will interfere with avionics equipment. This process offers approximately 50 decibels (dB) static noise reduction which is adequate in most cases to be below the threshold of noise that would cause interference in avionics equipment.

12.5 It is important to remember that precipitation static problems can only be corrected with the proper number of quality static dischargers, properly installed on a properly bonded aircraft. P−static is indeed a problem in the all weather operation of the aircraft, but there are effective ways to combat it. All possible methods of reducing the effects of P−static should be considered so as to provide the best possible performance in the flight environment.

12.6 A wide variety of discharger designs is available on the commercial market. The inclusion of well−designed dischargers may be expected to improve airframe noise in P−static conditions by as much as 50 dB. Essentially, the discharger provides a path by which accumulated charge may leave the airframe quietly. This is generally accomplished by providing a group of tiny corona points to permit onset of corona−current flow at a low aircraft potential. Additionally, aerodynamic design of dischargers to permit corona to occur at the lowest possible atmospheric pressure also lowers the corona threshold. In addition to permitting a low potential discharge, the discharger will minimize the radiation of radio frequency (RF) energy which accompanies the corona discharge, in order to minimize effects of RF components at communications and navigation frequencies on avionics performance. These effects are reduced through resistive attachment of the corona point(s) to the airframe, preserving direct current connection but attenuating the higher frequency components of the discharge.

12.7 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.

12.8 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.

13. Light Amplification by Stimulated Emission of Radiation (Laser) Operations and Reporting Illumination of Aircraft

13.1 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.

13.2 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.

13.3 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.

13.4 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.

13.5 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:

13.5.1 UTC Date and Time of Event.

13.5.2 Call Sign or Aircraft Registration Number.

13.5.3 Type Aircraft.

13.5.4 Nearest Major City.

13.5.5 Altitude.

13.5.6 Location of Event (Latitude/Longitude and/or Fixed Radial Distance (FRD)).

13.5.7 Brief Description of the Event and any other Pertinent Information.

13.6 Pilots are also encouraged to complete the Laser Beam Exposure Questionnaire (See FIG 5−7−1), and fax it to the Washington Operations Center Complex (WOCC) as soon as possible after landing.

13.7 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."

13.8 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 Airport/Facility Directory for information regarding laser activities.

14. Flying in Flat Light and White Out Conditions

14.1 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.

14.2 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.

14.3 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.

14.4 Never take off in a white out situation.

14.4.1 Realize that in flat light conditions it may be possible to depart but not to return to that site. During takeoff, make sure you have a reference point. Do not lose sight of it until you have a departure reference point in view. Be prepared to return to the takeoff reference if the departure reference does not come into view.

14.4.2 Flat light is common to snow skiers. One way to compensate for the lack of visual contrast and depth−of−field loss is by wearing amber tinted lenses (also known as blue blockers). Special note of caution: Eyewear is not ideal for every pilot. Take into consideration personal factors − age, light sensitivity, and ambient lighting conditions.

14.4.3 So what should a pilot do when all visual references are lost?

14.4.3.1 Trust the cockpit instruments.

14.4.3.2 Execute a 180 degree turnaround and start looking for outside references.

14.4.3.3 Above all − fly the aircraft.

14.4.4 Landing in Low Light Conditions. When landing in a low light condition − use extreme caution. Look for intermediate reference points, in addition to checkpoints along each leg of the route for course confirmation and timing. The lower the ambient light becomes, the more reference points a pilot should use.

14.4.5 Airport Landings.

14.4.5.1 Look for features around the airport or approach path that can be used in determining depth perception. Buildings, towers, vehicles or other aircraft serve well for this measurement. Use something that will provide you with a sense of height above the ground, in addition to orienting you to the runway.

14.4.5.2 Be cautious of snowdrifts and snow banks − anything that can distinguish the edge of the runway. Look for subtle changes in snow texture or shading to identify ridges or changes in snow depth.

14.4.6 Off−Airport Landings.

14.4.6.1 In the event of an off−airport landing, pilots have used a number of different visual cues to gain reference. Use whatever you must to create the contrast you need. Natural references seem to work best (trees, rocks, snow ribs, etc.)

a) Over flight.

b) Use of markers.

c) Weighted flags.

d) Smoke bombs.

e) Any colored rags.

f) Dye markers.

g) Kool−aid.

h) Trees or tree branches.

14.4.6.2 It is difficult to determine the depth of snow in areas that are level. Dropping items from the aircraft to use as reference points should be used as a visual aid only and not as a primary landing reference. Unless your marker is biodegradable, be sure to retrieve it after landing. Never put yourself in a position where no visual references exist.

14.4.6.3 Abort landing if blowing snow obscures your reference. Make your decisions early. Don't assume you can pick up a lost reference point when you get closer.

14.4.6.4 Exercise extreme caution when flying from sunlight into shade. Physical awareness may tell you that you are flying straight but you may actually be in a spiral dive with centrifugal force pressing against you. Having no visual references enhances this illusion. Just because you have a good visual reference does not mean that it's safe to continue. There may be snow−covered terrain not visible in the direction that you are traveling. Getting caught in a no visual reference situation can be fatal.

14.4.7 Flying Around a Lake.

14.4.7.1 When flying along lakeshores, use them as a reference point. Even if you can see the other side, realize that your depth perception may be poor. It is easy to fly into the surface. If you must cross the lake, check the altimeter frequently and maintain a safe altitude while you still have a good reference. Don't descend below that altitude.

14.4.7.2 The same rules apply to seemingly flat areas of snow. If you don't have good references, avoid going there.

14.4.8 Other Traffic. Be on the look out for other traffic in the area. Other aircraft may be using your same reference point. Chances are greater of colliding with someone traveling in the same direction as you, than someone flying in the opposite direction.

14.4.9 Ceilings. Low ceilings have caught many pilots off guard. Clouds do not always form parallel to the surface, or at the same altitude. Pilots may try to compensate for this by flying with a slight bank and thus creating a descending turn.

14.4.10 Glaciers. Be conscious of your altitude when flying over glaciers. The glaciers may be rising faster than you are climbing.

15. Operations in Ground Icing Conditions

15.1 The presence of aircraft airframe icing during takeoff, typically caused by improper or no deicing of the aircraft being accomplished prior to flight has contributed to many recent accidents in turbine aircraft. The General Aviation Joint Steering Committee (GAJSC) is the primary vehicle for government−industry cooperation, communication, and coordination on GA accident mitigation. The Turbine Aircraft Operations Subgroup (TAOS) works to mitigate accidents in turbine accident aviation. While there is sufficient information and guidance currently available regarding the effects of icing on aircraft and methods for deicing, the TAOS has developed a list of recommended actions to further assist pilots and operators in this area.

15.1.1 While the efforts of the TAOS specifically focus on turbine aircraft, it is recognized that their recommendations are applicable to and can be adapted for the pilot of a small, piston powered aircraft too.

15.2 The following recommendations are offered:

15.2.1 Ensure that your aircraft's lift−generating surfaces are COMPLETELY free of contamination before flight through a tactile (hands on) check of the critical surfaces when feasible. Even when otherwise permitted, operators should avoid smooth or polished frost on lift−generating surfaces as an acceptable preflight condition.

15.2.2 Review and refresh your cold weather standard operating procedures.

15.2.3 Review and be familiar with the Airplane Flight Manual (AFM) limitations and procedures necessary to deal with icing conditions prior to flight, as well as in flight.

15.2.4 Protect your aircraft while on the ground, if possible, from sleet and freezing rain by taking advantage of aircraft hangars.

15.2.5 Take full advantage of the opportunities available at airports for deicing. Do not refuse deicing services simply because of cost.

15.2.6 Always consider canceling or delaying a flight if weather conditions do not support a safe operation.

15.3 If you haven't already developed a set of Standard Operating Procedures for cold weather operations, they should include:

15.3.1 Procedures based on information that is applicable to the aircraft operated, such as AFM limitations and procedures;

15.3.2 Concise and easy to understand guidance that outlines best operational practices;

15.3.3 A systematic procedure for recognizing, evaluating and addressing the associated icing risk, and offer clear guidance to mitigate this risk;

15.3.4 An aid (such as a checklist or reference cards) that is readily available during normal day−to−day aircraft operations.

15.4 There are several sources for guidance relating to airframe icing, including:

http://aircrafticing.grc.nasa.gov/index.html

http://www.ibac.org/is−bao/isbao.htm

http://www.natasafety1st.org/bus_deice.htm

15.4.1 Advisory Circular (AC) 91−74, Pilot Guide, Flight in Icing Conditions.

15.4.2 AC 135−17, Pilot Guide Small Aircraft Ground Deicing.

15.4.3 AC 135−9, FAR Part 135 Icing Limitations.

15.4.4 AC 120−60, Ground Deicing and Anti−icing Program.

15.4.5 AC 135−16, Ground Deicing and Anti−icing Training and Checking.

15.5 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 web site by selecting the current year's information bulletins:

http://www.faa.gov/library/manuals/examiners_inspectors/8400/fsat

FIG 5−7−1

LASER BEAM EXPOSURE QUESTIONNAIRE

FAX TO WASHINGTON OPERATIONS CENTER COMPLEX (WOCC) at (202) 267-5289 ATTN: DEN

PILOT NAME: ______________________ **PHONE NUMBER:** ______________

COMPANY: ______________________ **FLIGHT NUMBER:** ________

1. Date and time (UTC)? ____________ 2. Position of event (lat/long and/or FRD)? ______________

3. Altitude? ______ 4. What was the visibility? ______

5. What were the atmospheric conditions? (Check those which apply) ❑ Clear ❑ Overcast ❑ Rainy ❑ Foggy ❑ Hazy ❑ Sunny

6. What was the color(s) of the light? ____________ 7. Did the color(s) change during the exposure? ❑ Yes ❑ No

8. Did you attempt an evasive maneuver? ❑ Yes ❑ No If yes, did the beam follow you as you tried to move away? ❑ Yes ❑ No

9. Can you estimate how far away the light source was from your location? ______________

10. What was the position of the light relative to the aircraft? ______________

11. Was the source moving? ❑ Yes ❑ No

12. Was the light coming directly from its source or did it appear to be reflected off other surfaces? ______________

13. Were there multiple sources of light? ❑ Yes ❑ No 14. How long was the exposure? ______________

15. Did the light seem to track your path or was there incidental contact? ______________

16. What tasks were you performing when the exposure occurred? ______________

17. Did the light prevent or hamper you from doing those tasks, or was the light more of an annoyance? ______________

18. What were the visual effects you experienced (after-image, blind spot, flash-blindness, glare*)? ______________

19. Did you report the incident by radio to ATC? ❑ Yes ❑ No

Any other pertinent information: ______________________________

This questionnaire may be filled out by the competent authority during interviews with aircrews exposed to unauthorized laser illumination. This information will be used to aid in subsequent investigation by ATC, law enforcement and other governmental agencies to safeguard the safety and efficiency of civil aviation operation in the NAS.

*Examples of common visual effects:

After-image. An image that remains in the visual field after an exposure to a bright light.
Blind spot. A temporary or permanent loss of vision of part of the visual field.
Flash-blindness. The inability to see (either temporarily or permanently) caused by bright light entering the eye and persisting after the illumination has ceased.
Glare. A temporary disruption in vision caused by the presence of a bright light (such as an oncoming car's headlights) within an individual's field of vision. Glare lasts only as long as the bright light is actually present within the individual's field of vision.

4. Emergency Medical Service (EMS) Multiple Helicopter Operations

4.1 Background. EMS helicopter operators often overlap other EMS operator areas. Standardized procedures can enhance the safety of operating multiple helicopters to landing zones (LZs) and to hospital heliports. Communication is the key to successful operations and in maintaining organization between helicopters, ground units and communication centers. EMS helicopter operators which operate in the same areas should establish joint operating procedures and provide them to related agencies.

4.2 Recommended Procedures.

4.2.1 Landing Zone Operations. The first helicopter to arrive on−scene should establish communications with the ground unit at least 10 NMs from the LZ to receive a LZ briefing and to provide ground control the number of helicopters that can be expected. An attempt should be made to contact other helicopters on 123.025 to pass on to them pertinent LZ information and the ground unit's frequency. Subsequent helicopters arriving on scene should establish communications on 123.025 at least 10 NMs from the LZ. After establishing contact on 123.025, they should contact the ground unit for additional information. All helicopters should monitor 123.025 at all times.

4.2.1.1 If the landing zone is not established by the ground unit when the first helicopter arrives, then the first helicopter should establish altitude and orbit location requirements for the other arriving helicopters. Recommended altitude separation between helicopters is 500 feet (weather and airspace permitting). Helicopters can orbit on cardinal headings from the scene coordinates. (See FIG ENR 6.2−9)

4.2.1.2 Upon landing in the LZ, the first helicopter should update the other helicopters on the LZ conditions, i.e., space, hazards and terrain.

4.2.1.3 Before initiating any helicopter movement to leave the LZ, all operators should attempt to contact other helicopters on 123.025, and state their position and route of flight intentions for departing the LZ.

4.2.2 Hospital Operations. Because many hospitals require landing permission and have established procedures (frequencies to monitor, primary and secondary routes for approaches and departures, and orbiting areas if the heliport is occupied) pilots should always receive a briefing from the appropriate facility (communication center, flight following, etc.) before proceeding to the hospital.

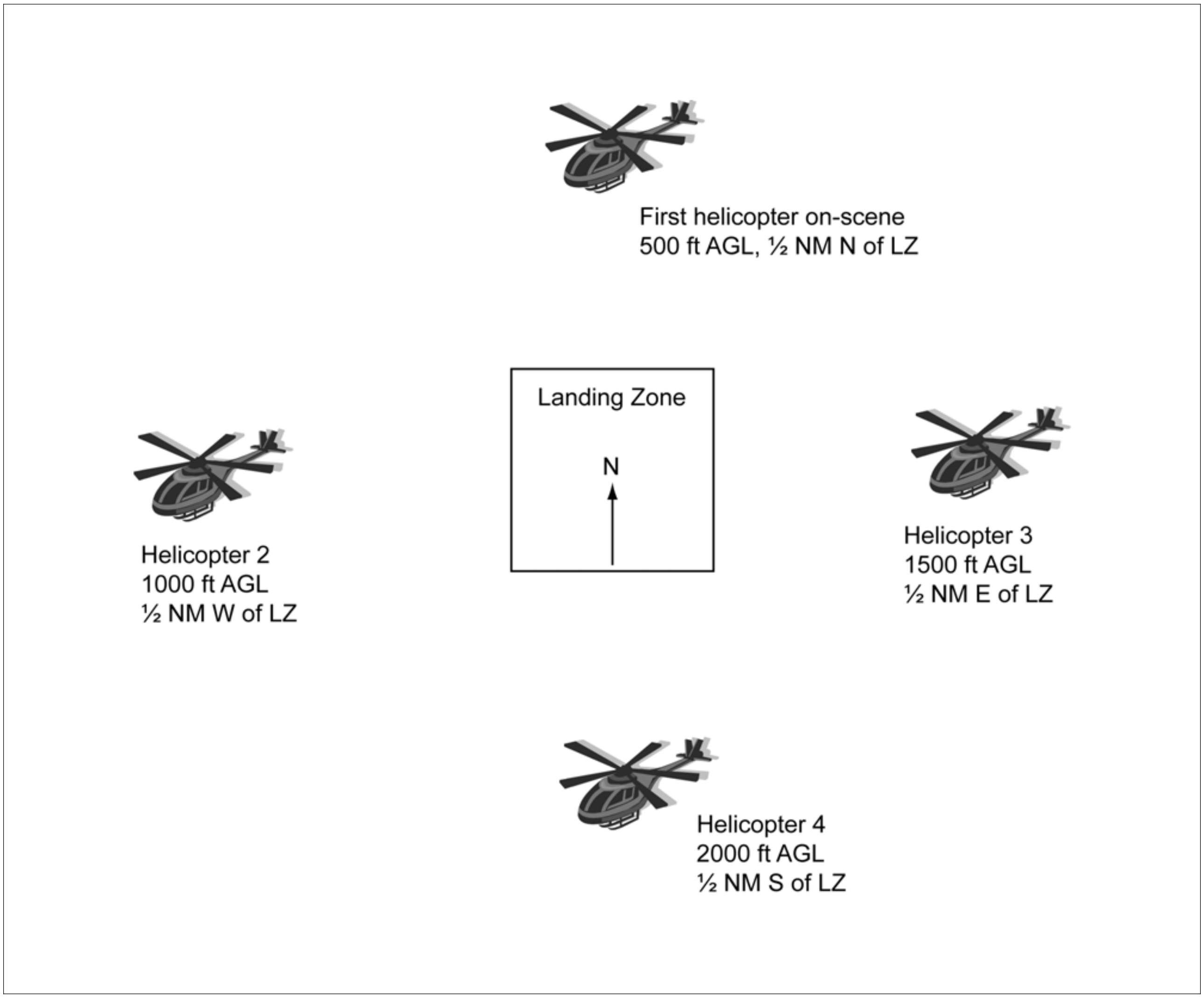
4.2.2.1 In the event of multiple helicopters coming into the hospital heliport, the helicopter nearest to the heliport should contact other inbound helicopters on 123.025 and establish intentions. Follow the guidelines established in the LZ operations.

4.2.2.2 To facilitate approach times, the pilot−in−command of the helicopter occupying the hospital heliport should advise any other operators whether the patient will be off loaded with the rotor blades turning or stopped, and the approximate time to do so.

4.2.2.3 Before making any helicopter movement to leave the hospital heliport, all operators should attempt to contact other helicopters on 123.025 and state their position and route of flight intentions for departing the heliport.

FIG ENR 6.2−9

EMS Multiple Helicopter LZ/Heliport Operation



***NOTE−** If the LZ/hospital heliport weather conditions or airspace altitude restrictions prohibit the recommended vertical separation, 1 NM separations should be kept between helicopter orbit areas.*

PART 3 – AERODROMES (AD)

AD 0.

AD 0.1 Preface − Not applicable

AD 0.2 Record of AIP Amendments − See GEN 0.2−1

AD 0.3 Record of AIP Supplements − Not applicable

AD 0.4 Checklist of Pages

PAGE	DATE
PART 3 – AERODROMES (AD)	
AD 0	
0.4−1	31 JULY 08
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AD 1	
1.1−1	15 MAR 07
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1.1−3	15 MAR 07
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2−51	31 JULY 08
2−52	31 JULY 08
2−53	31 JULY 08
2−54	31 JULY 08
2−55	31 JULY 08

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

21.2.1.4 A runway holding position sign(s) will be installed on a runway that is normally used as a taxiway, adjacent to the holding position markings.

21.2.1.5 A runway holding position sign on a taxiway will be installed adjacent to holding position markings.

21.2.2 Runway Approach Area Holding Position Sign. At some airports, it is necessary to hold an aircraft on a taxiway located in the approach or departure area for a runway so that the aircraft does not interfere with operations on that runway. In these situations a sign with the designation of the approach end of the runway followed by a "dash" (−) and letters "APCH" will be located at the holding position on the taxiway. Holding position markings in accordance with paragraph 20 will be located on the taxiway pavement. An example of this sign is shown in FIG AD 1.1−36. In this example, the sign may protect the approach to Runway 15 and/or the departure for Runway 33.

21.2.3 ILS Critical Area Holding Position Sign. At some airports, when the instrument landing system is being used, it is necessary to hold an aircraft on a taxiway at a location other than the holding position described in paragraph 19, Holding Position Markings. In these situations the holding position sign for these operations will have the inscription "ILS" and be located adjacent to the holding position marking on the taxiway described in paragraph 19. An example of this sign is shown in FIG AD 1.1−37.

21.2.4 No Entry Sign. This sign, shown in FIG AD 1.1−38, prohibits an aircraft from entering an area. Typically, this sign would be located on a taxiway intended to be used in only one direction or at the intersection of vehicle roadways with runways, taxiways or aprons where the roadway may be mistaken as a taxiway or other aircraft movement surface.

NOTE−
The holding position sign provides the pilot with a visual cue as to the location of the holding position marking. The operational significance of holding position markings are described in paragraph 19.

22. Location Signs

Location signs are used to identify either a taxiway or runway on which the aircraft is located. Other location signs provide a visual cue to pilots to assist them in determining when they have exited an area. The various location signs are described below.

22.1 Taxiway Location Sign. This sign has a black background with a yellow inscription and yellow border as shown in FIG AD 1.1−39. The inscription is the designation of the taxiway on which the aircraft is located. These signs are installed along taxiways either by themselves or in conjunction with direction signs or runway holding position signs.
(See FIG AD 1.1−44 and FIG AD 1.1−40.)

22.2 Runway Location Sign. This sign has a black background with a yellow inscription and yellow border as shown in FIG AD 1.1−41. 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 1.1−42. 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 1.1−43. 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 1.1−44.

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 1.1−45 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 1.1−44.)

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 1.1−44.)

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 1.1−46. In this case, the location sign is located to the left of the direction sign.

24. Destination Signs

24.1 Destination signs also have a yellow background with a black inscription indicating a destination on the airport. These signs always have an arrow showing the direction of the taxiing route to that destination. FIG AD 1.1−47 is an example of a typical destination sign. When the arrow on the destination sign indicates a turn, the sign is located prior to the intersection.

24.2 Destinations commonly shown on these types of signs include runways, aprons, terminals, military areas, civil aviation areas, cargo areas, international areas, and fixed base operators. An abbreviation may be used as the inscription on the sign for some of these destinations.

24.3 When the inscription for two or more destinations having a common taxiing route are placed on a sign, the destinations are separated by a "dot" (●) and one arrow would be used as shown in FIG AD 1.1−48. When the inscription on a sign contains two or more destinations having different taxiing routes, each destination will be accompanied by an arrow and will be separated from the other destinations on the sign with a vertical black message divider as shown in FIG AD 1.1−49.

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 1.1−50 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 are constructed of high energy−absorbing materials of selected strength, are located in the safety area beyond the end of the runway. They are designed to crush under the weight of commercial aircraft and they 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.

NOTE−
EMAS may be located as close as 35 feet.beyond the end of the runway. Aircraft should never taxi or drive across the runway.

FIG AD 1.1−1
Precision & Nonprecision Configurations

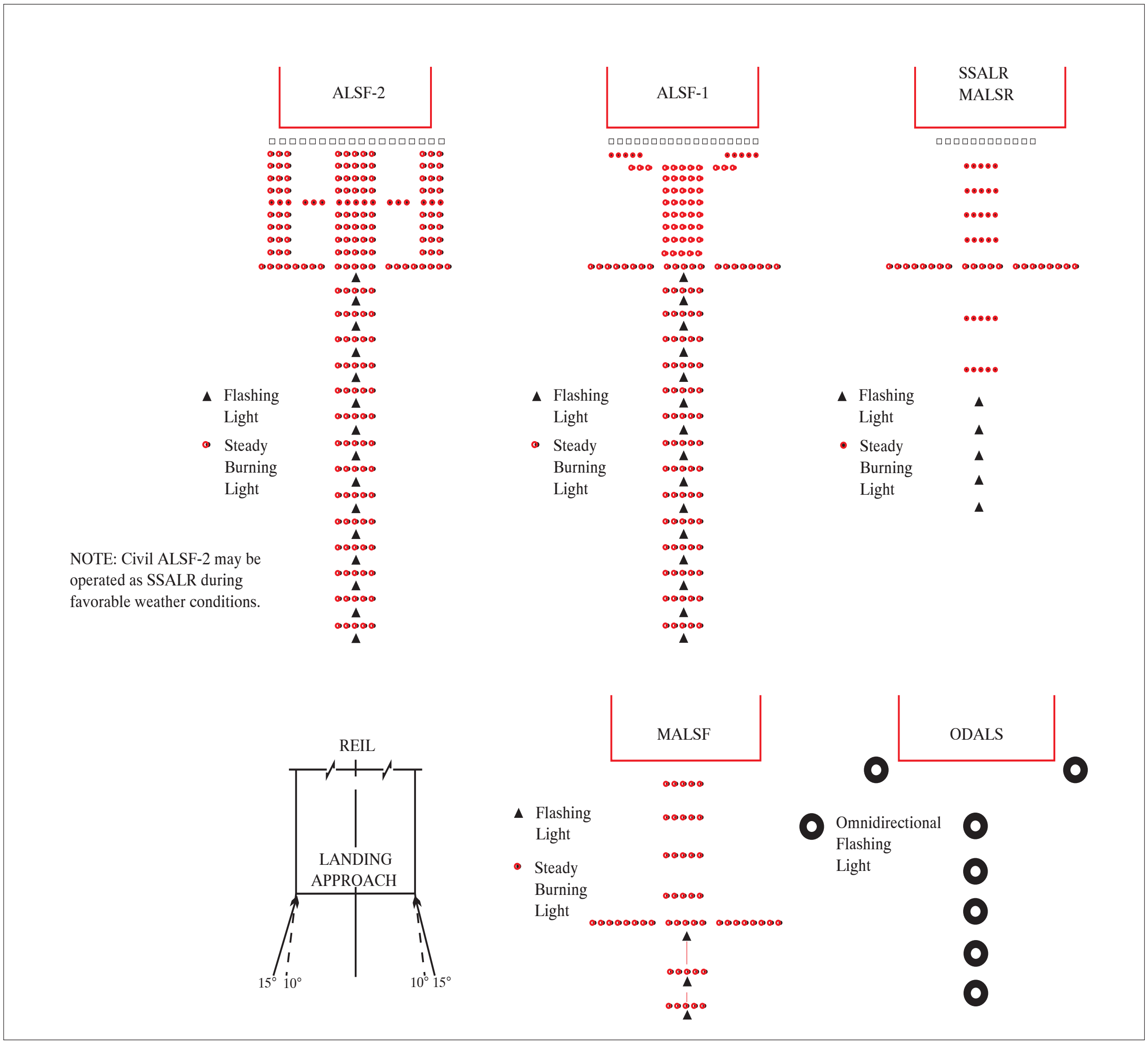


FIG AD 1.1−2
2-Bar VASI

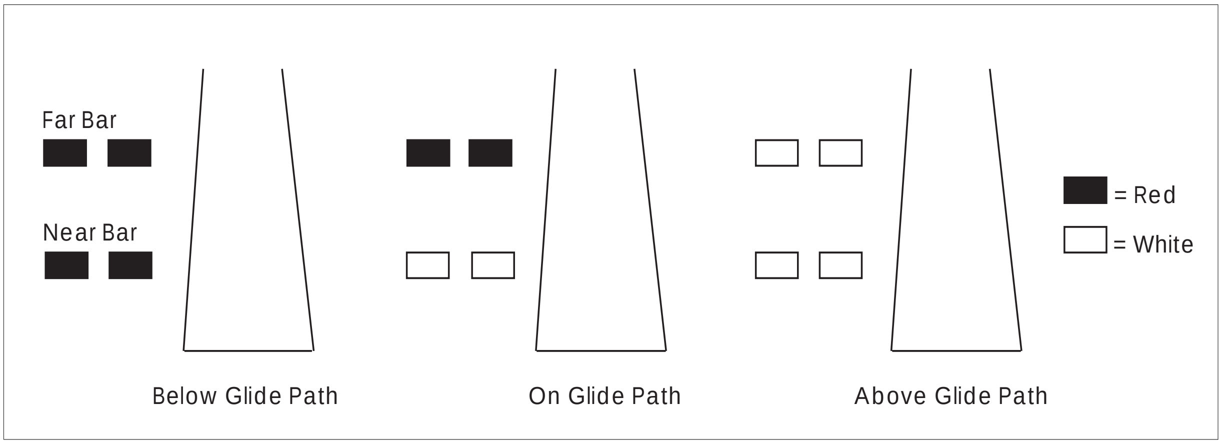


FIG AD 1.1−3
3-Bar VASI

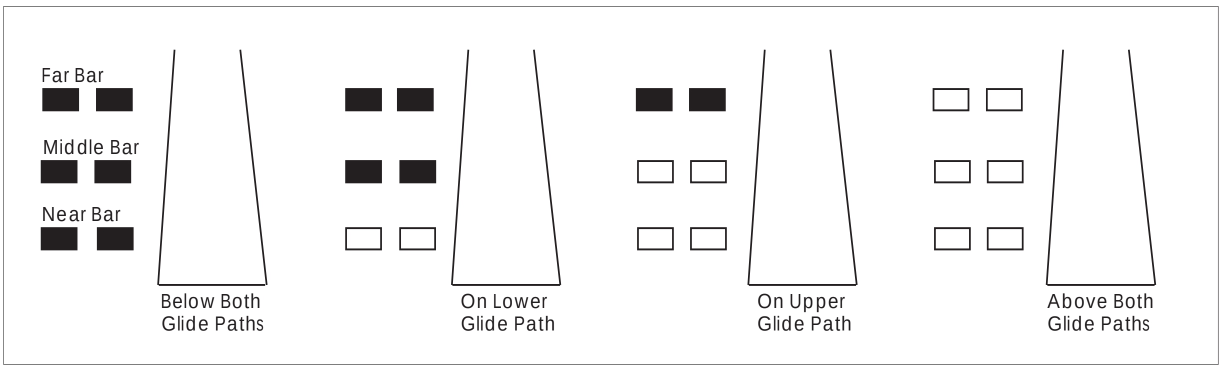


FIG AD 1.1−4
VASI Variations

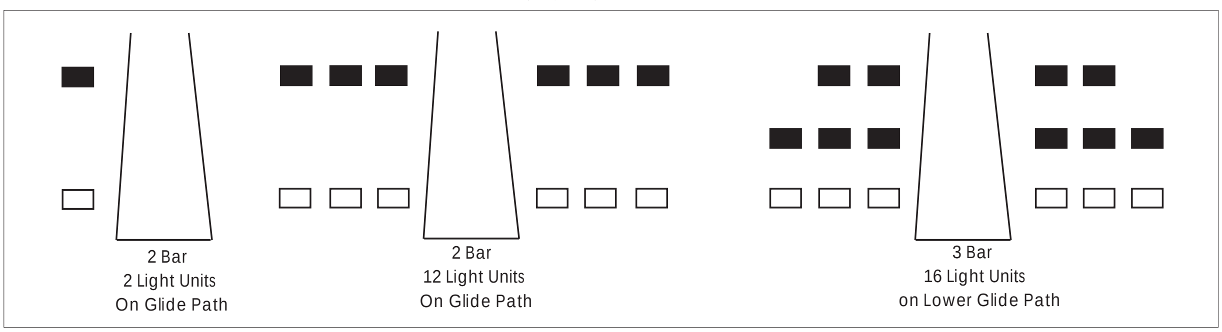


FIG AD 1.1−48

Destination Sign for Common Taxiing Route to Two Runways

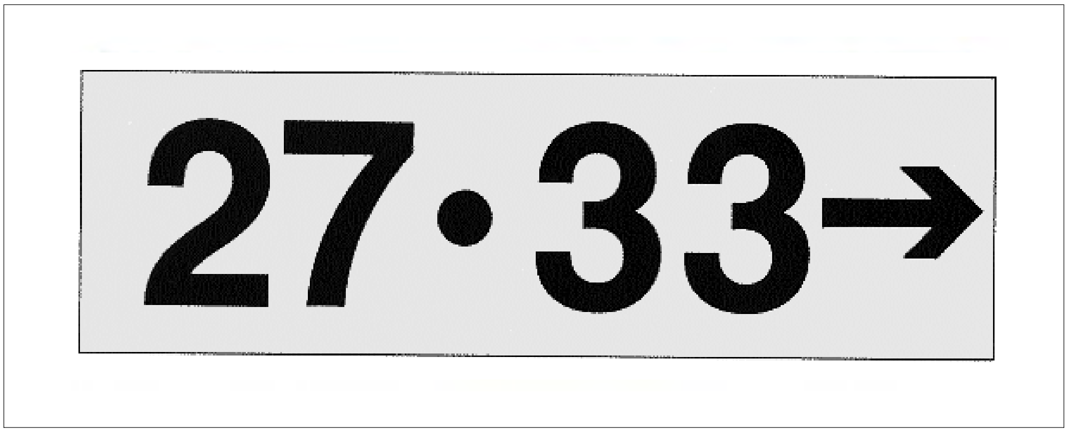


FIG AD 1.1−49

Destination Sign for Different Taxiing Routes to Two Runways

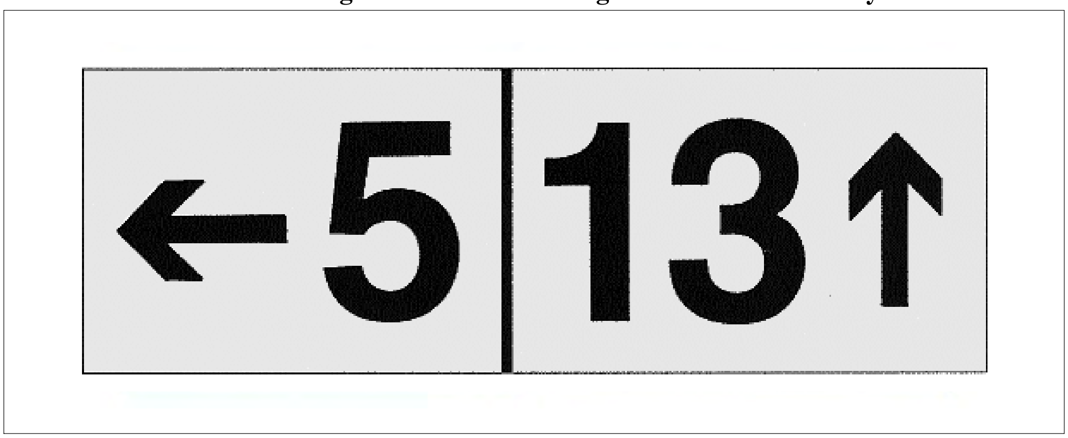


FIG AD 1.1−50

Runway Distance Remaining Sign Indicating 3,000 feet of Runway Remaining

FIG AD 1.1−51

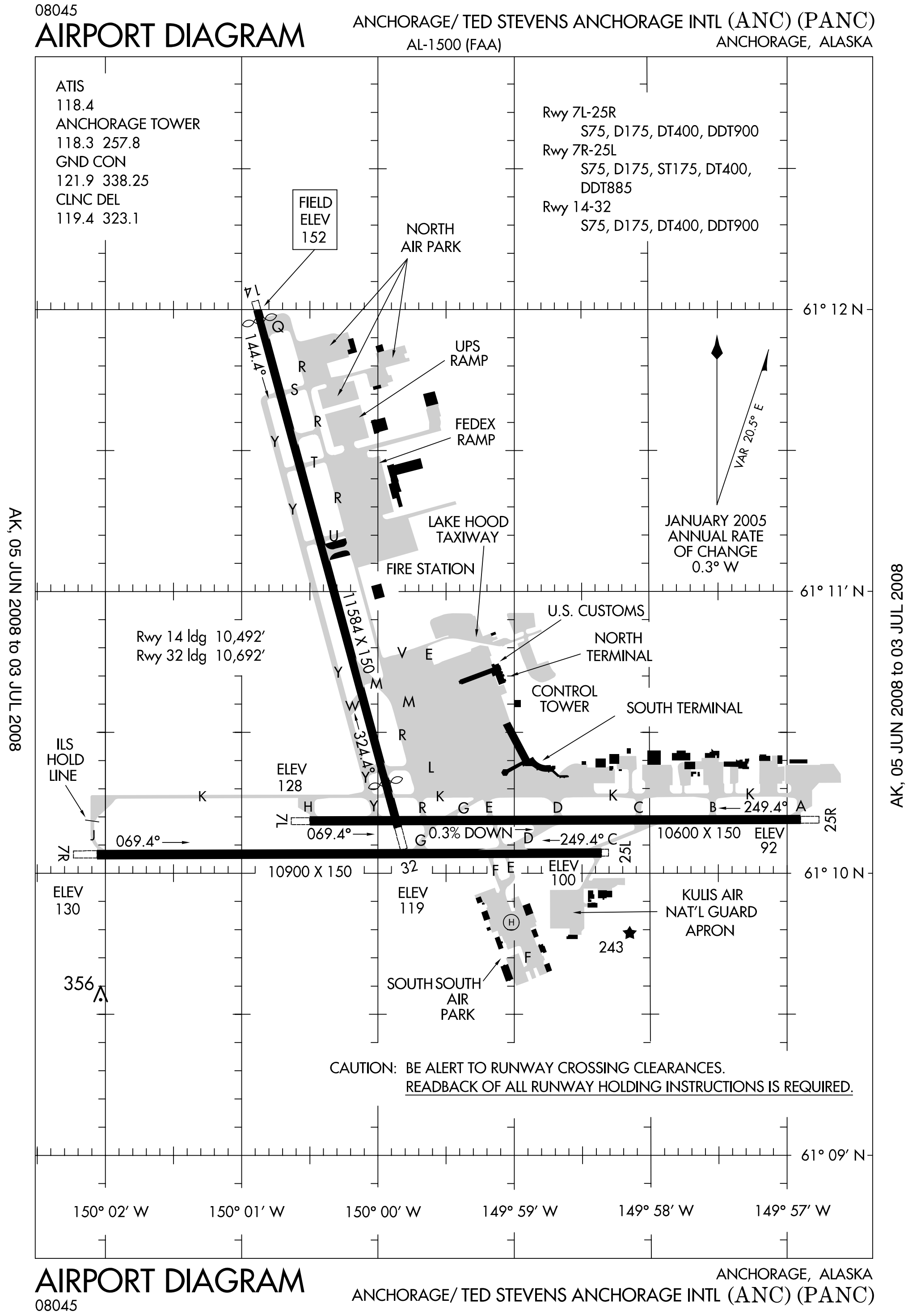
Engineered Materials Arresting System (EMAS)

ICAO ID	Location	Airport Name	Designation
Tennessee			
KMEM	Memphis	Memphis International	Regular
KBNA	Nashville	Nashville International	Regular
Texas			
KDFW	Dallas	Dallas−Fort Worth International	Regular
KELP	El Paso	El Paso International	Regular
KIAH	Houston	George Bush Intercontinental/ Houston	Regular
KLRD	Laredo	Laredo International	Regular
KSAT	San Antonio	San Antonio International	Regular
Utah			
KSLC	Salt Lake City	Salt Lake City International	Regular
Virgin Islands			
TIST	Charlotte Amalie St. Thomas	Cyril E. King	Regular
TISX	Christiansted St. Croix	Henry E Rohlsen	Regular
Washington			
KPAE	Everett	Snohomish County (Paine Field)	Alternate
KSEA	Seattle	Seattle−Tacoma International	Regular
KGEG	Spokane	Spokane International	Alternate
Wisconsin			
KMKE	Milwaukee	General Mitchell International	Regular

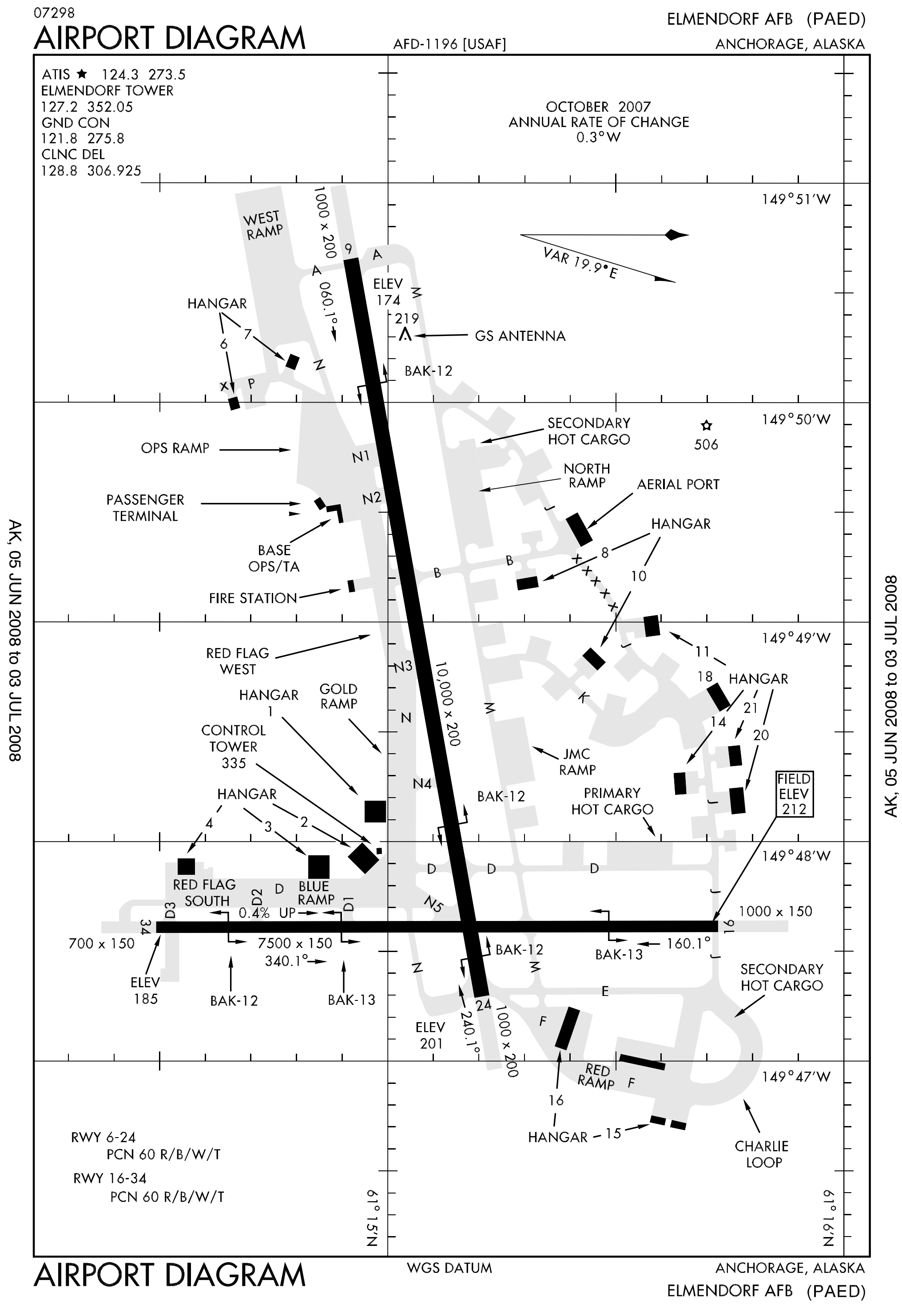
1.1 Diagrams of these airports, arranged alphabetically by state and in the order listed above, are on the pages following. The most up−to−date diagrams of these and other U.S. airports are in the Terminal Procedures Publication (TPP). For additional information on these airports, see the U.S. Airport/ Facility Directory (A/FD).

1.2 Both the A/FD and TPP may be purchased from:
National Aeronautical Charting Office (NACO)
Distribution Division,
Federal Aviation Administration
6303 Ivy Lane, Suite 400
Greenbelt, MD 20770
Telephone: 301−436−8301/6990
301−436−6829 (FAX)
e−mail: 9−AMC−Chartsales@faa.gov

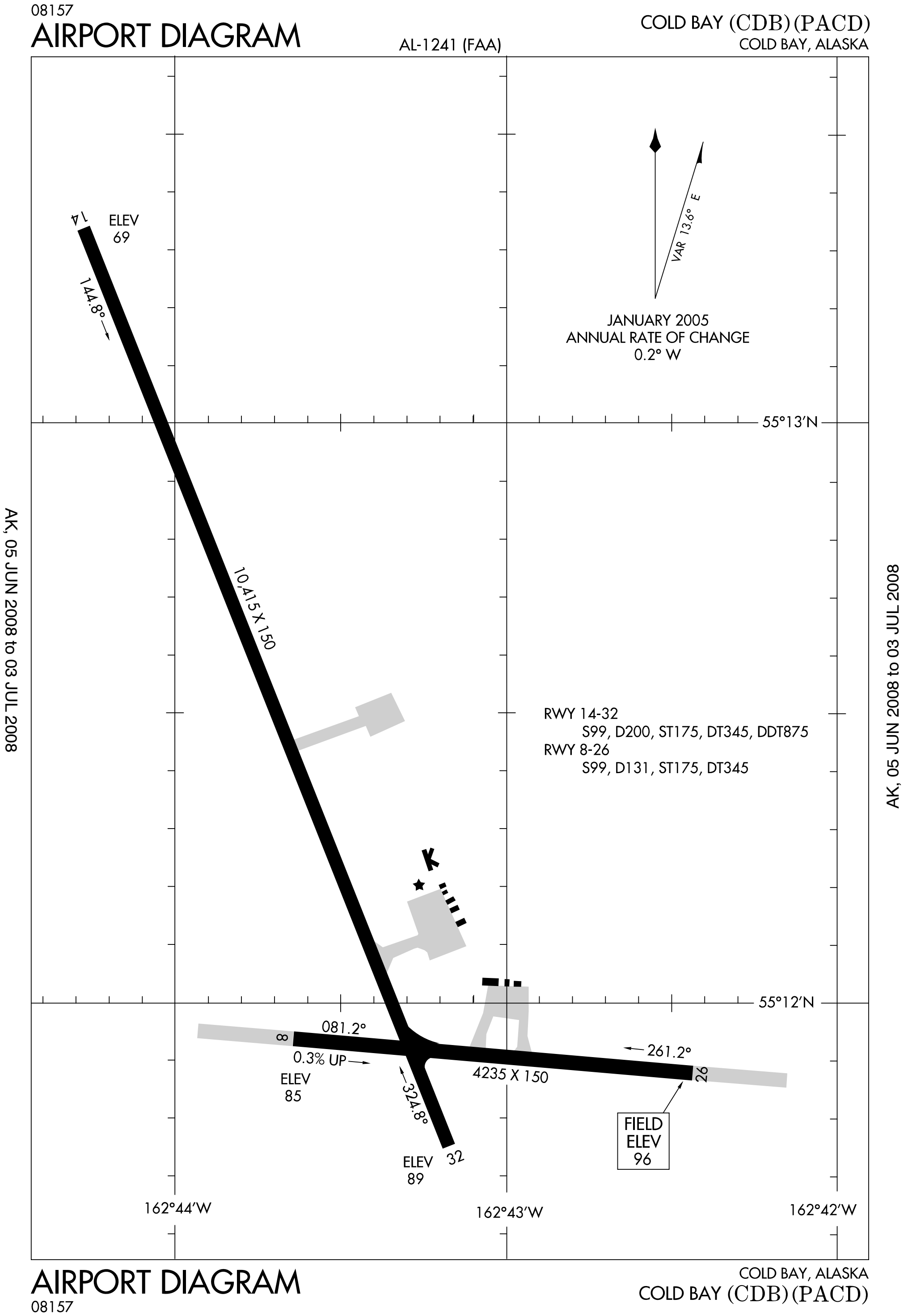
Anchorage, Alaska
Ted Stevens Anchorage International
ICAO Identifier PANC



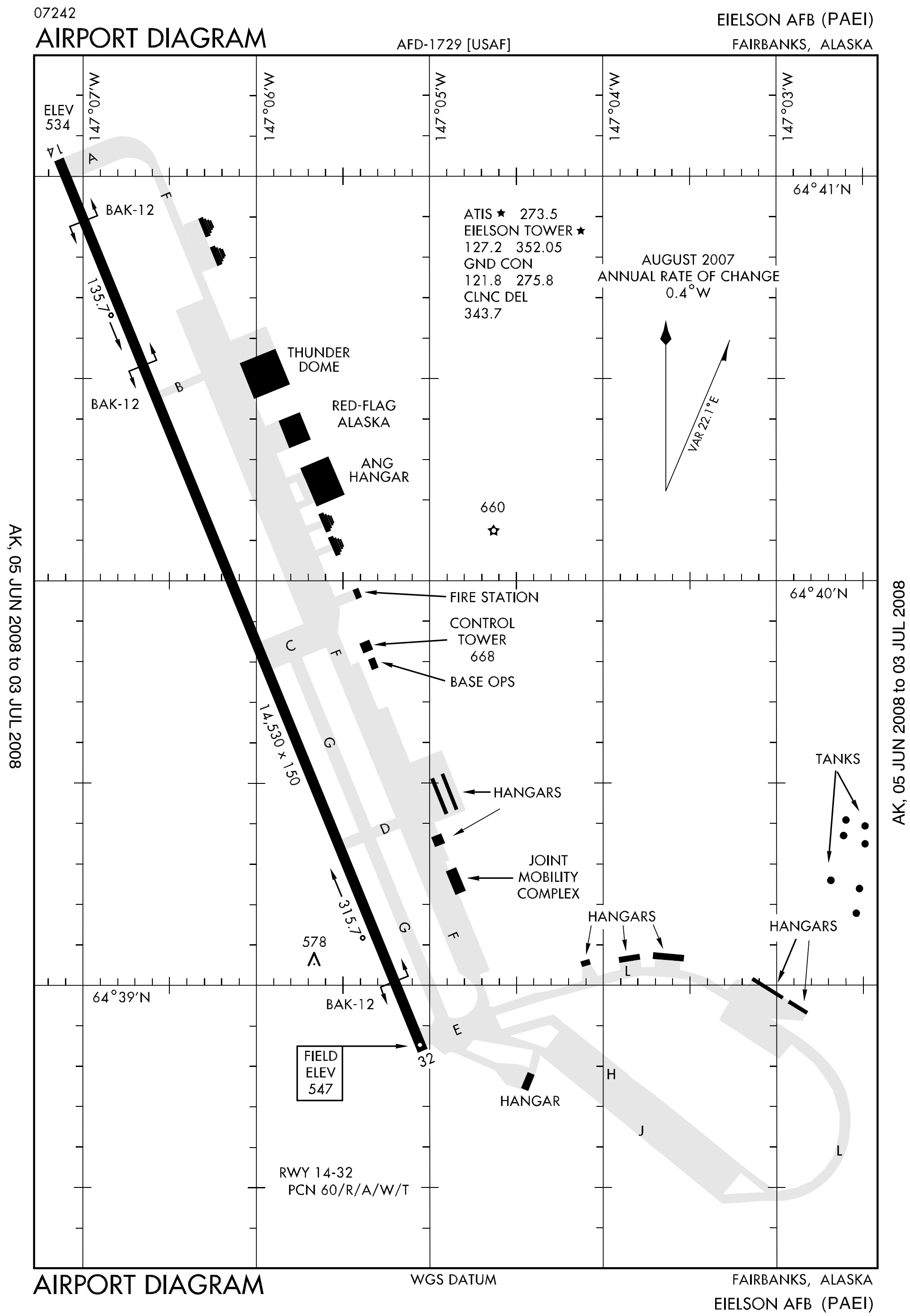
Anchorage, Alaska
Elmendorf AFB
ICAO Identifier PAED



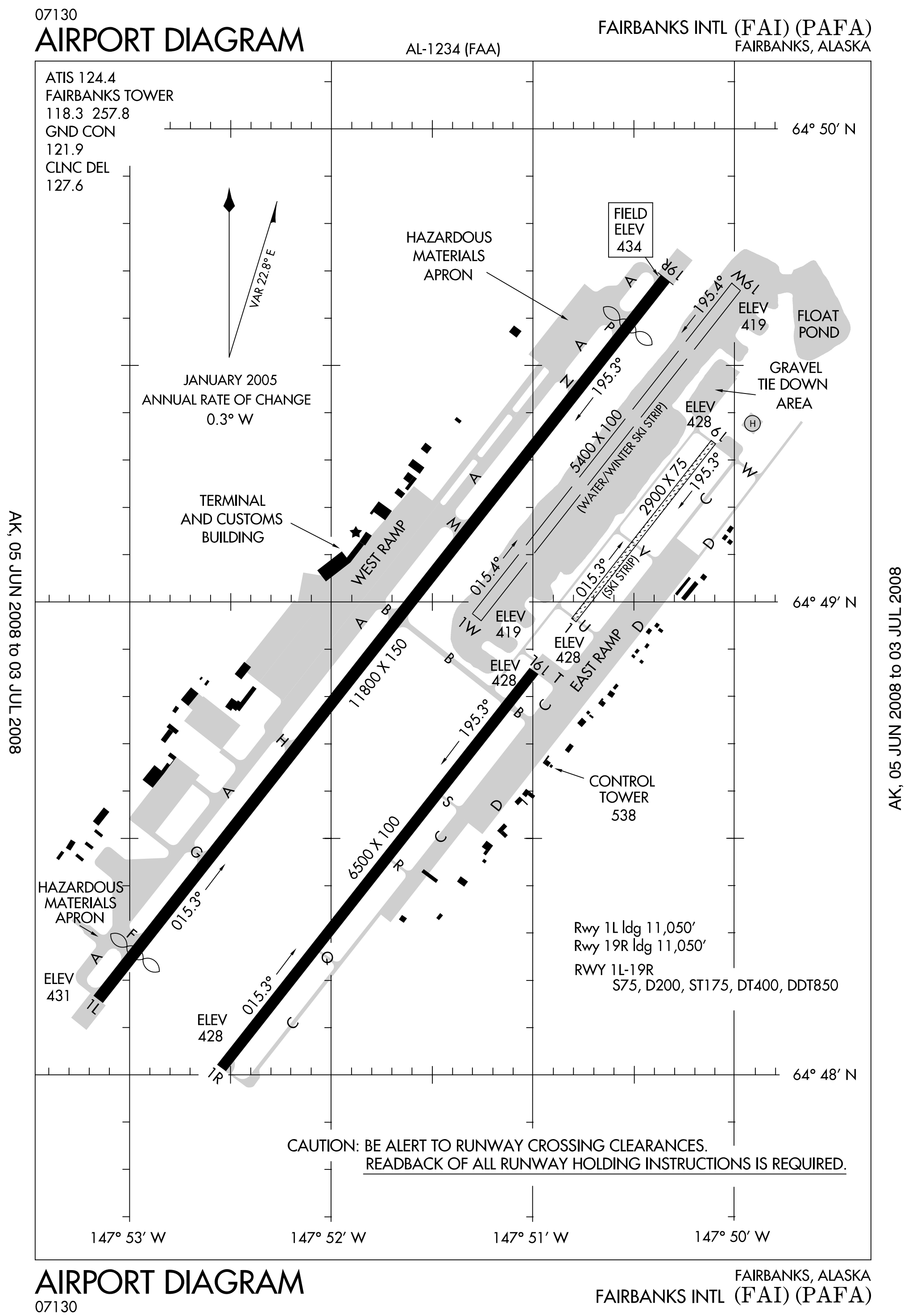
Cold Bay, Alaska
Cold Bay
ICAO Identifier PACD



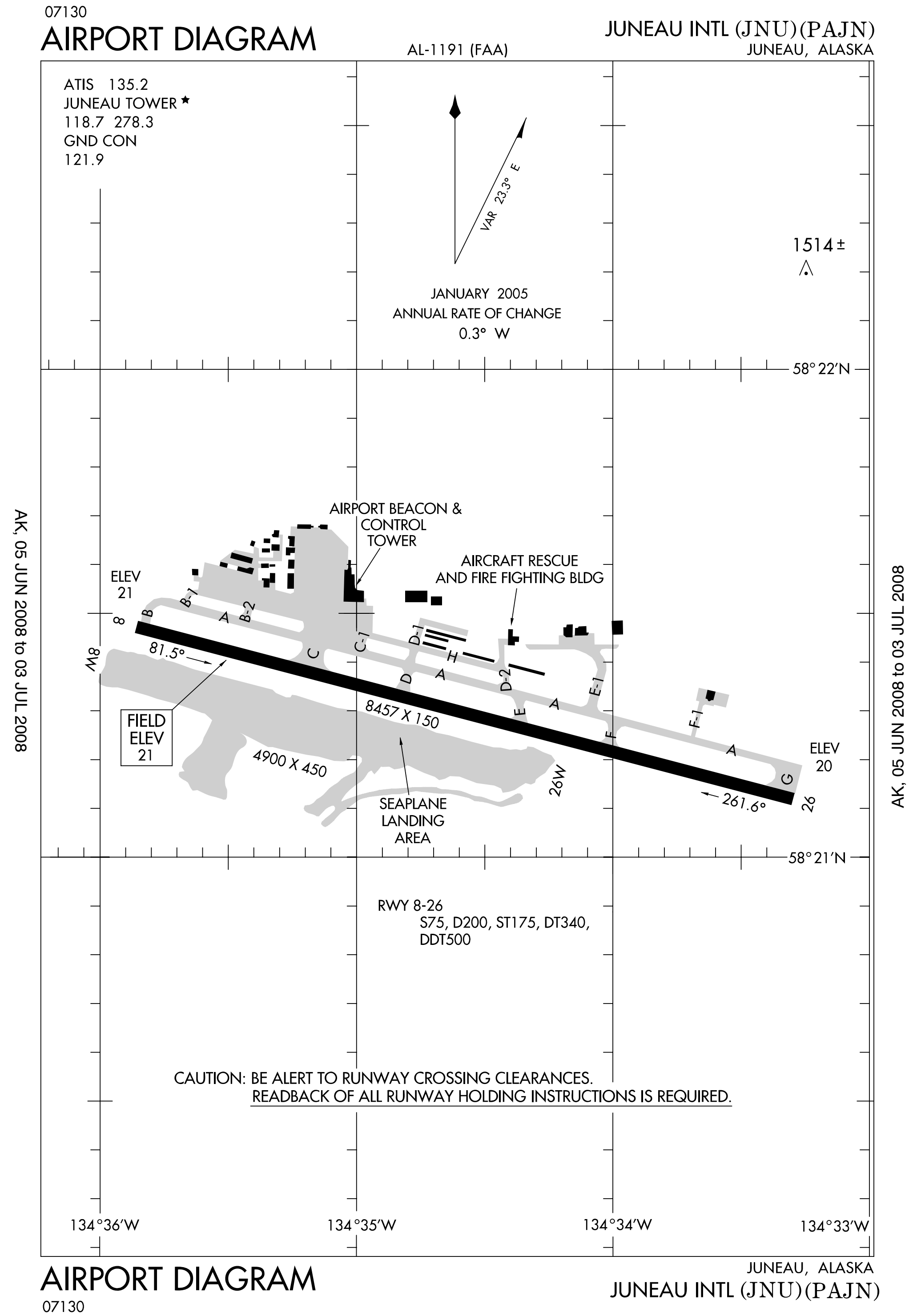
Fairbanks, Alaska
Eielson AFB
ICAO Identifier PAEI



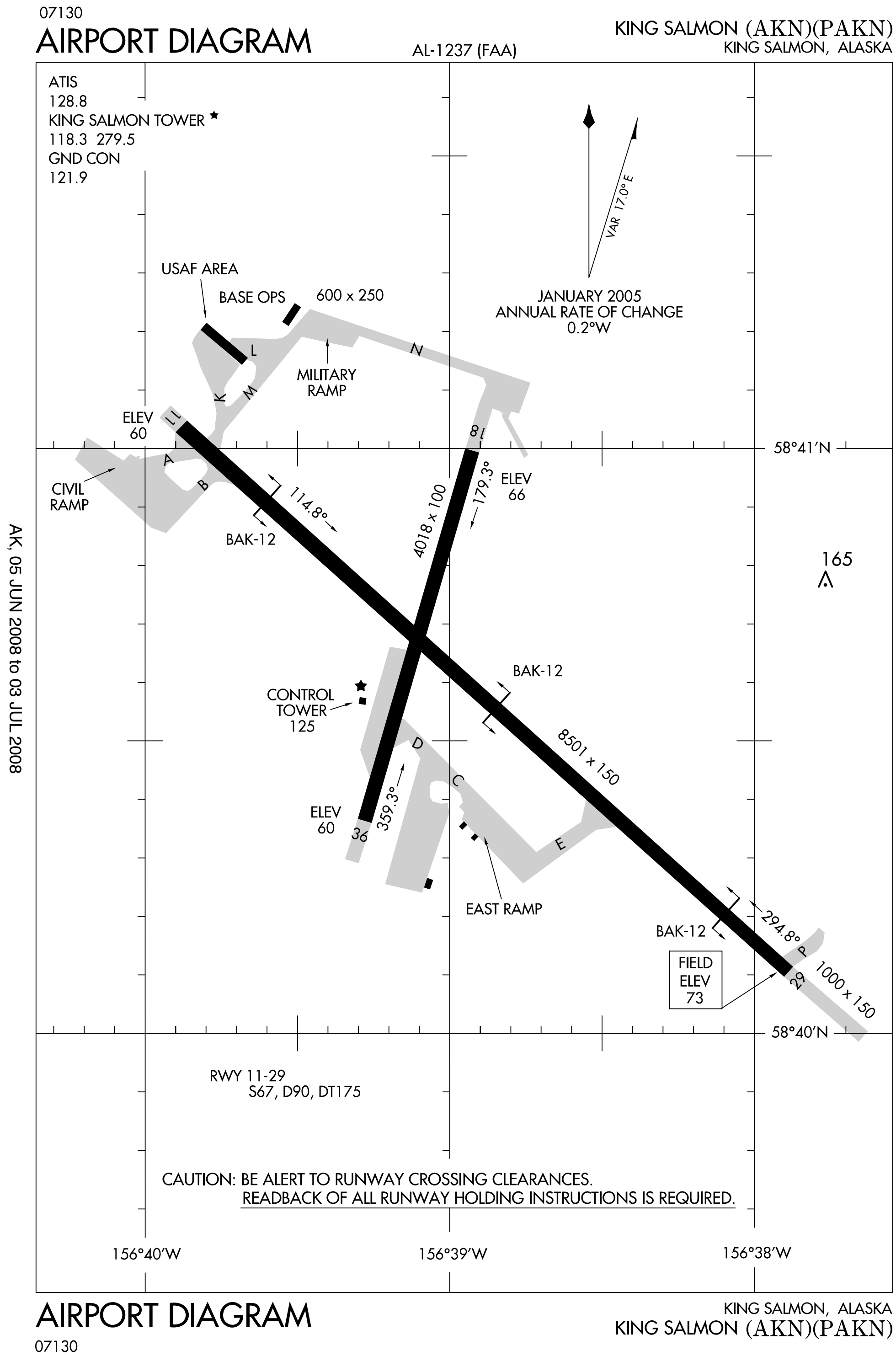
Fairbanks, Alaska
Fairbanks International
ICAO Identifier PAFA



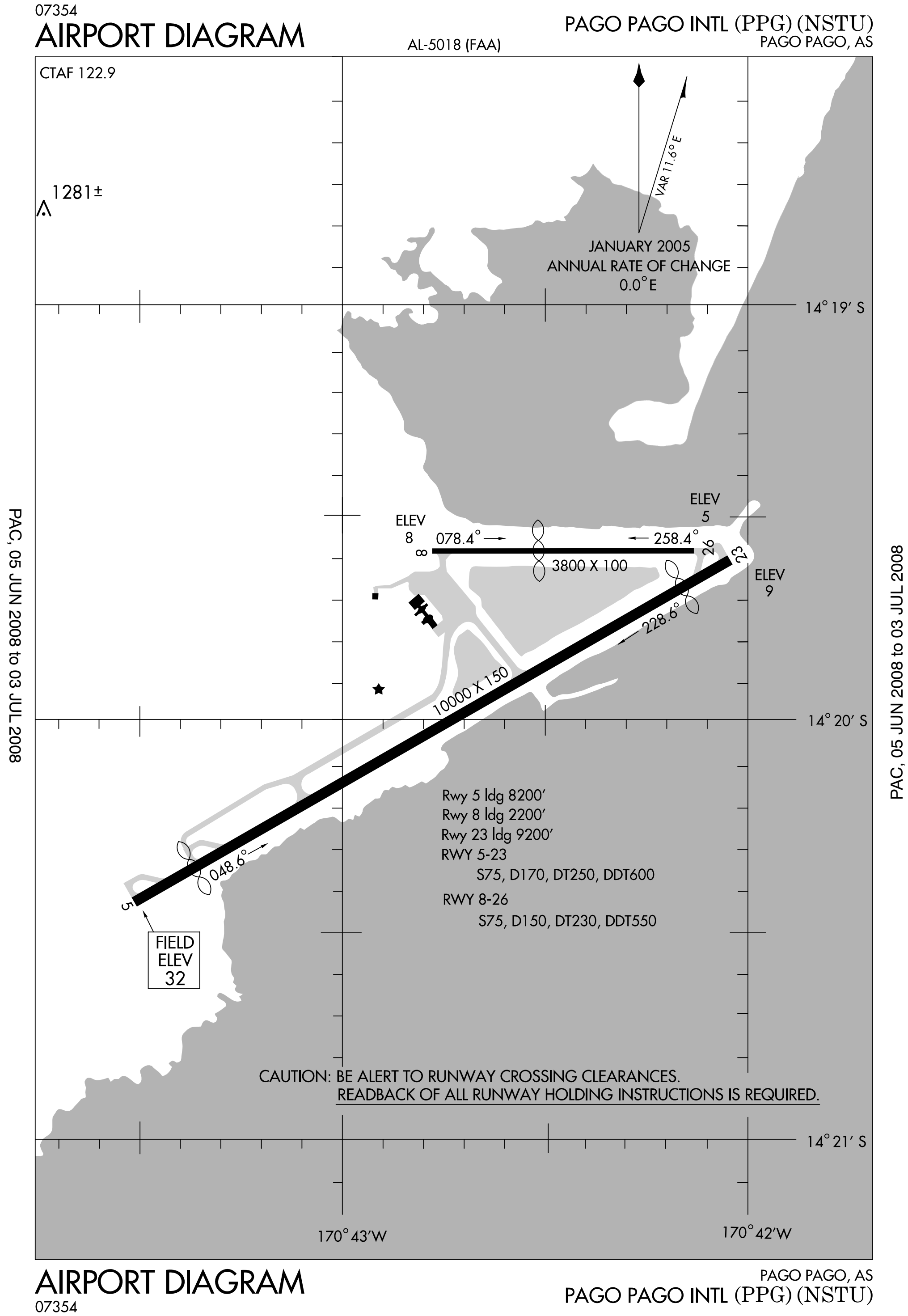
Juneau, Alaska
Juneau International
ICAO Identifier PAJN



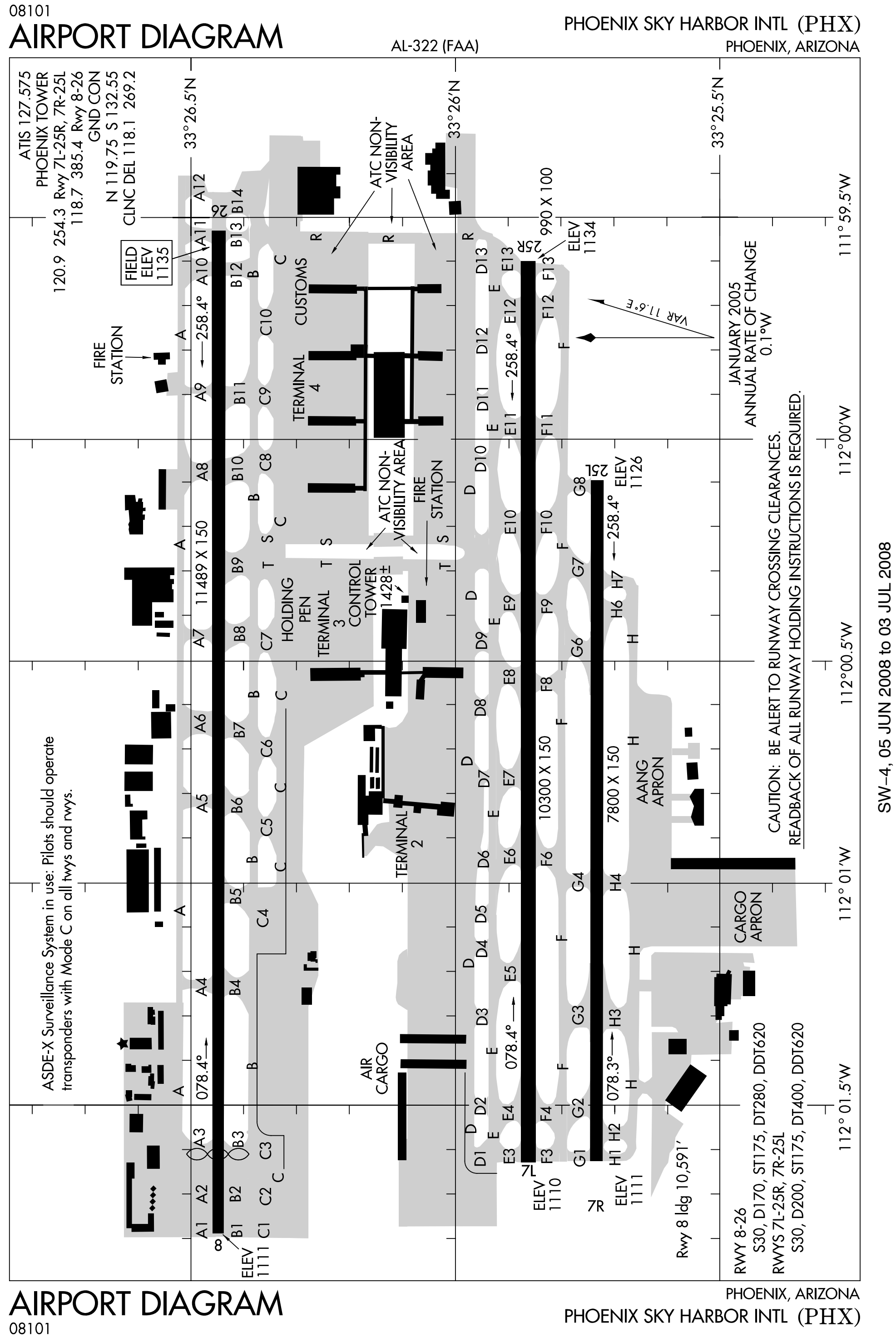
King Salmon, Alaska
King Salmon
ICAO Identifier PAKN



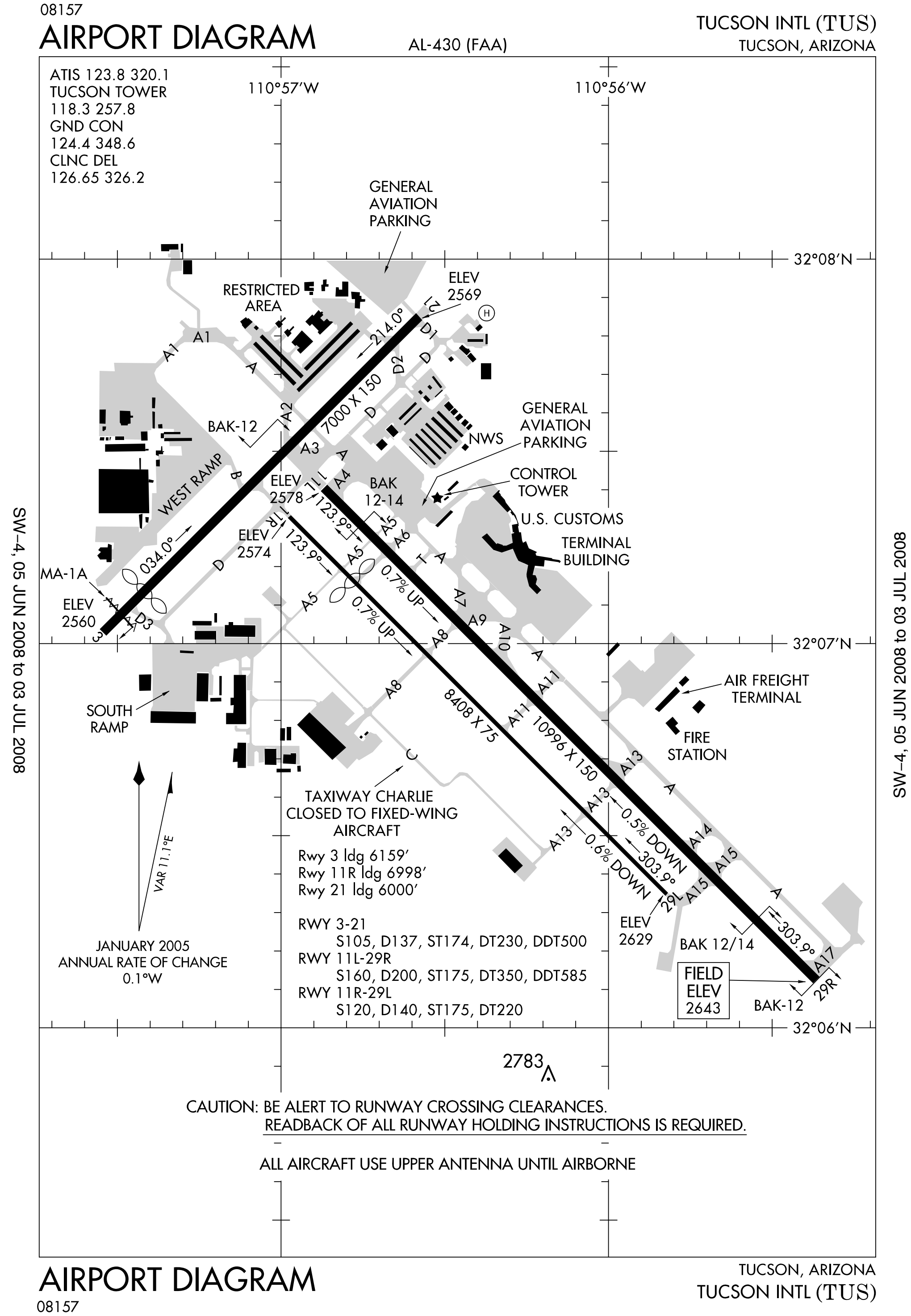
Pago Pago, American Samoa
Pago Pago/International
ICAO Identifier NSTU



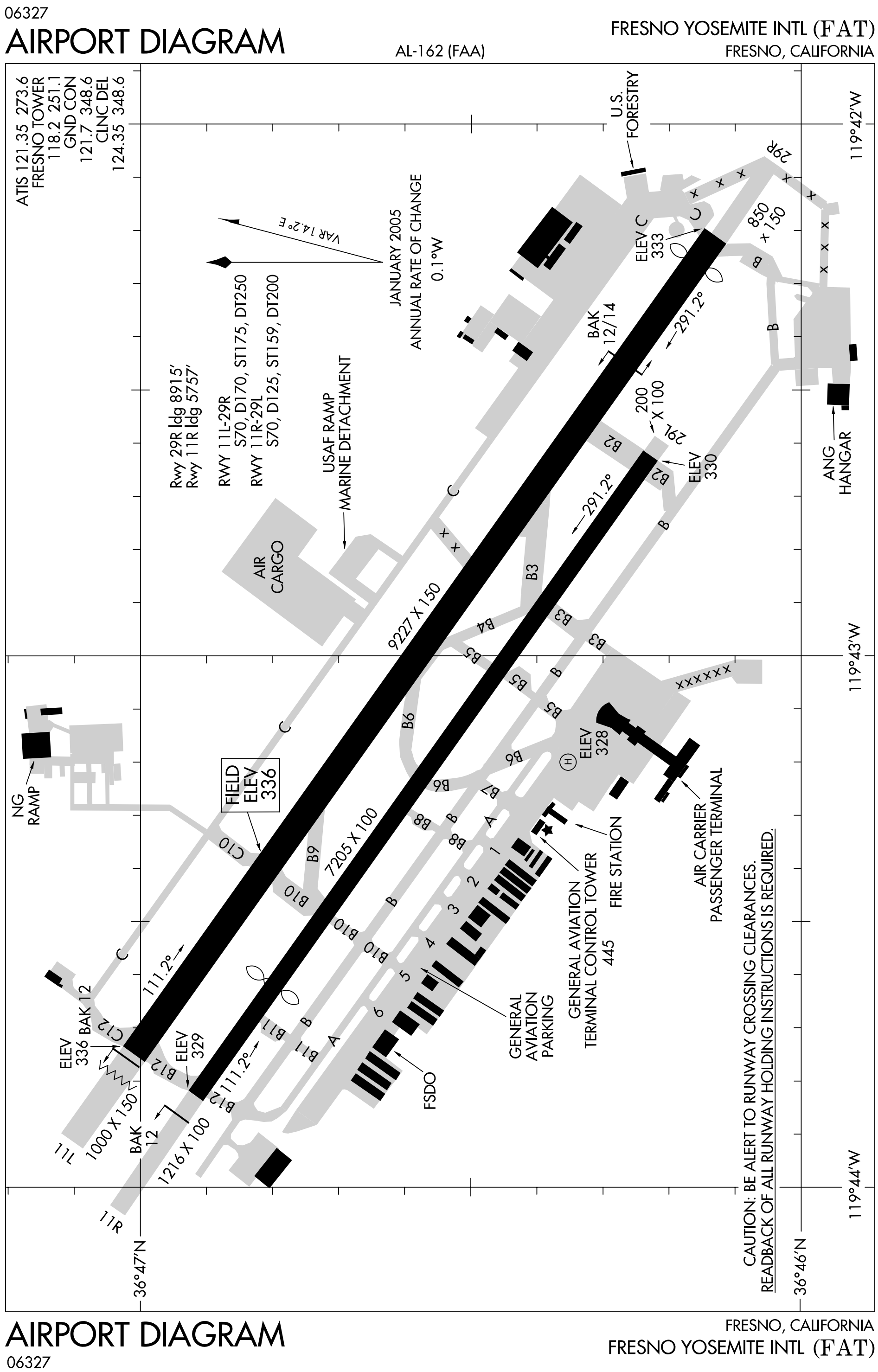
Phoenix, Arizona
Phoenix Sky Harbor International
ICAO Identifier KPHX



Tucson, Arizona
Tucson International
ICAO Identifier KTUS



Fresno, California
Fresno Yosemite International
ICAO Identifier KFAT

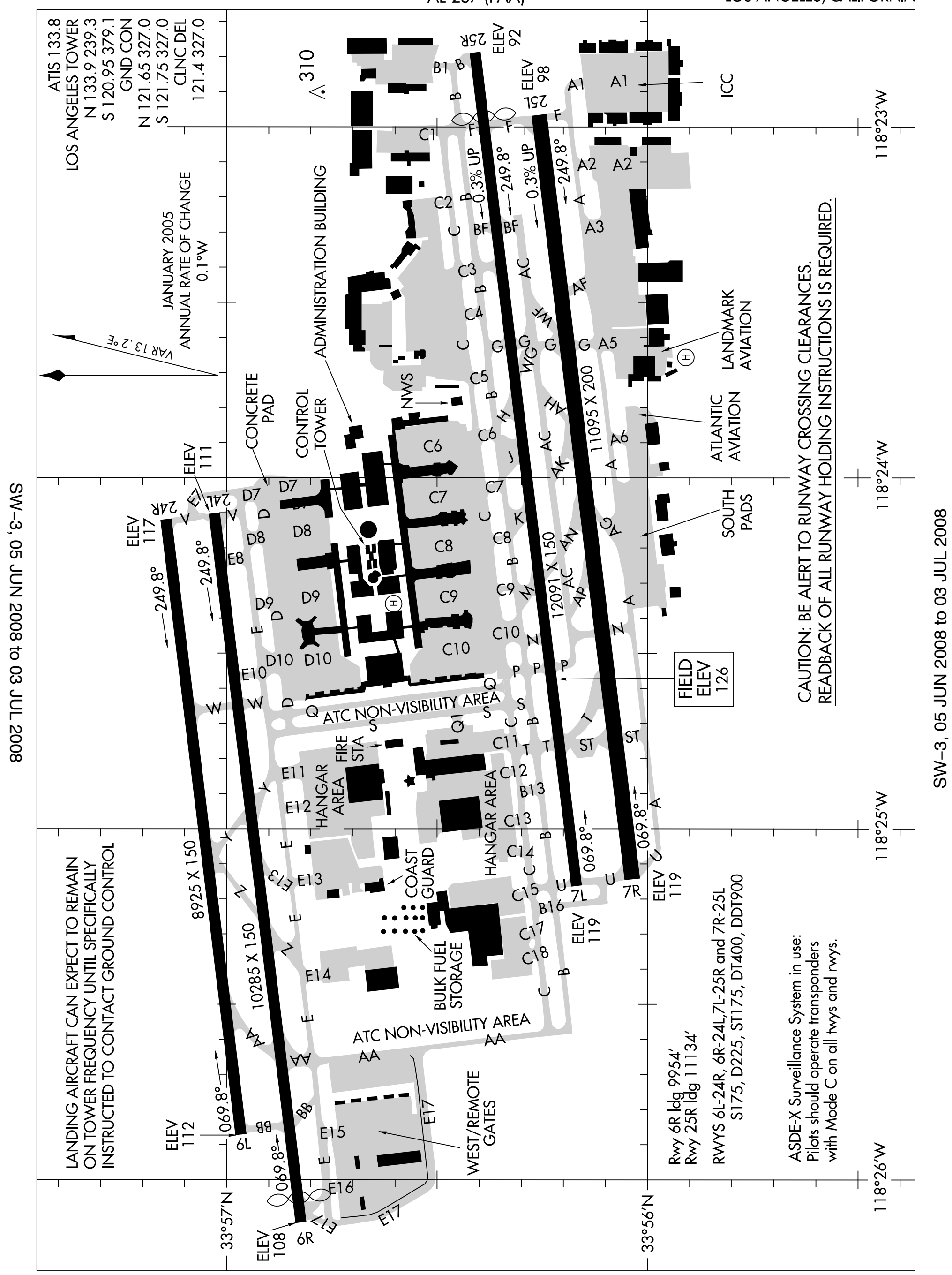


Los Angeles, California
Los Angeles International
ICAO Identifier KLAX

08157
AIRPORT DIAGRAM

AL-237 (FAA)

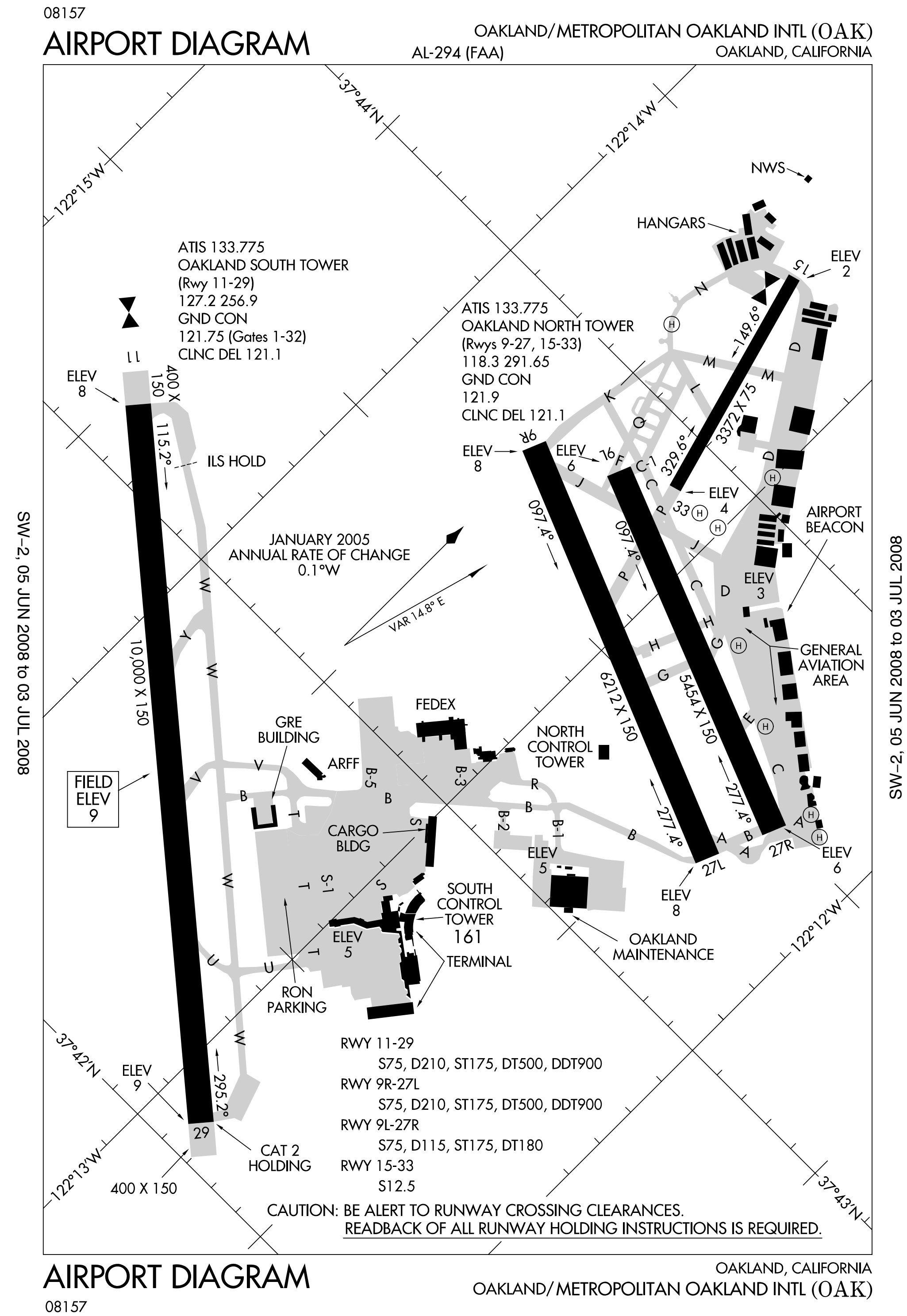
LOS ANGELES INTL (LAX)
LOS ANGELES, CALIFORNIA



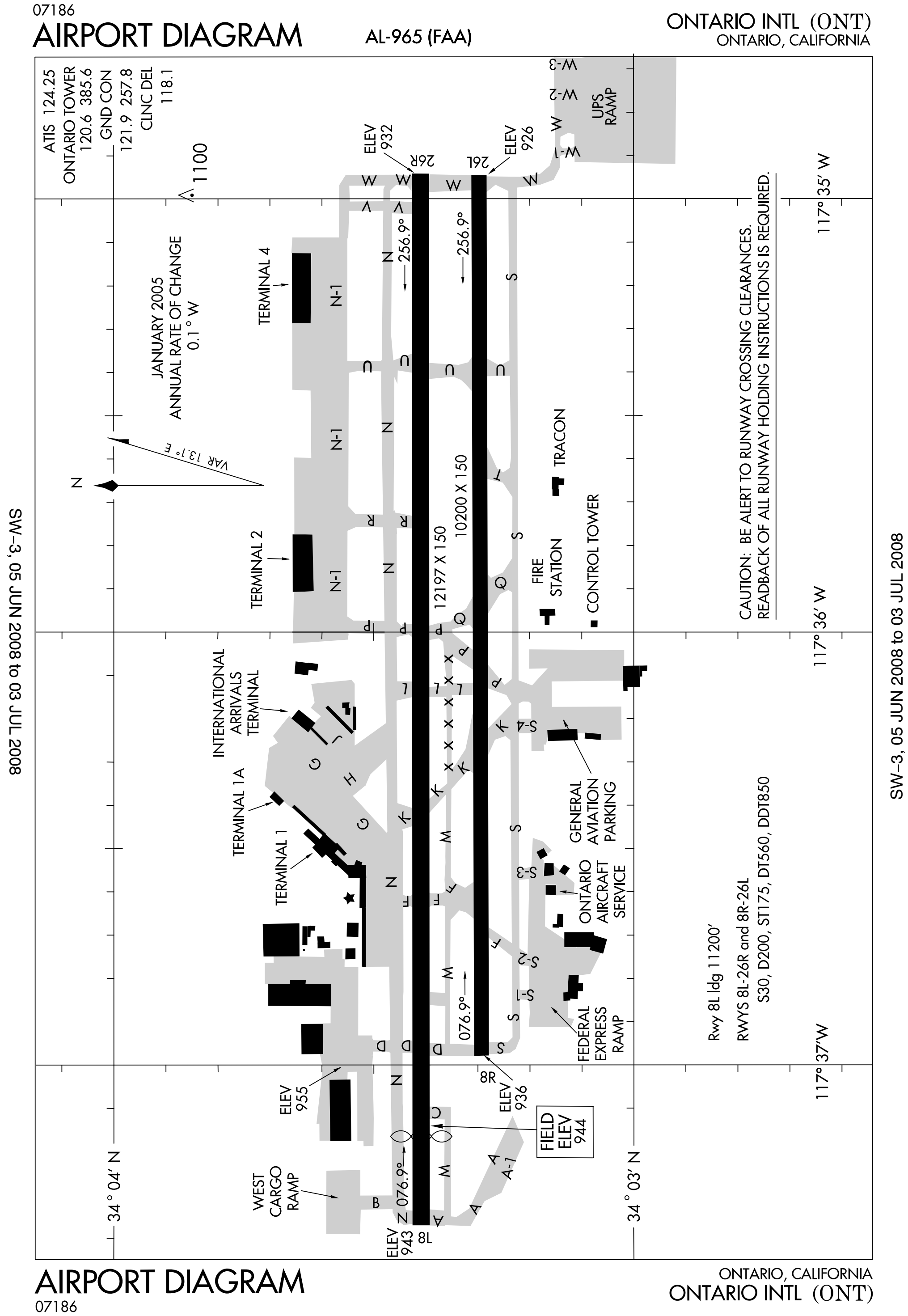
AIRPORT DIAGRAM
08157

LOS ANGELES, CALIFORNIA
LOS ANGELES INTL (LAX)

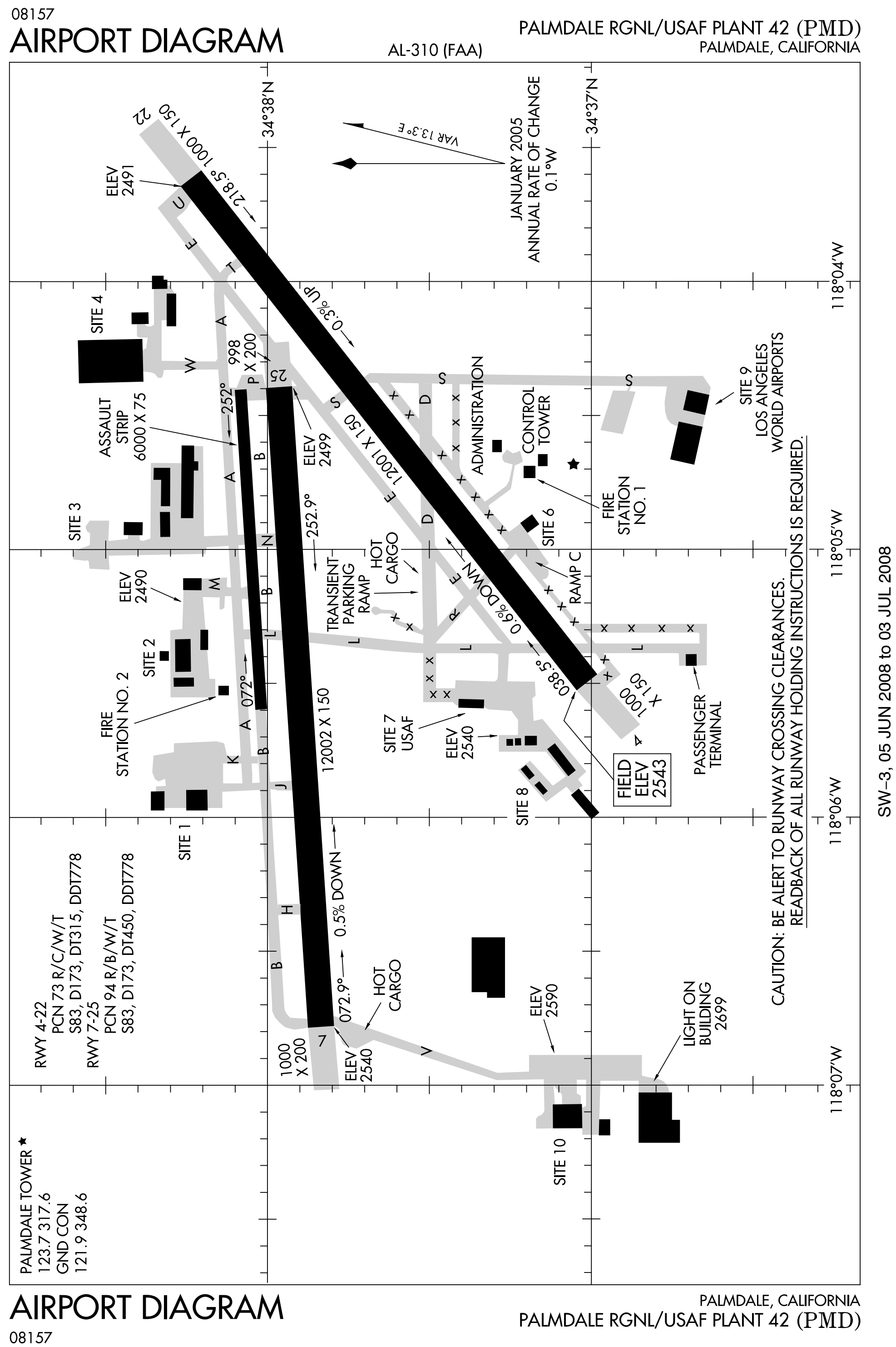
Oakland, California
Metropolitan Oakland International
ICAO Identifier KOAK



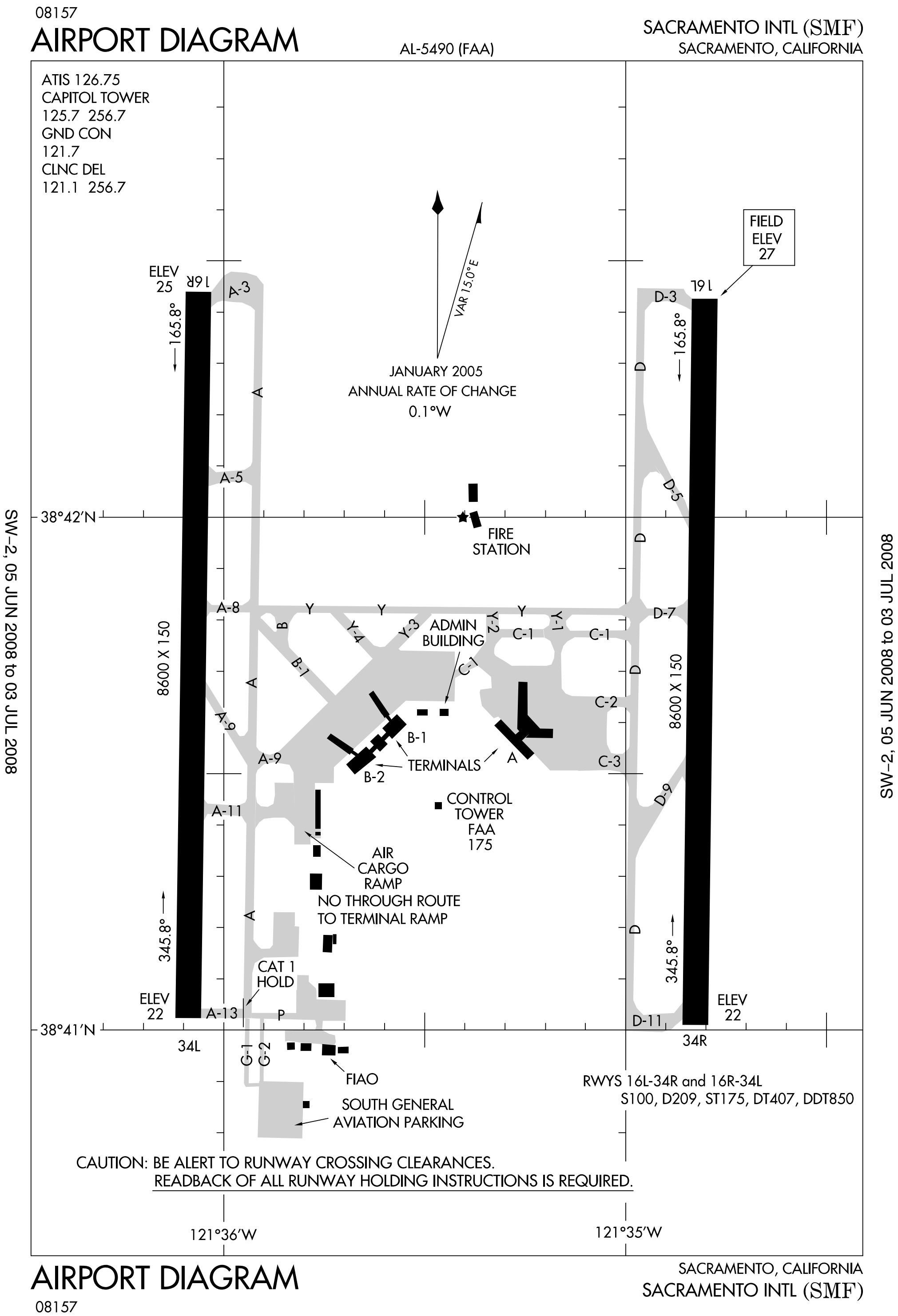
Ontario, California
Ontario International
ICAO Identifier KONT



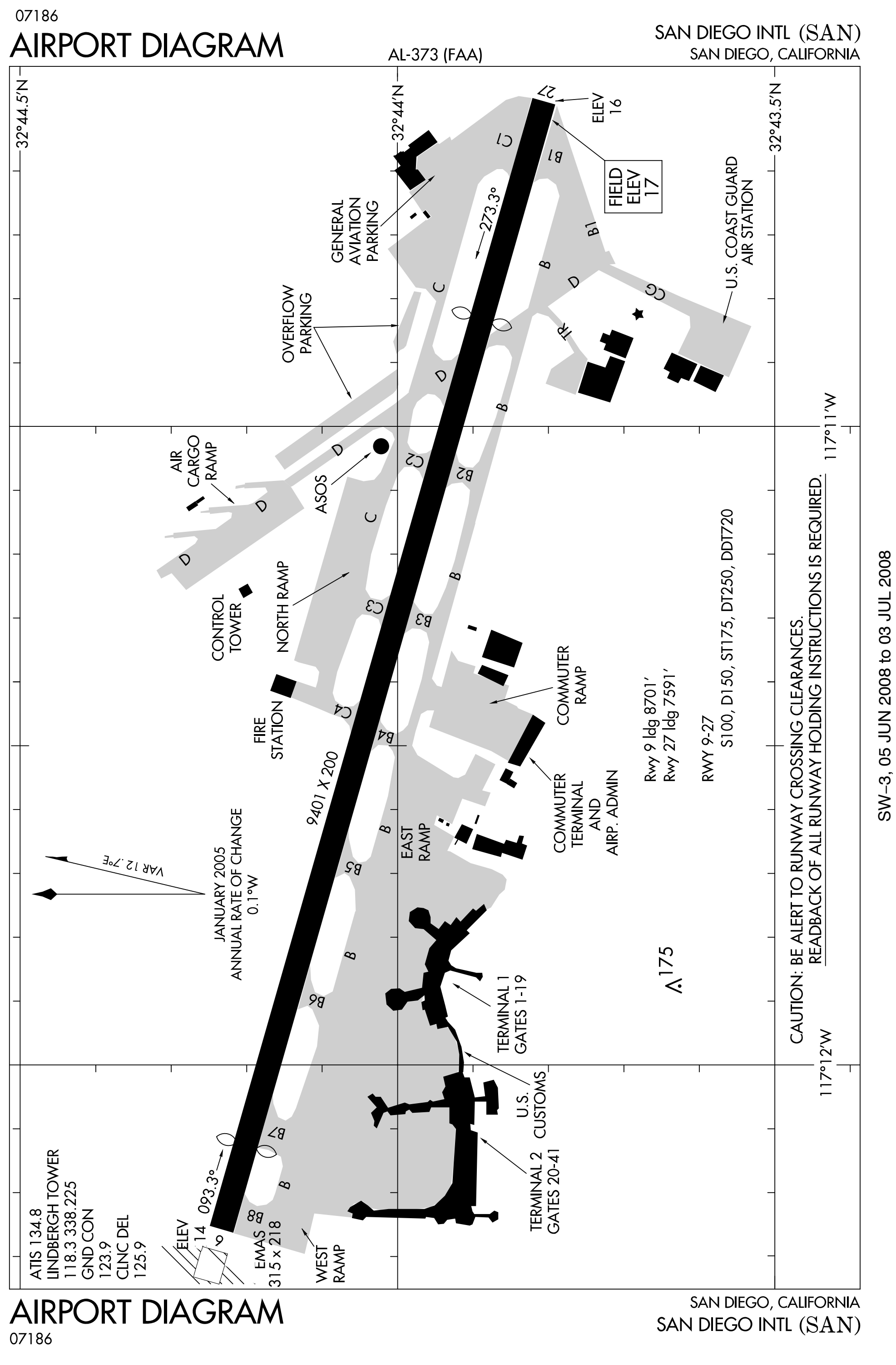
Palmdale, California
Palmdale Production Flight/Test Installation
AF Plant #42
ICAO Identifier KPMD



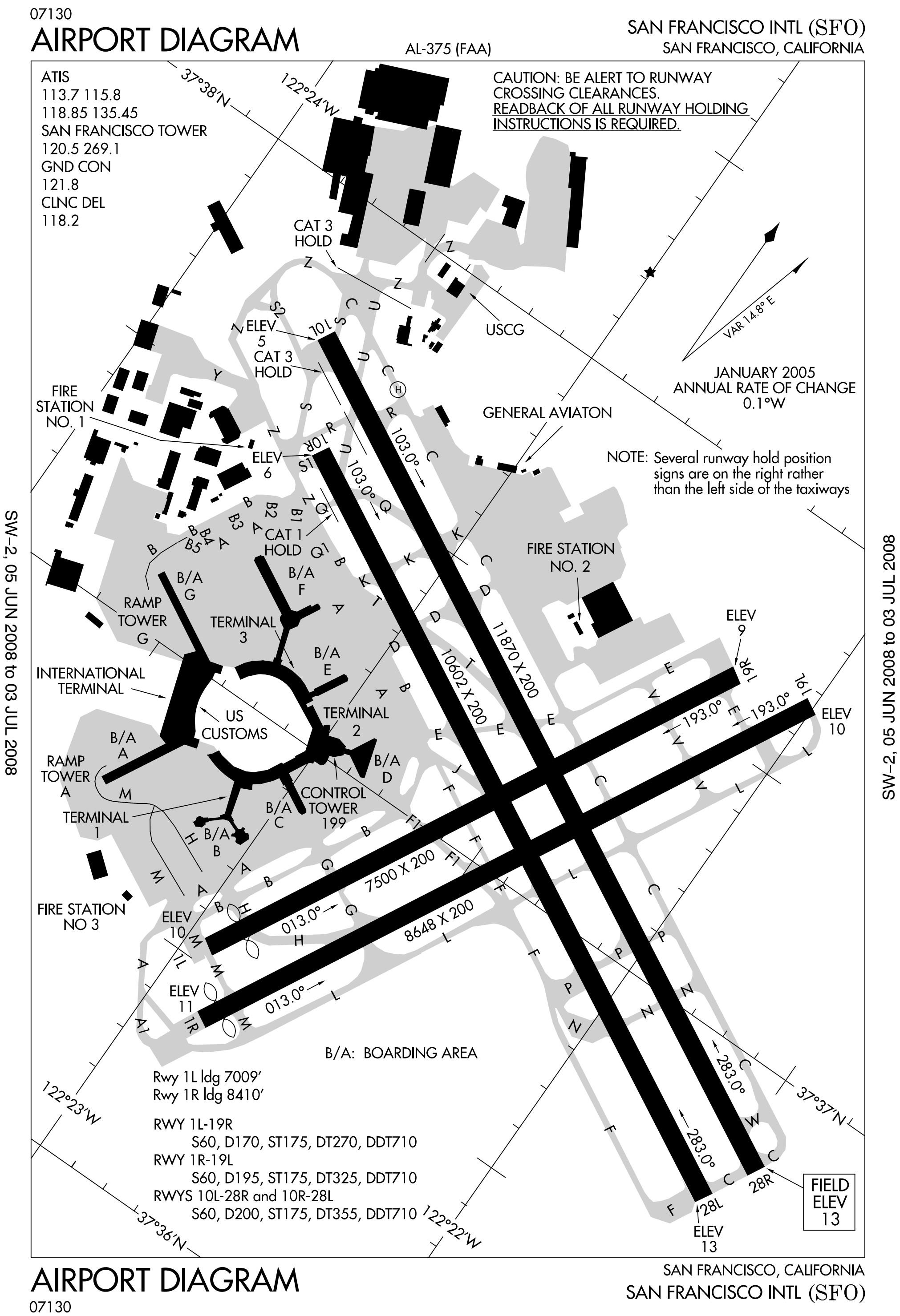
Sacramento, California
Sacramento International
ICAO Identifier KSMF



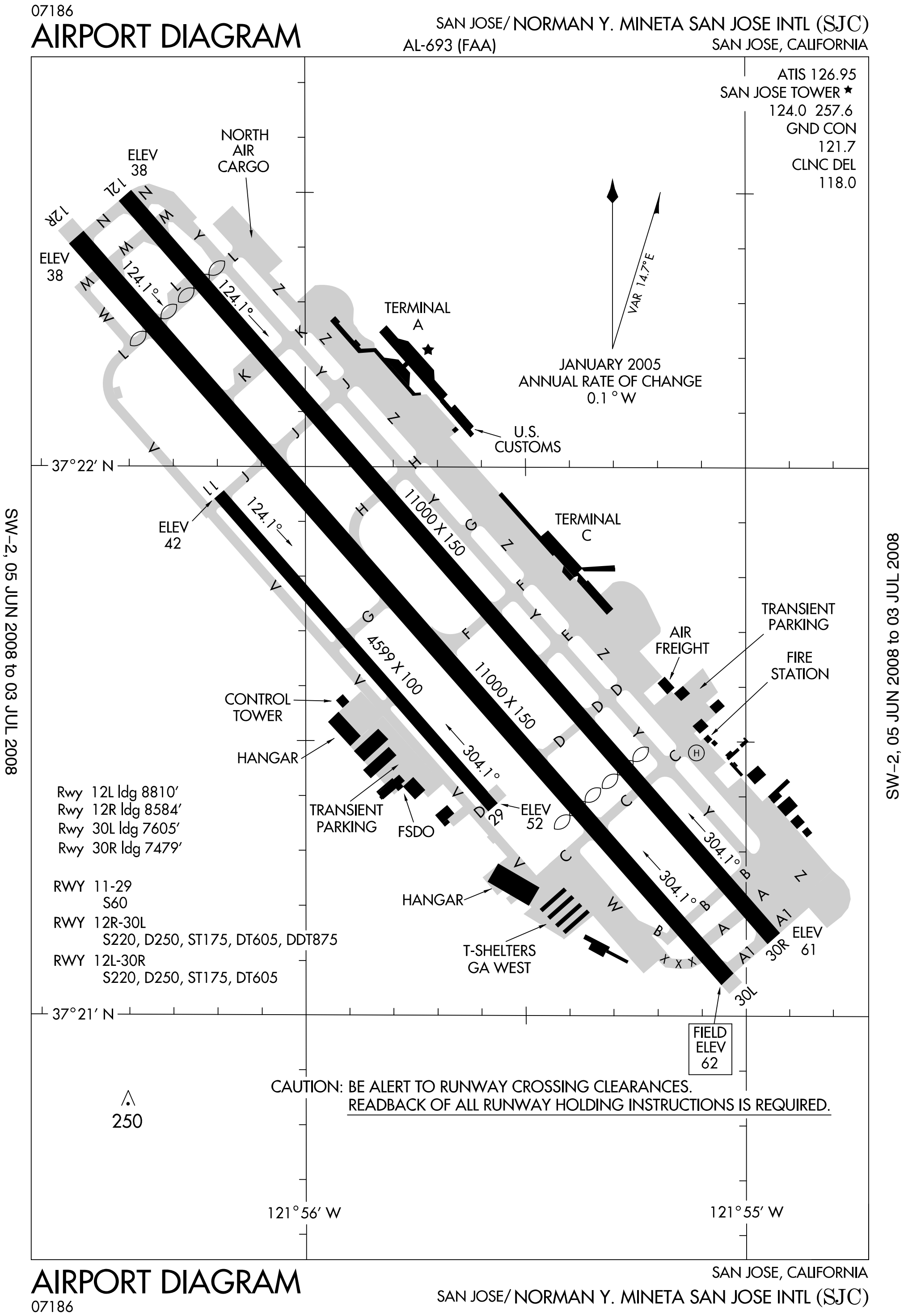
San Diego, California
San Diego International
ICAO Identifier KSAN



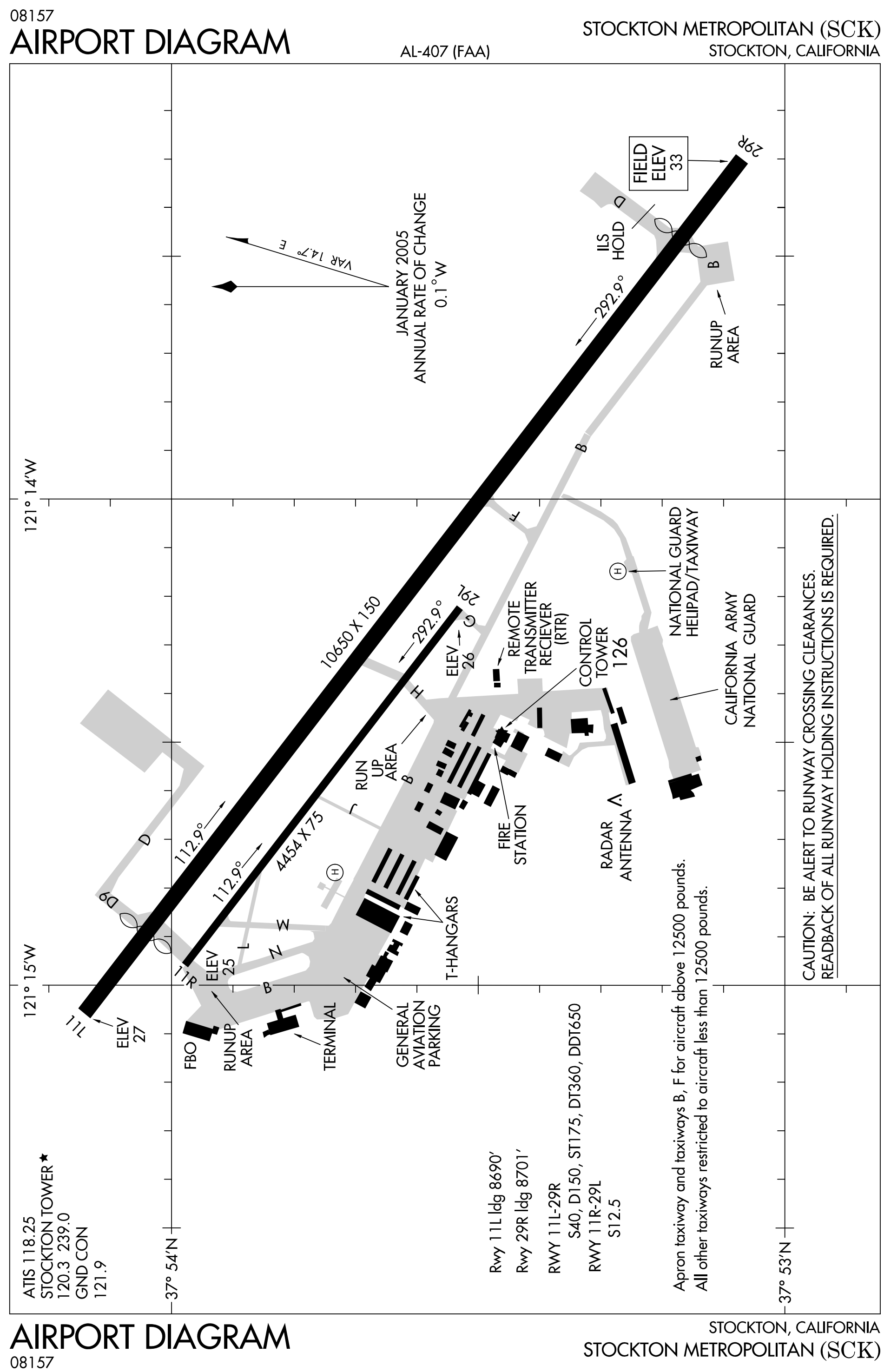
San Francisco, California
San Francisco International
ICAO Identifier KSFO



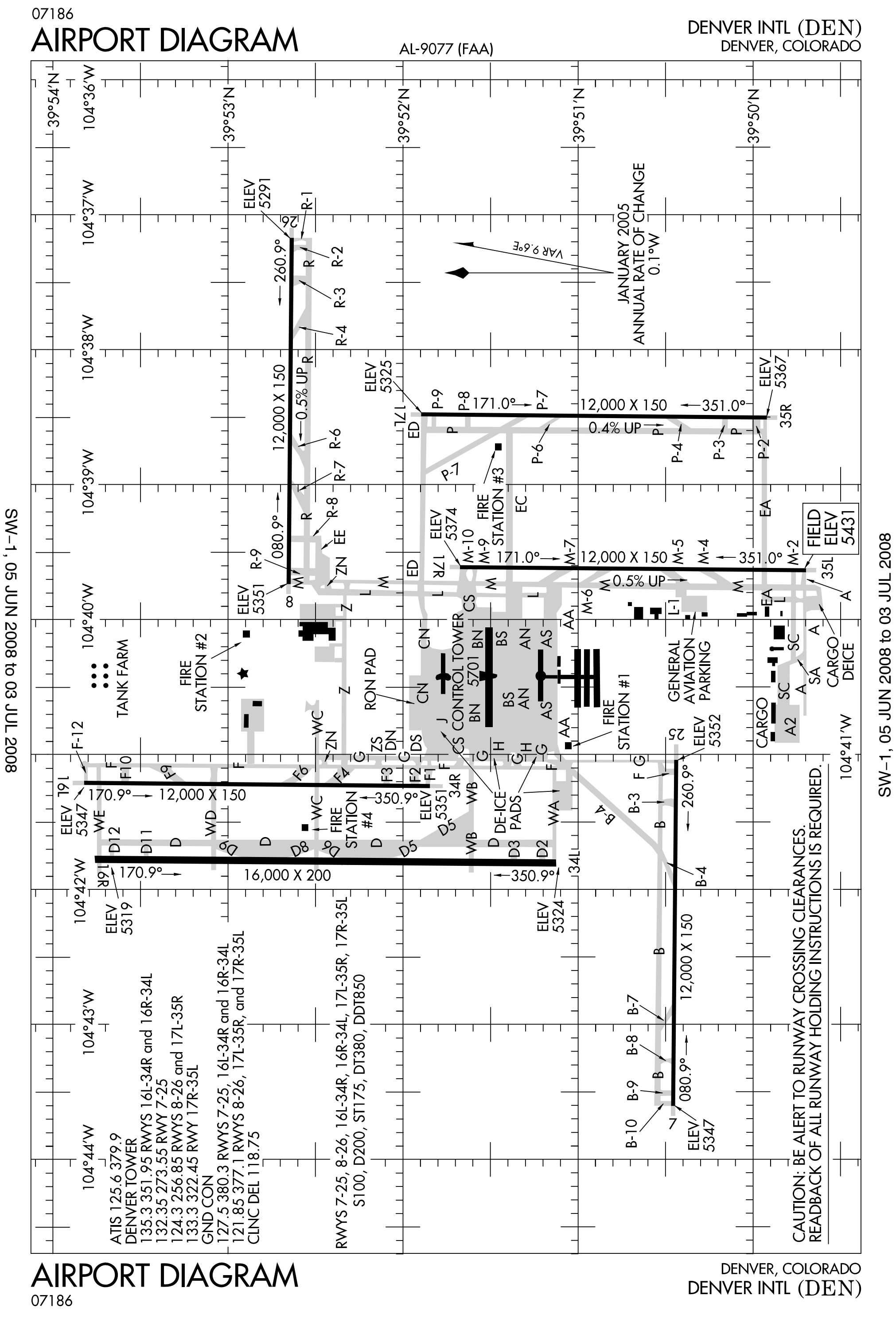
San Jose, California
Norman Y. Mineta San Jose International
ICAO Identifier KSJC



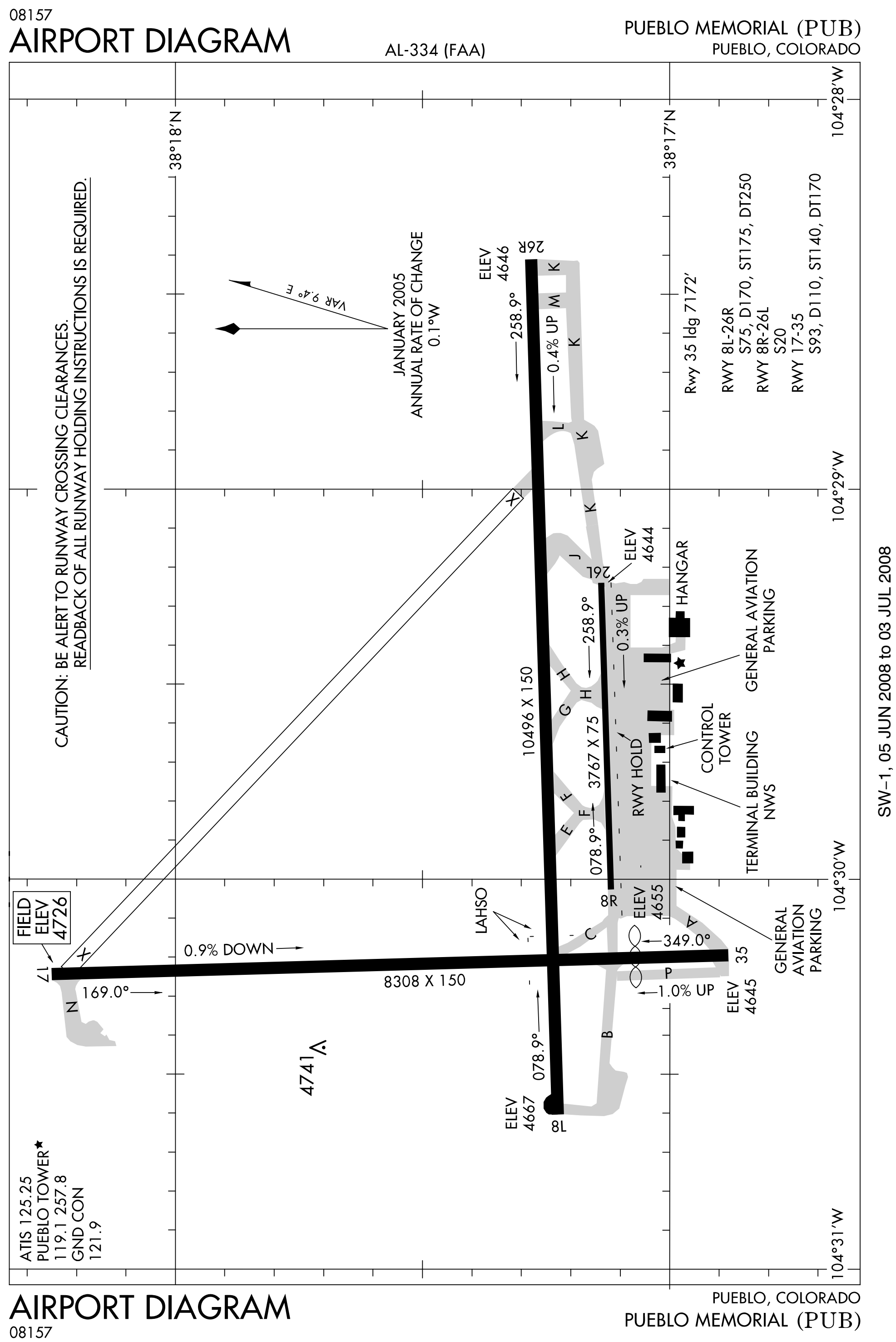
Stockton, California
Stockton Metropolitan
ICAO Identifier KSCK



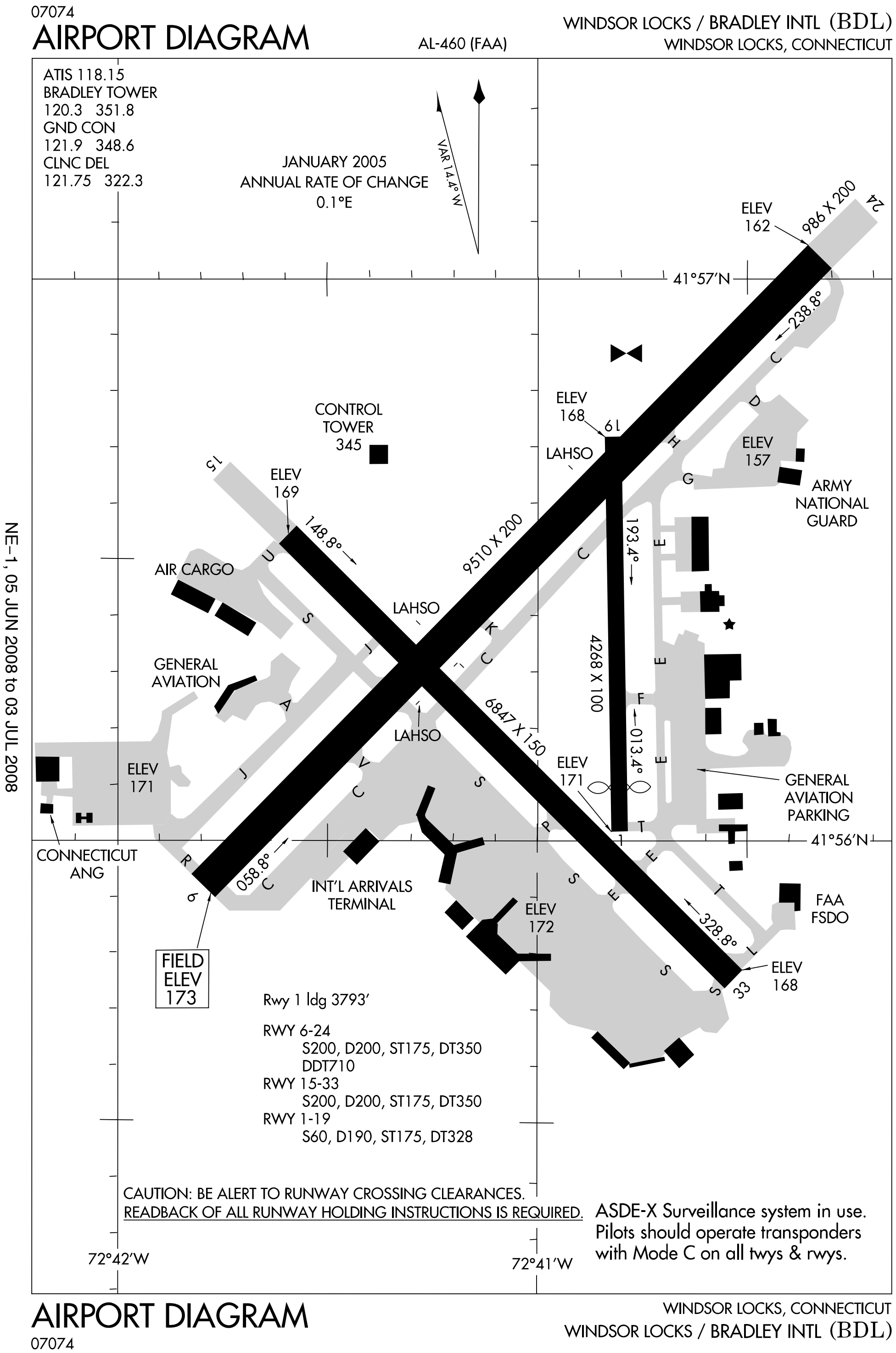
Denver, Colorado
Denver International
ICAO Identifier KDEN



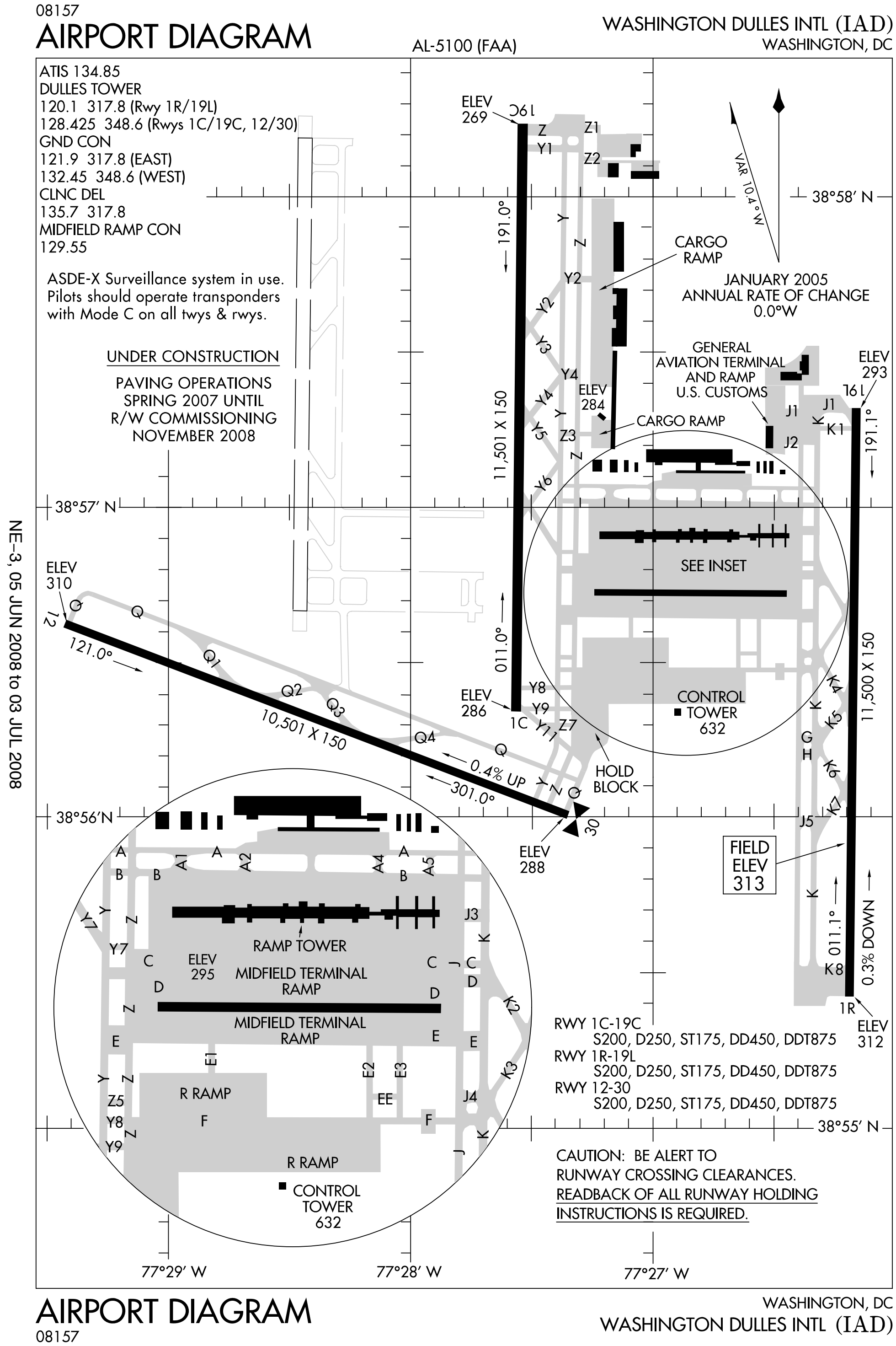
Pueblo, Colorado
Pueblo Memorial
ICAO Identifier KPUB



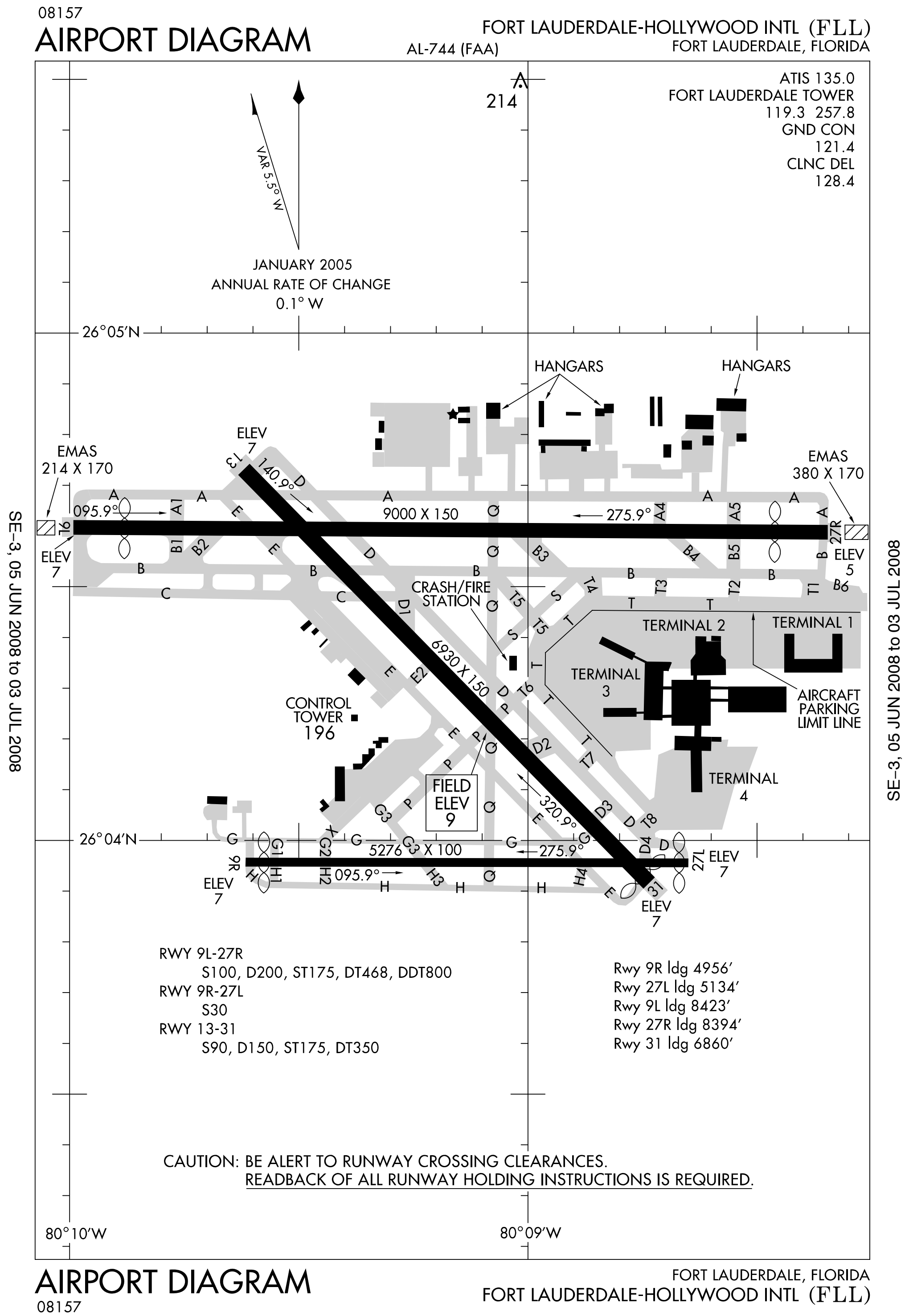
Windsor Locks, Connecticut
Bradley International
ICAO Identifier KBDL



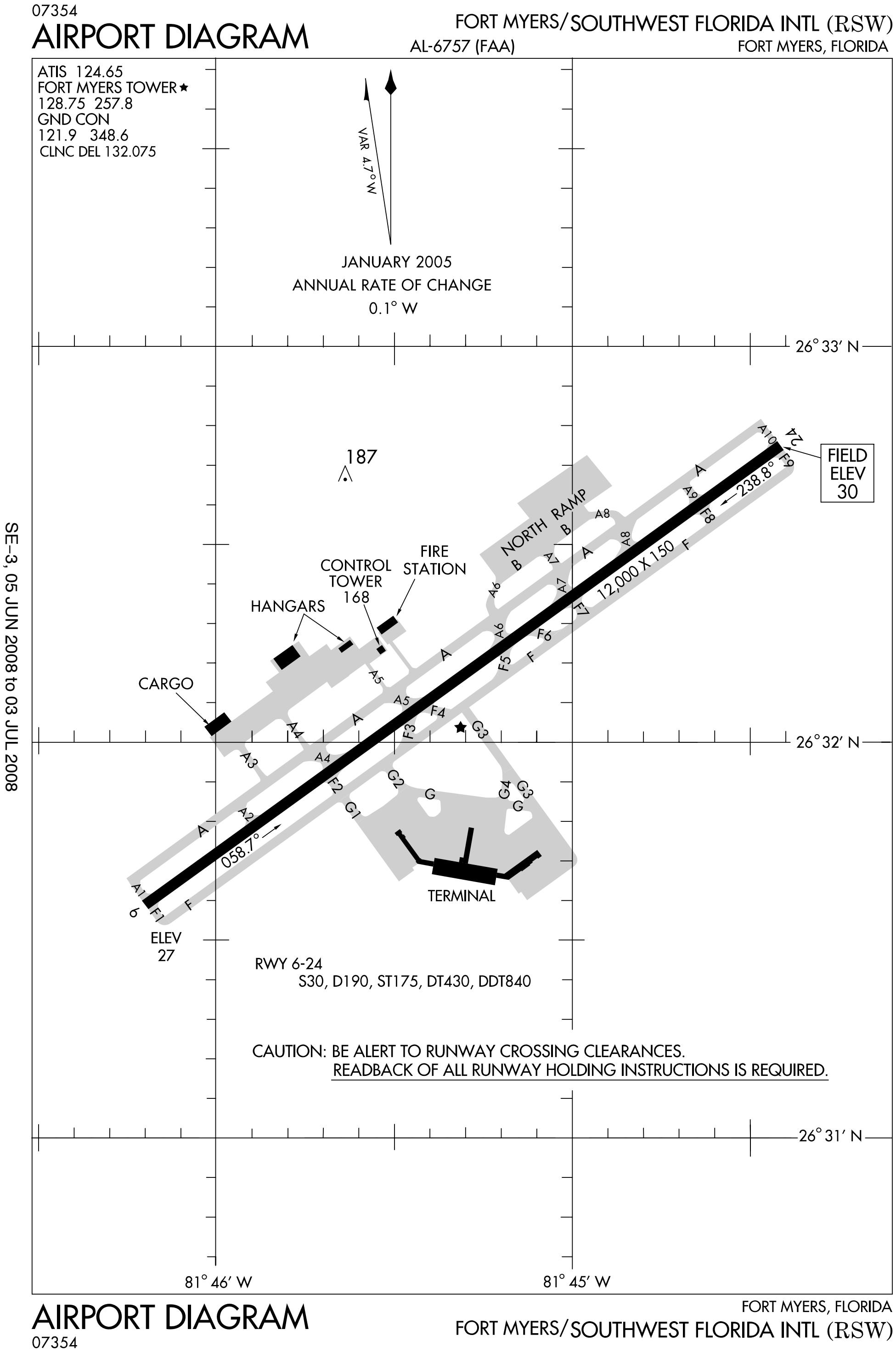
Washington, District of Columbia
Washington Dulles International
ICAO Identifier KIAD



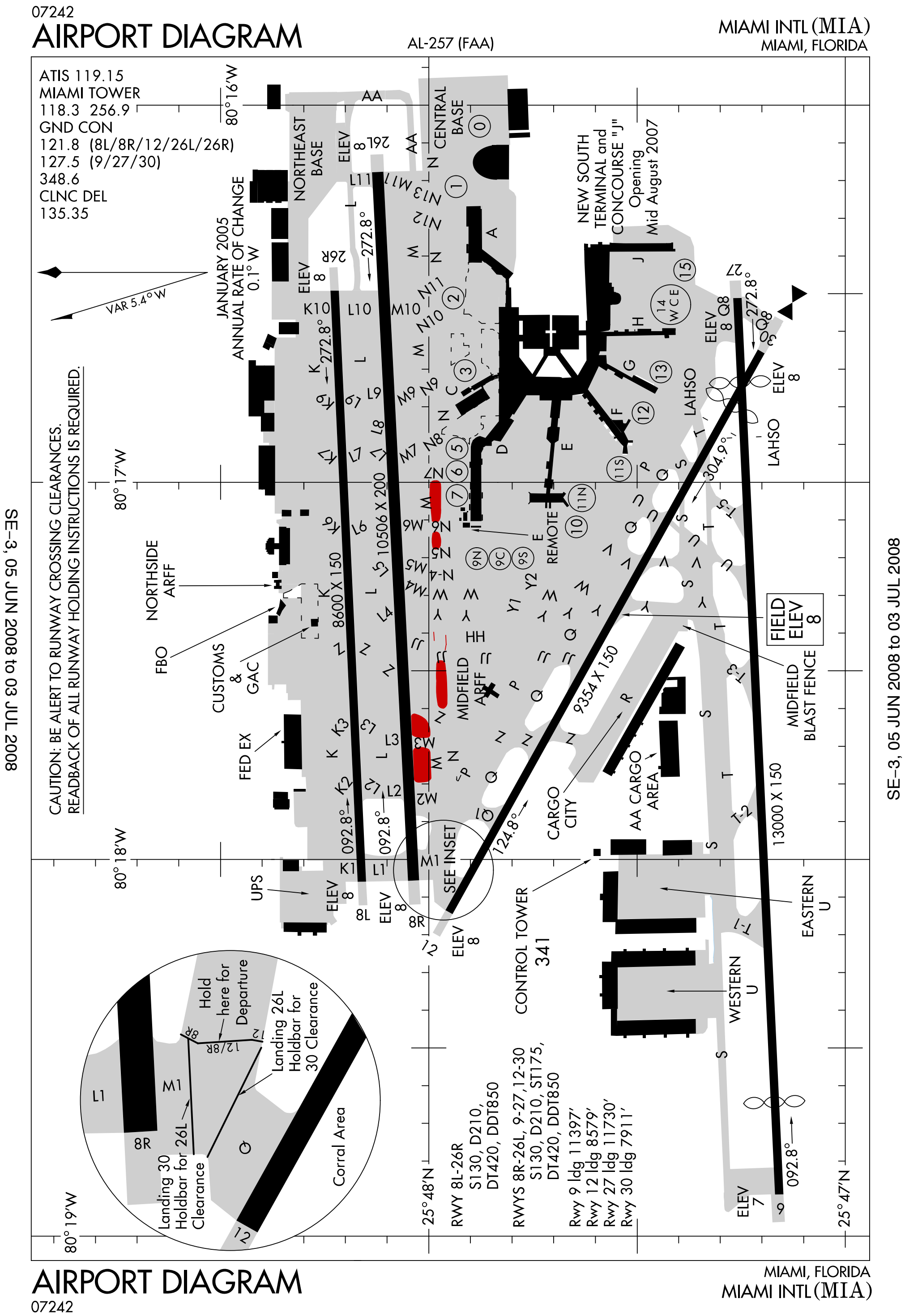
Fort Lauderdale, Florida
Fort Lauderdale/Hollywood International
ICAO Identifier KFLL



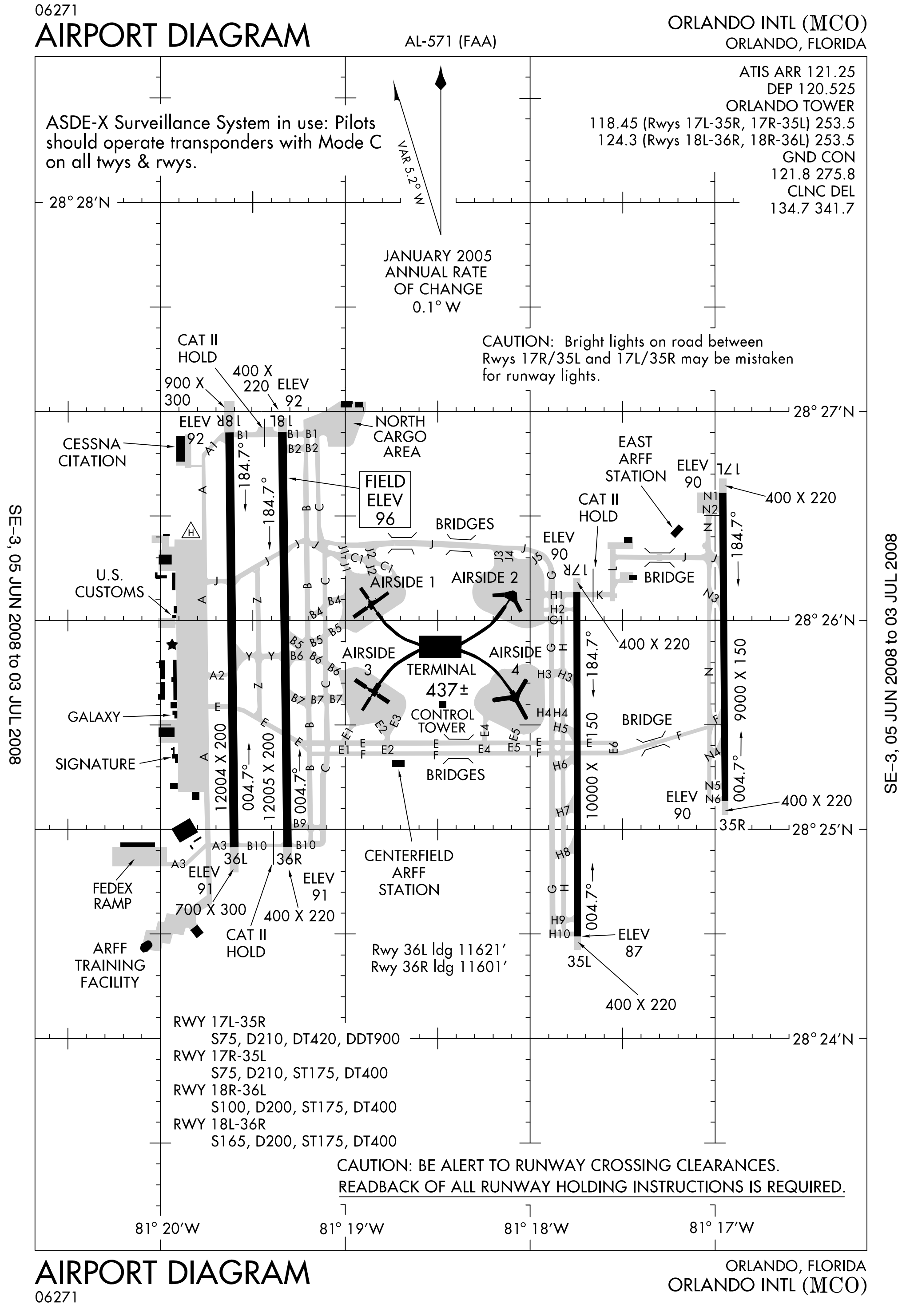
Fort Myers, Florida
Southwest Florida International
ICAO Identifier KRSW



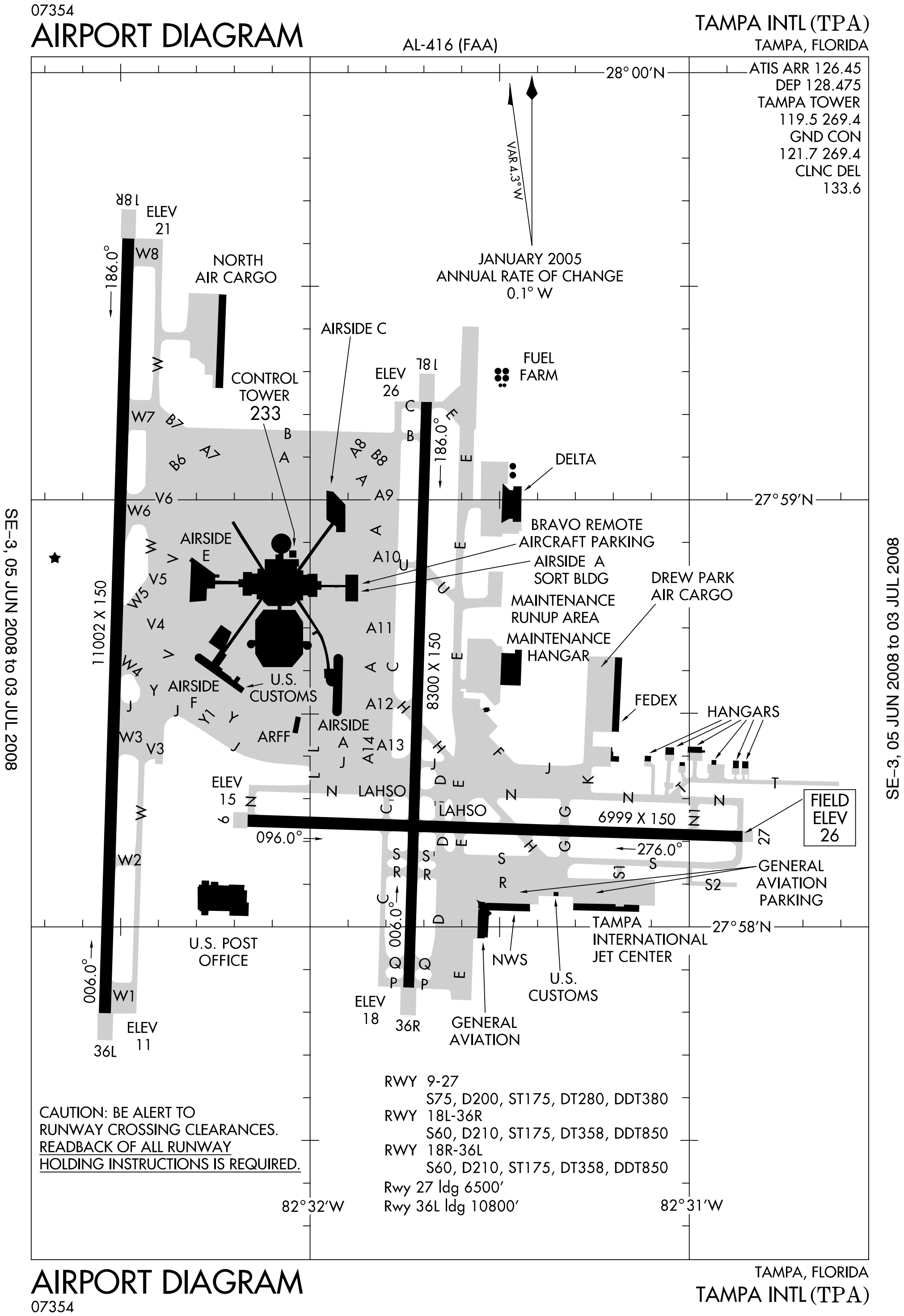
Miami, Florida
Miami International
ICAO Identifier KMIA



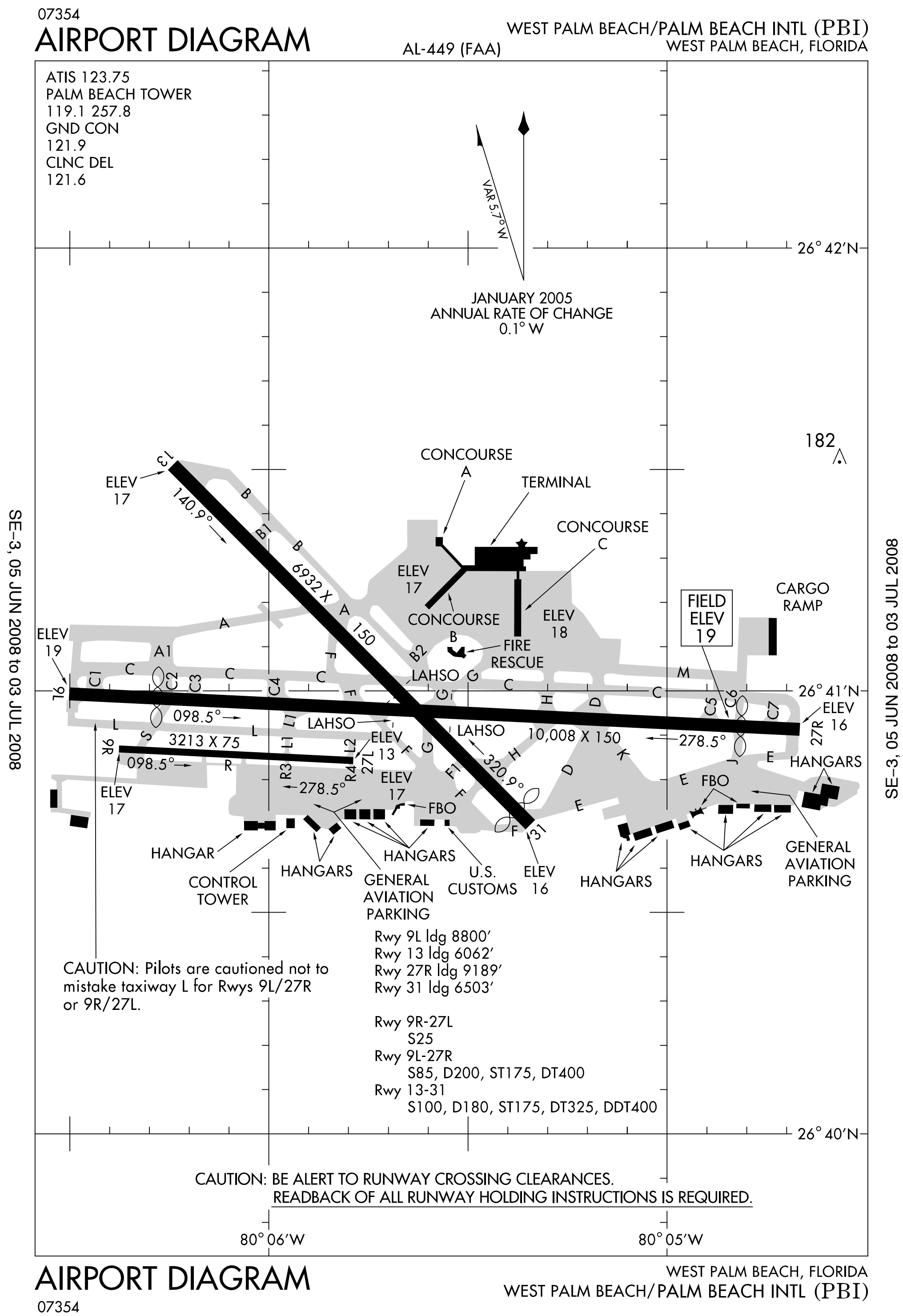
Orlando, Florida
Orlando International
ICAO Identifier KMCO



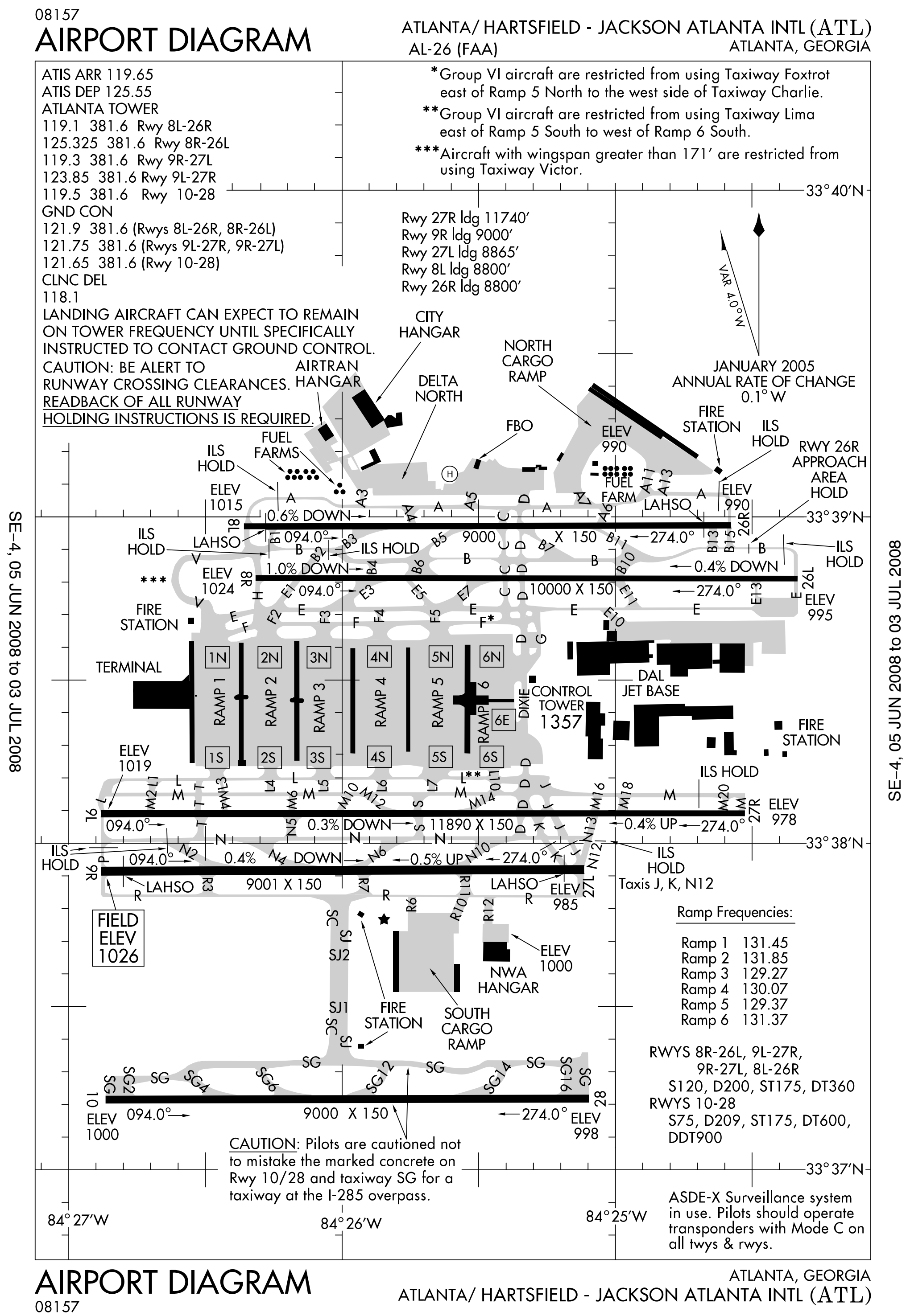
Tampa, Florida
Tampa International
ICAO Identifier KTPA



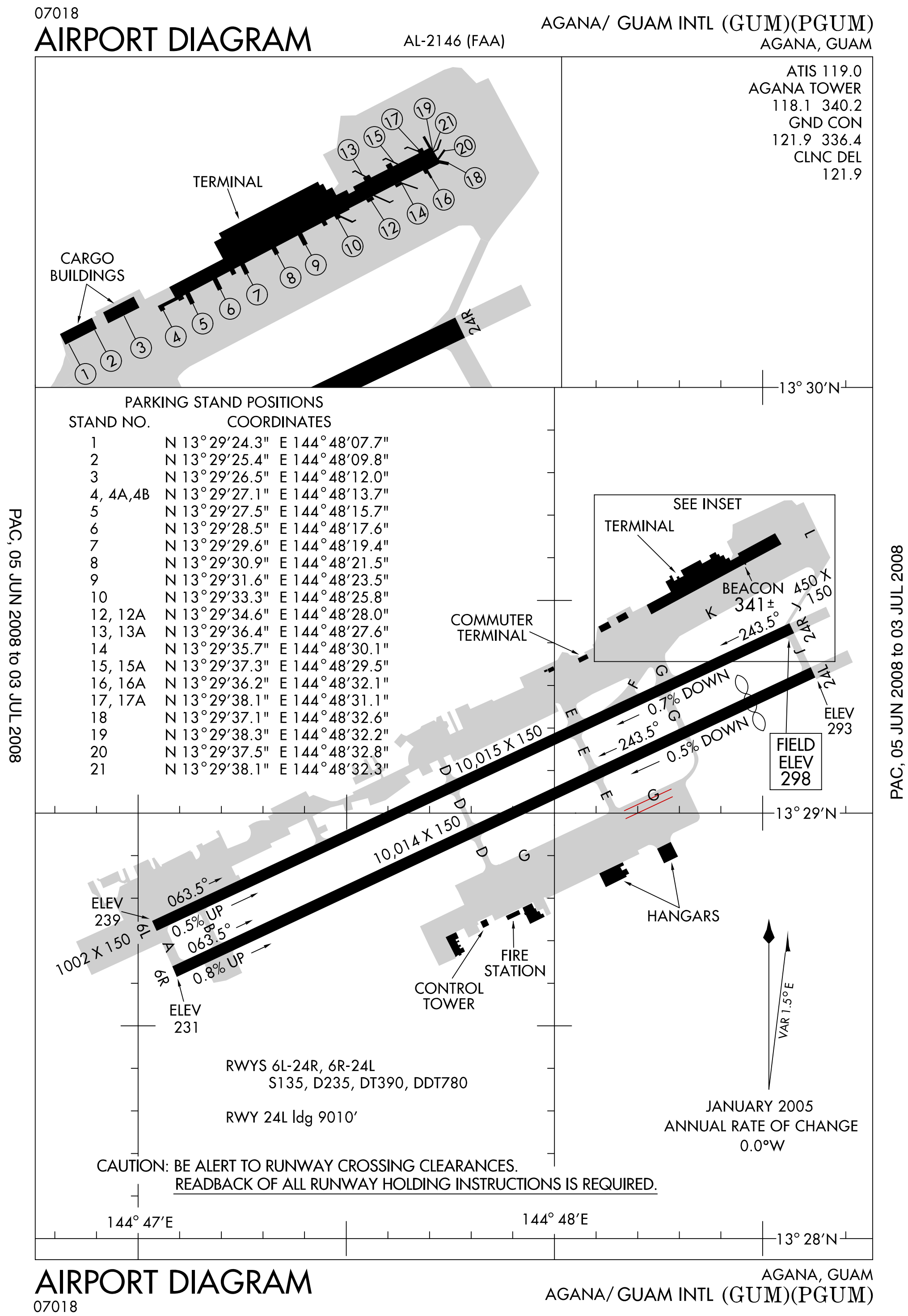
West Palm Beach, Florida
Palm Beach International
ICAO Identifier KPBI



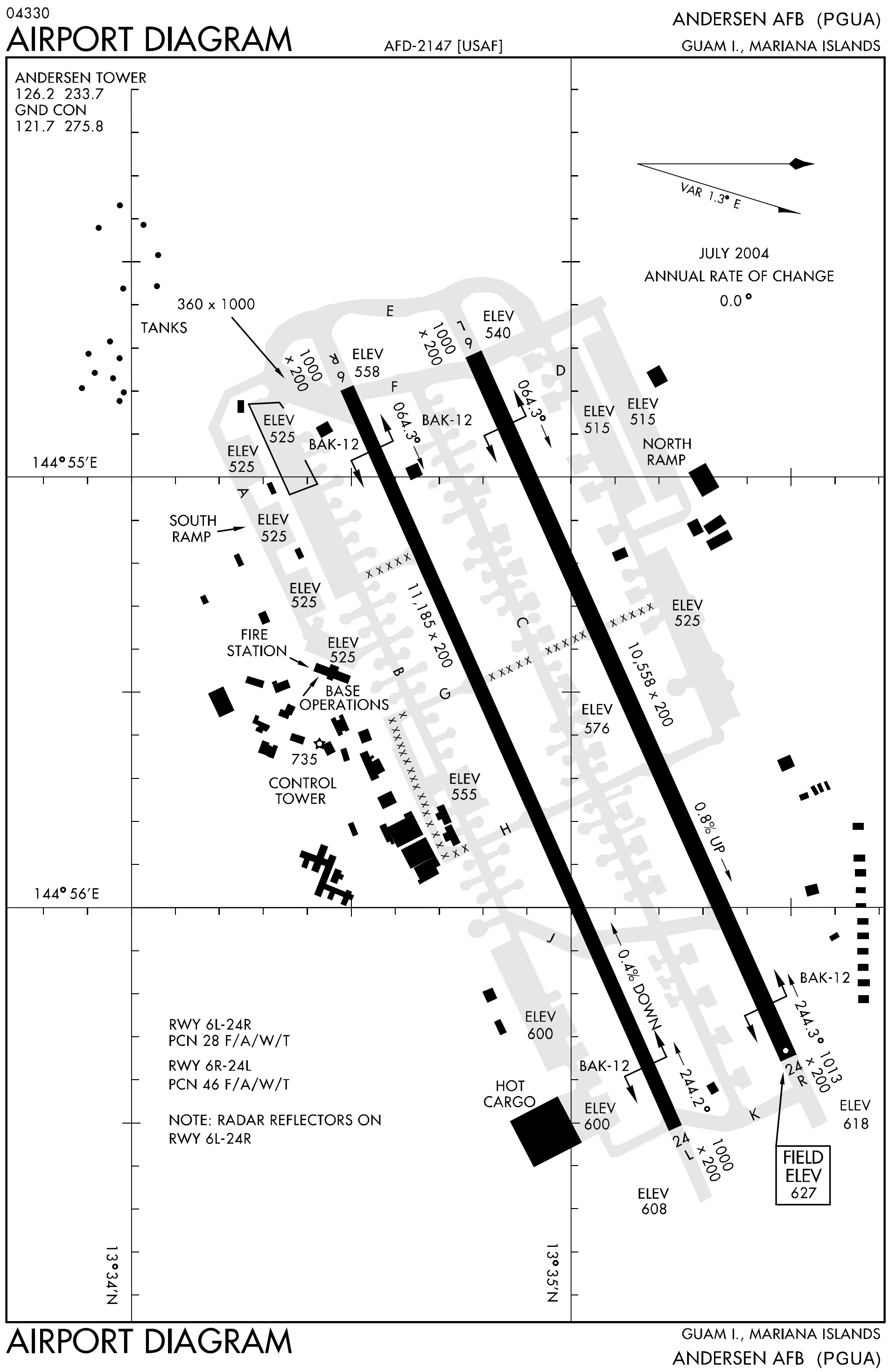
Atlanta, Georgia
Hartsfield−Jackson Atlanta International
ICAO Identifier KATL



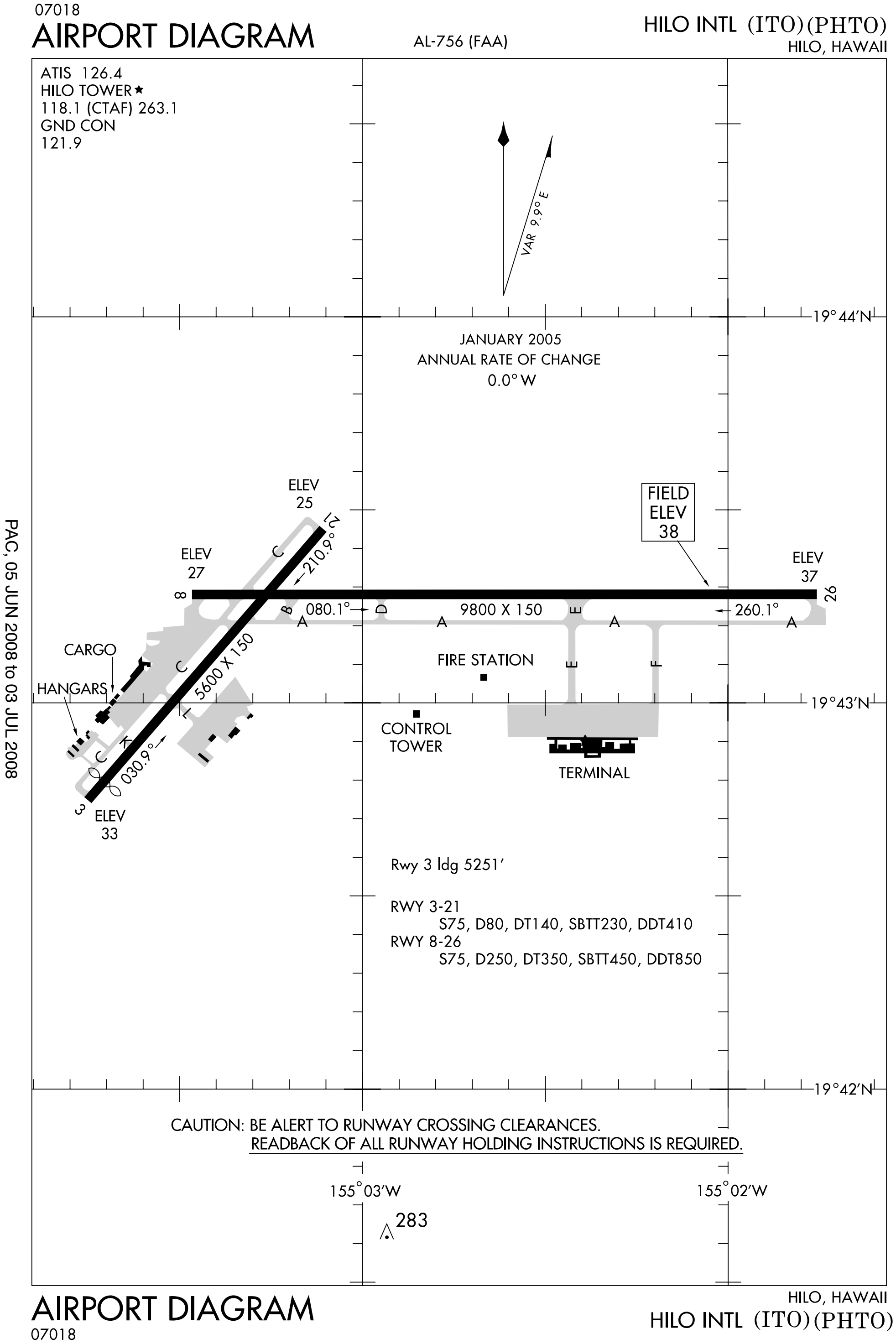
Agana, Guam
Guam International
ICAO Identifier PGUM



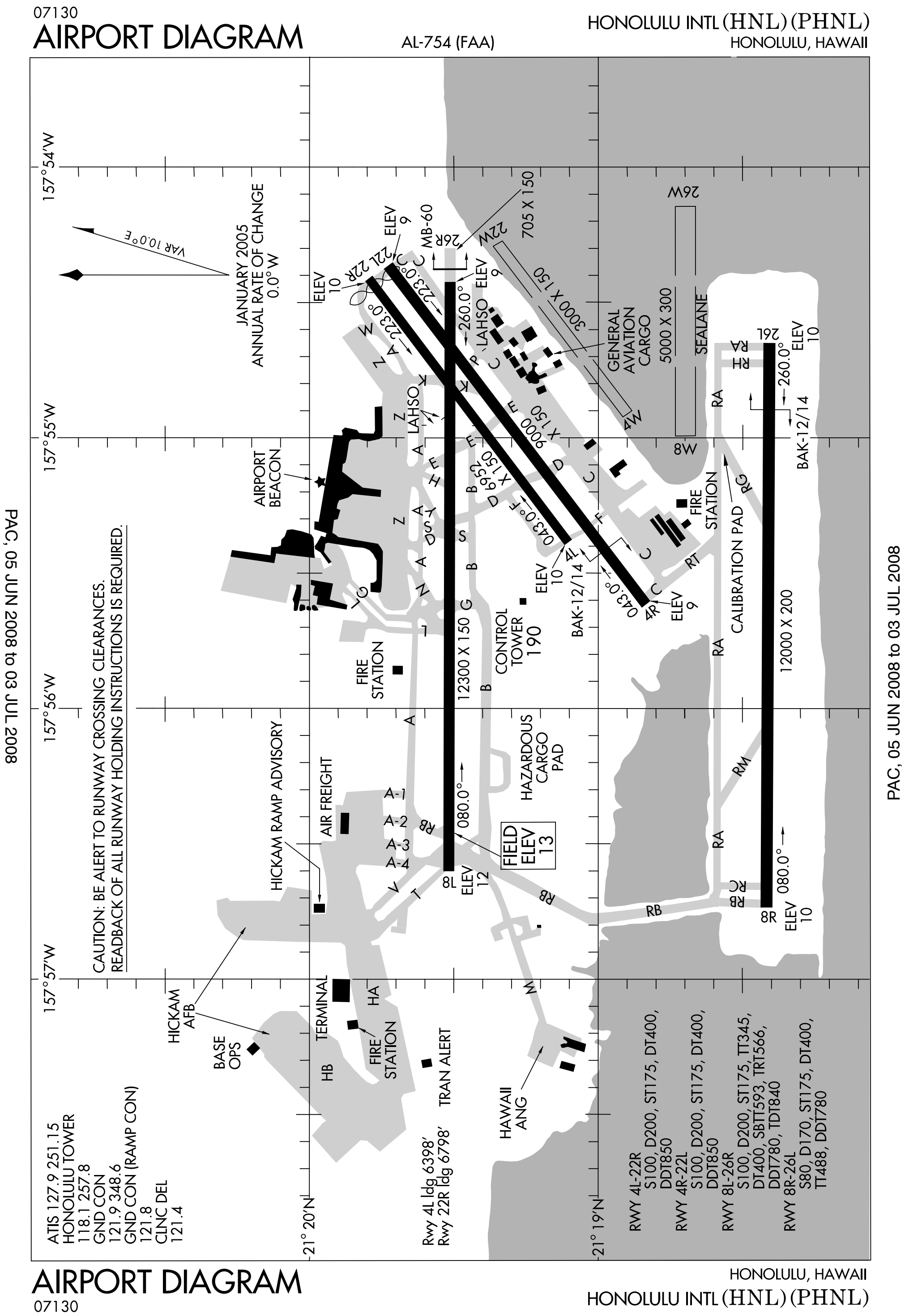
Guam Island, Guam
Andersen Air Force Base
ICAO Identifier PGUA



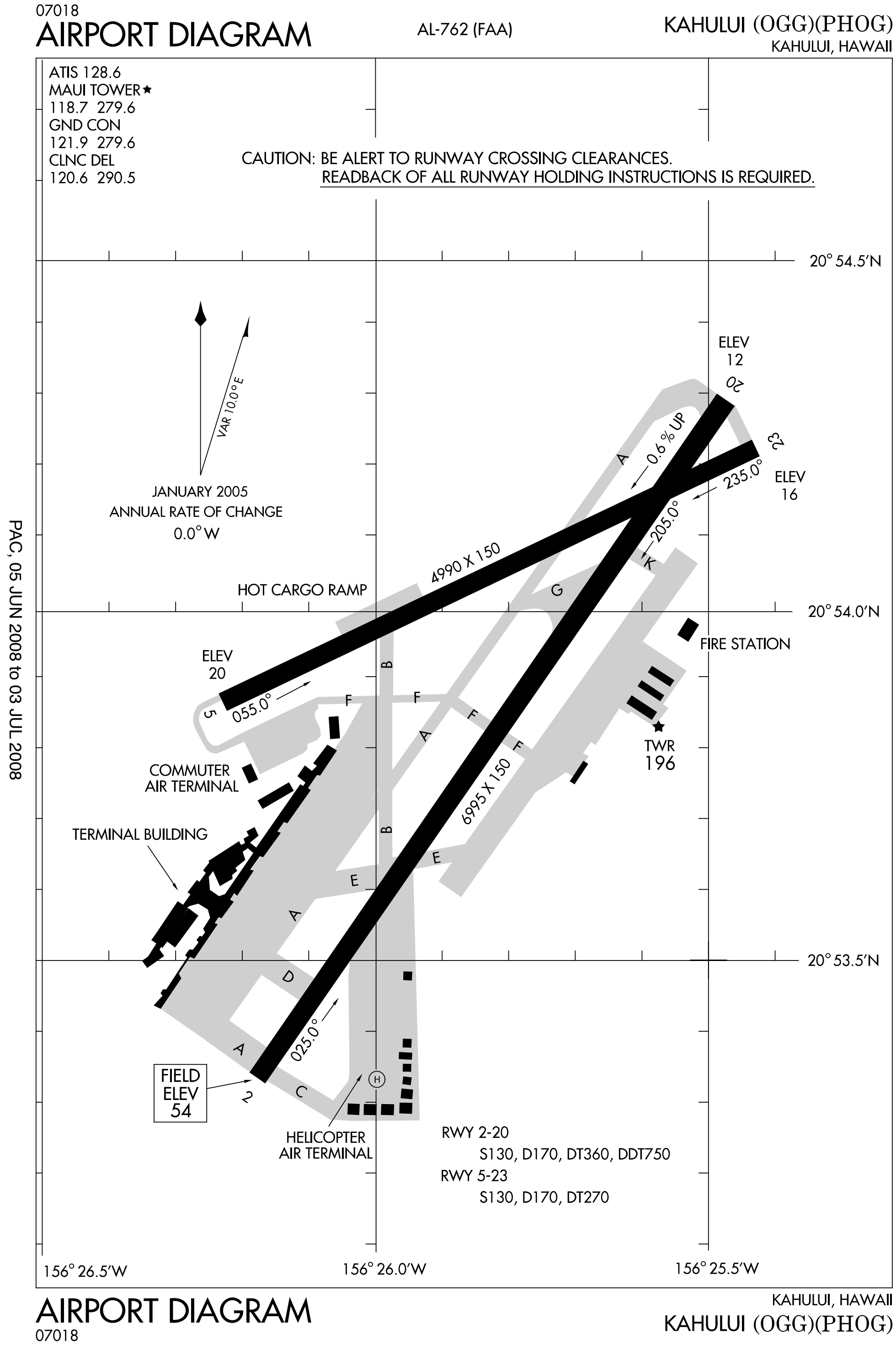
Hilo, Hawaii
Hilo International
ICAO Identifier PHTO



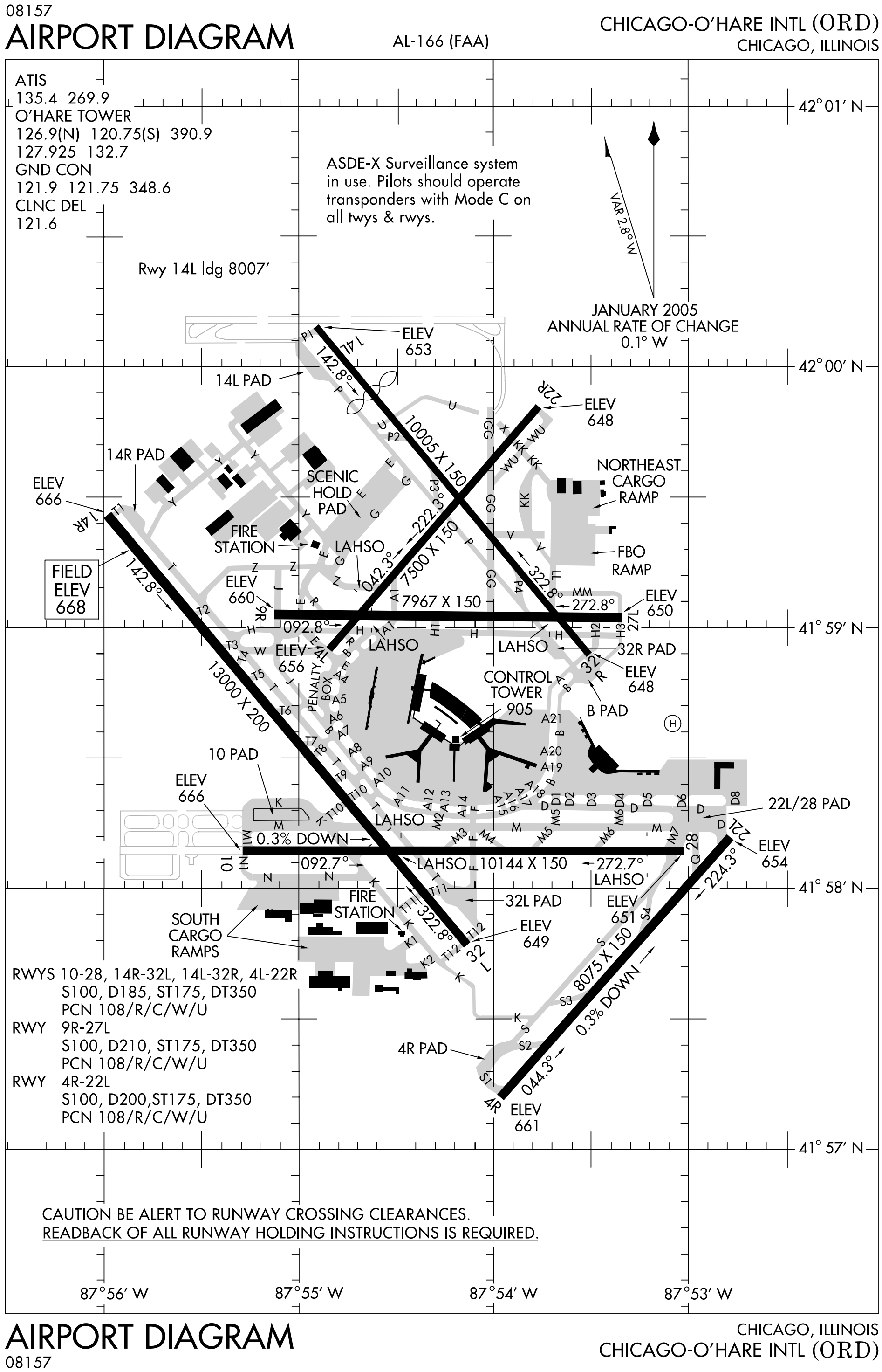
Honolulu, Hawaii
Honolulu International
ICAO Identifier PHNL



Kahului, Hawaii
Kahului
ICAO Identifier PHOG



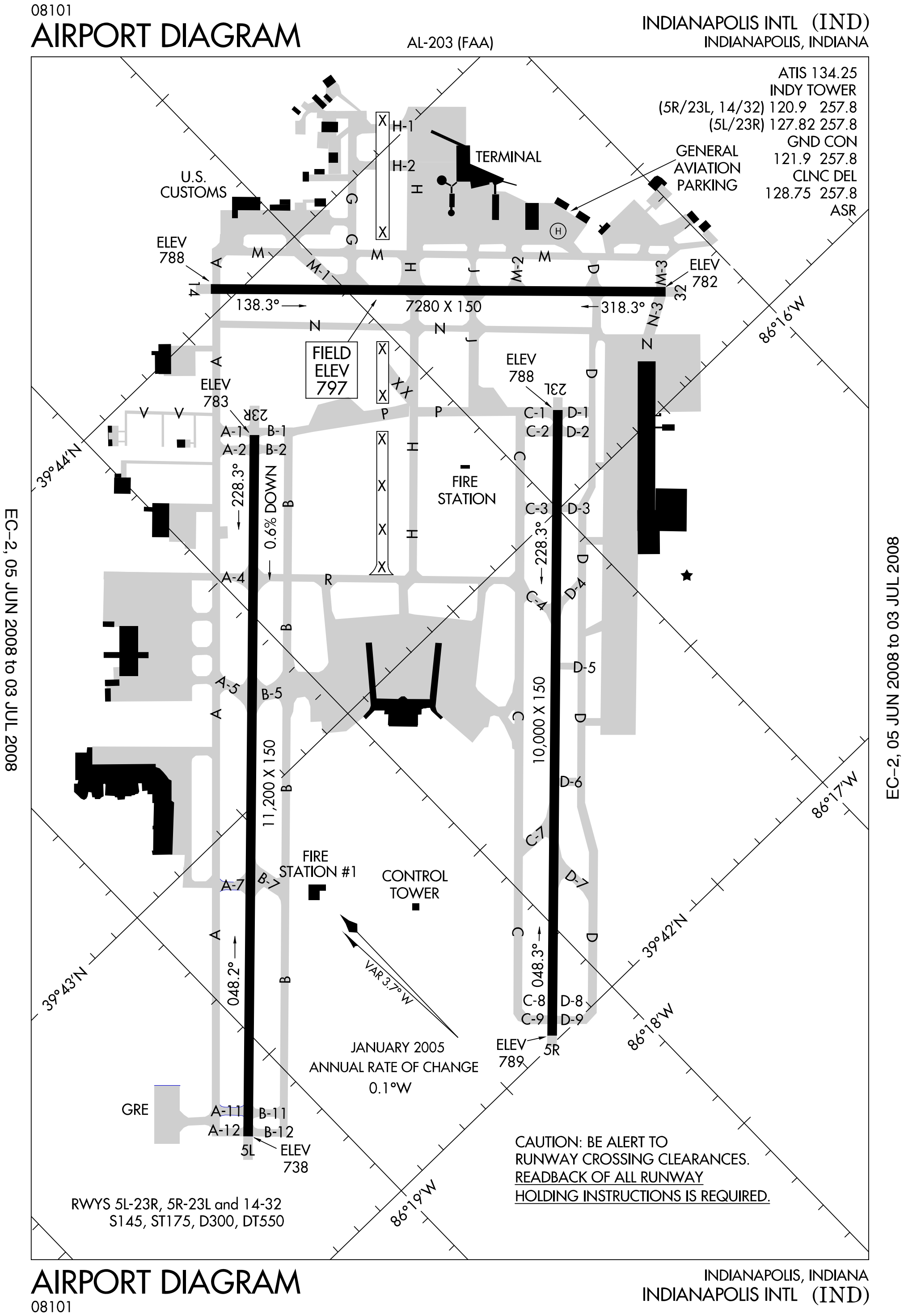
Chicago, Illinois
Chicago−O'Hare International
ICAO Identifier KORD



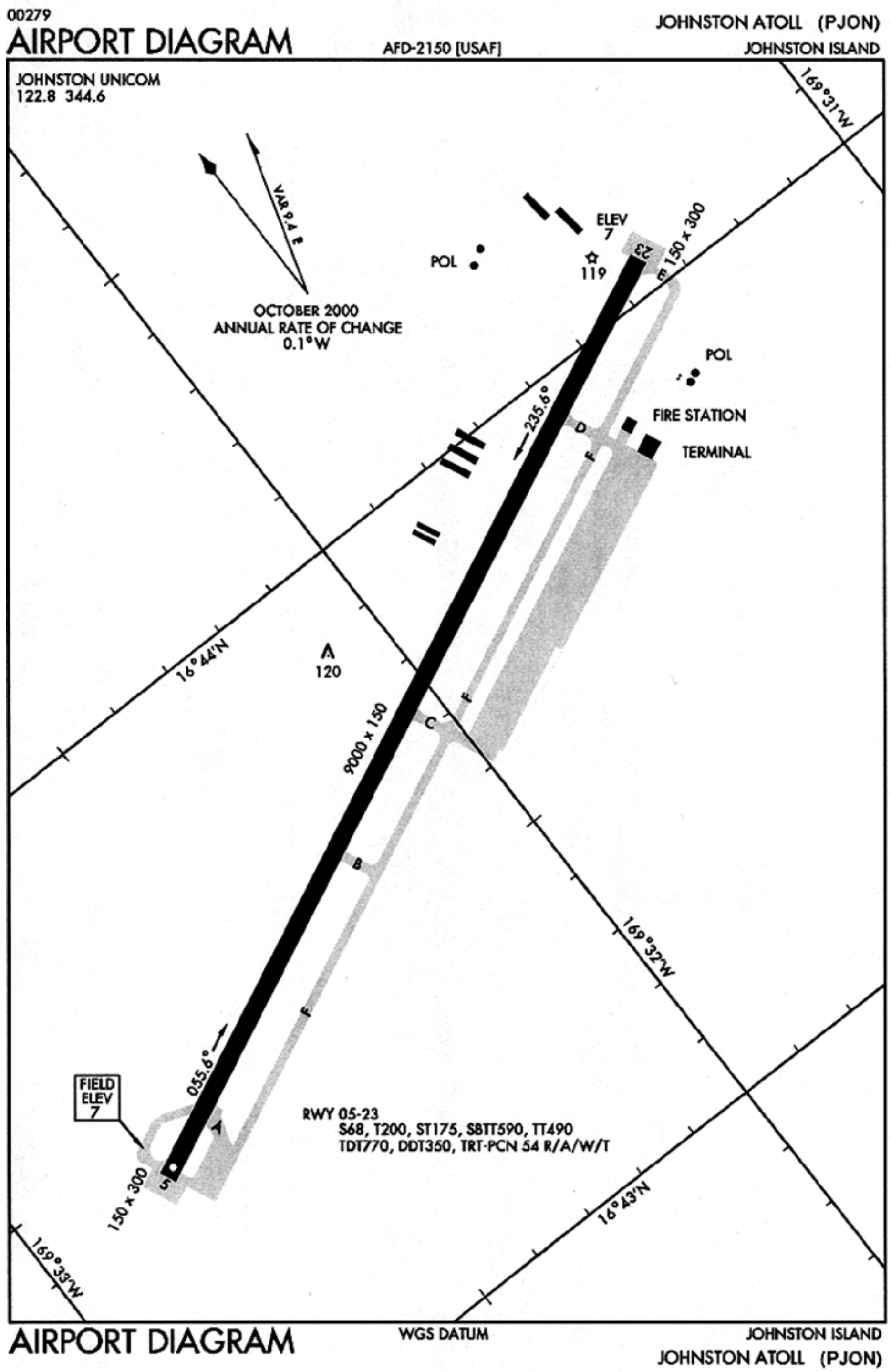
EC−3, 05 JUN 2008 to 03 JUL 2008

EC−3, 05 JUN 2008 to 03 JUL 2008

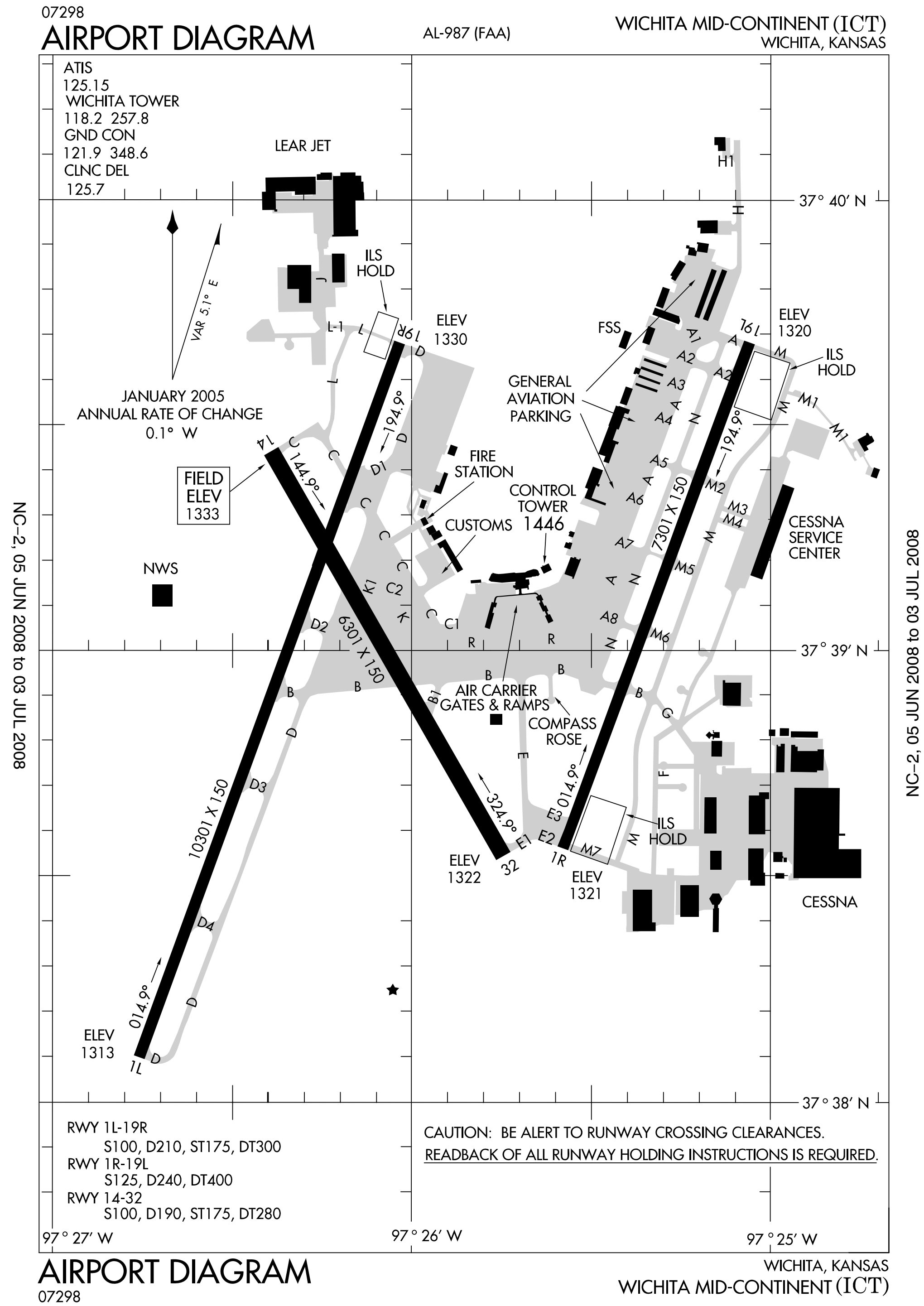
Indianapolis, Indiana
Indianapolis International
ICAO Identifier KIND



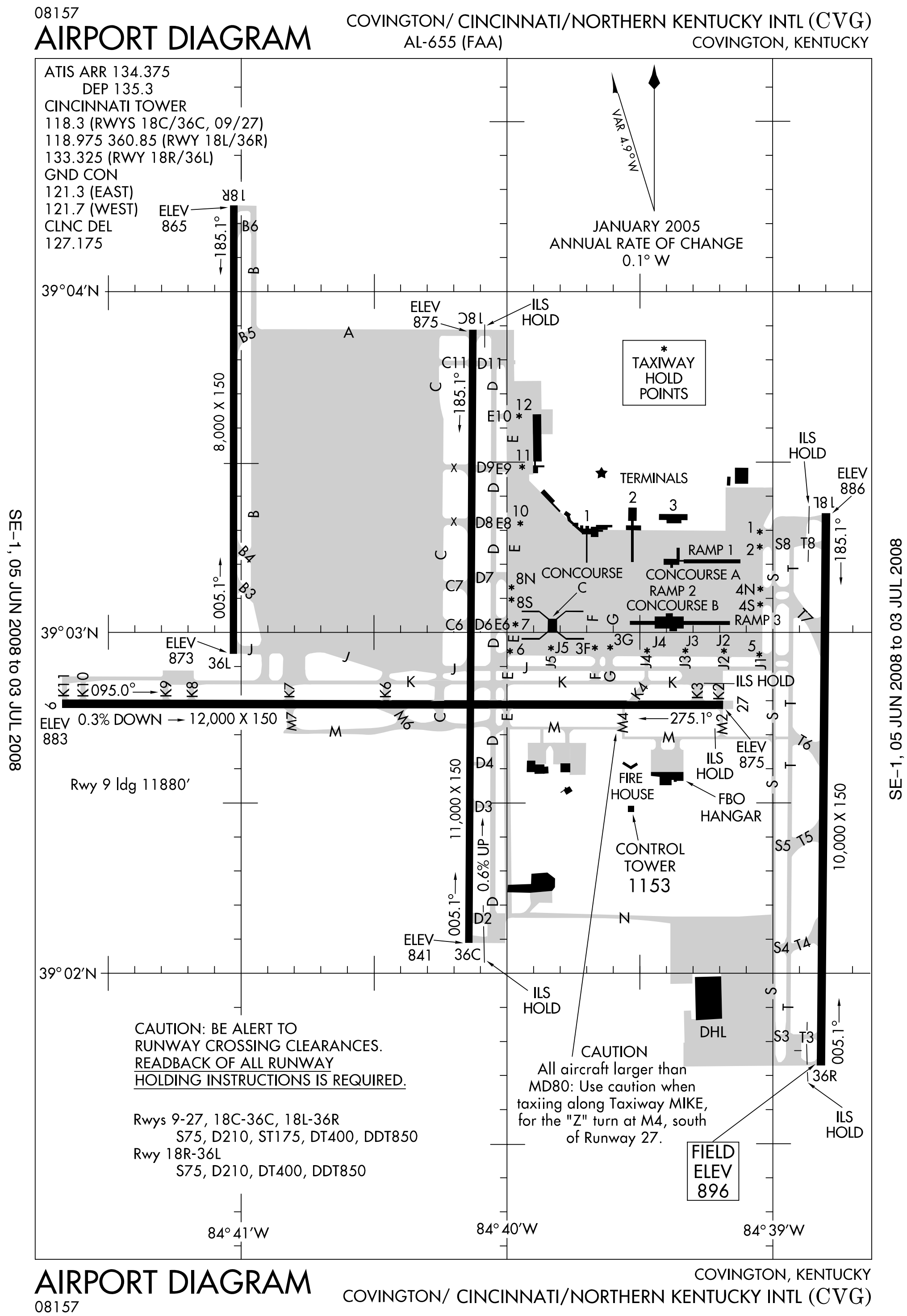
Johnston Island
Johnston Atoll
ICAO Identifier PJON



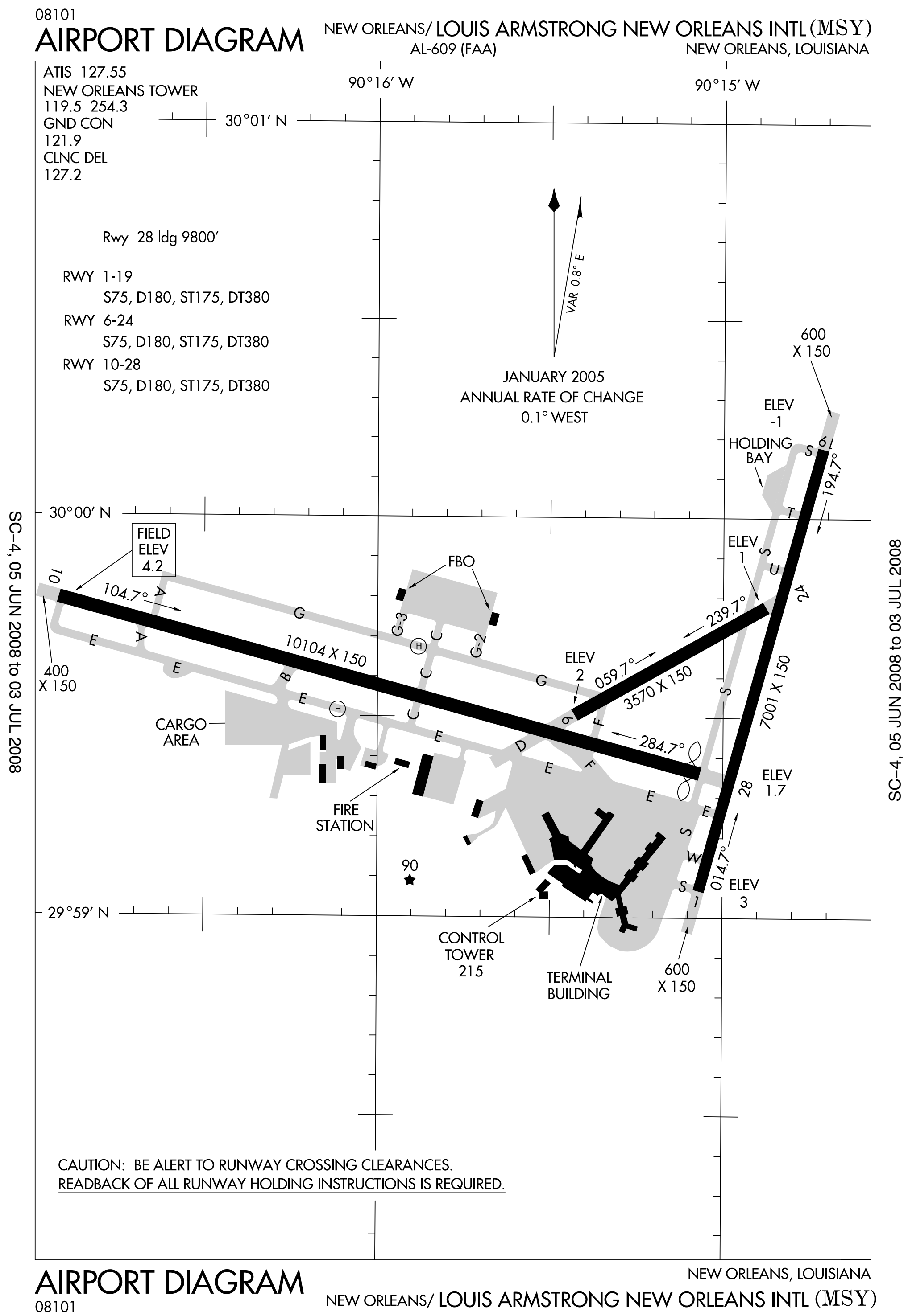
Wichita, Kansas
Wichita Mid−Continent
ICAO Identifier KICT



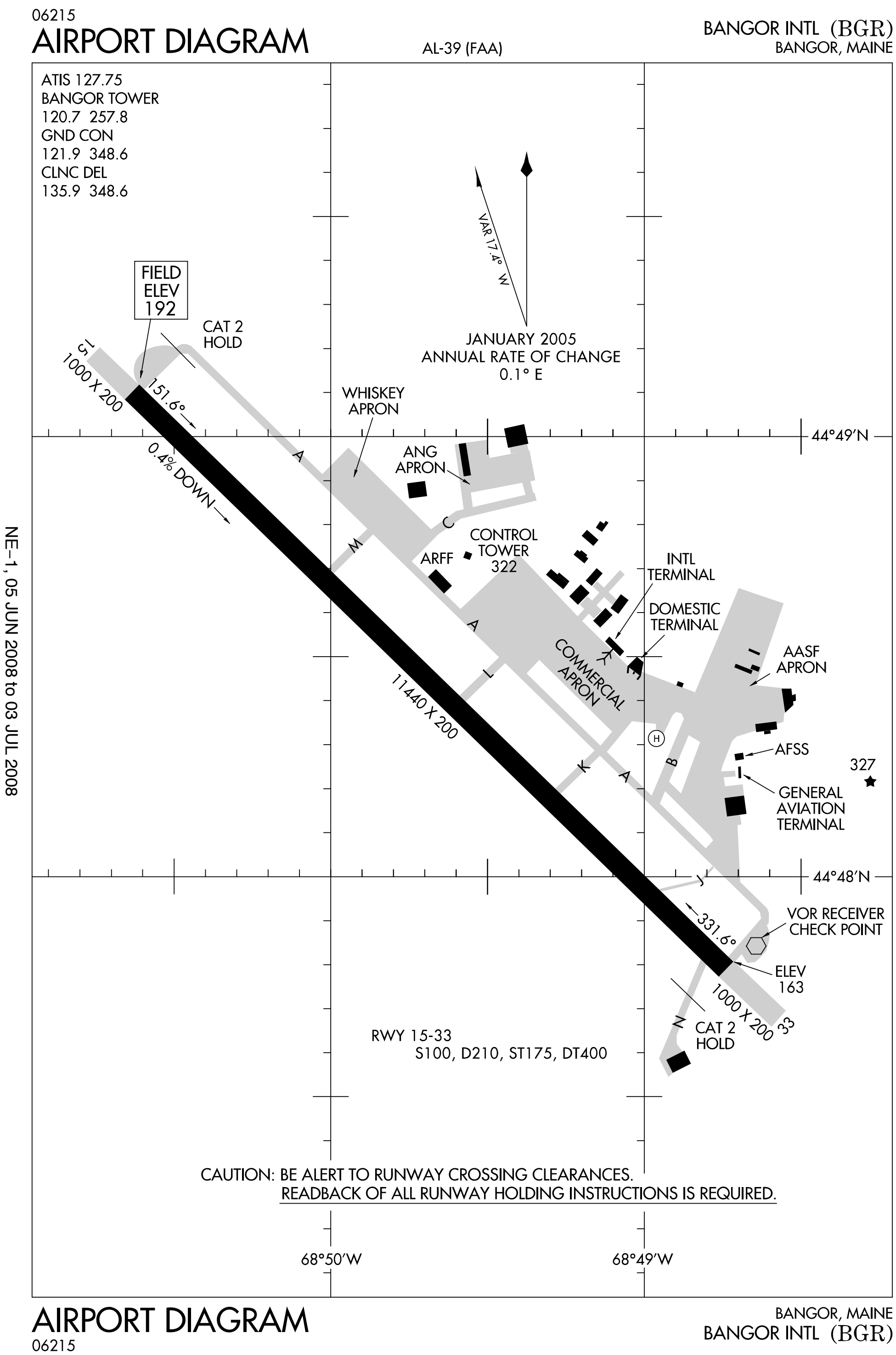
Covington, Kentucky
Cincinnati/Northern Kentucky International
ICAO Identifier KCVG



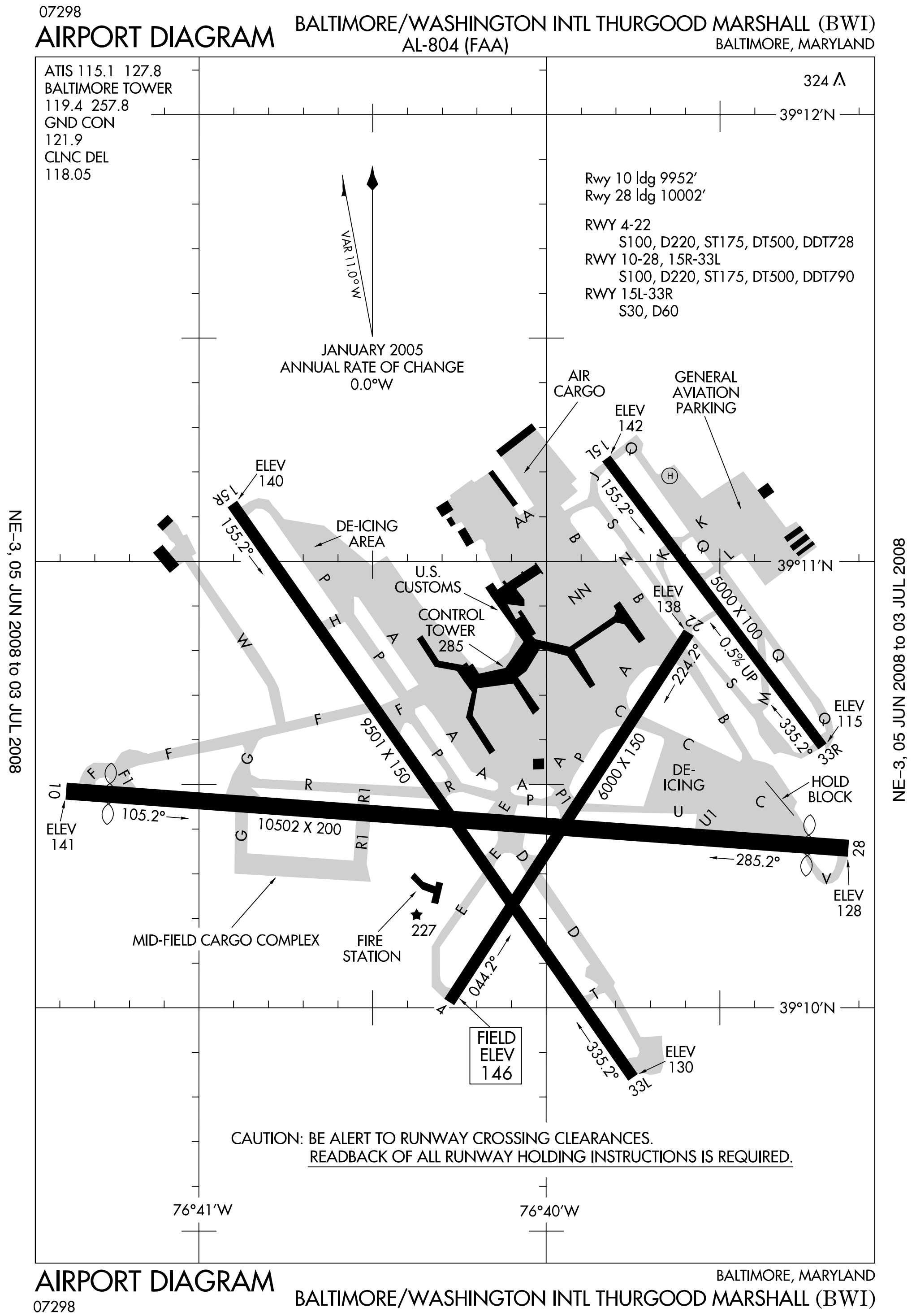
New Orleans, Louisana
Louis Armstrong New Orleans International
ICAO Identifier KMSY



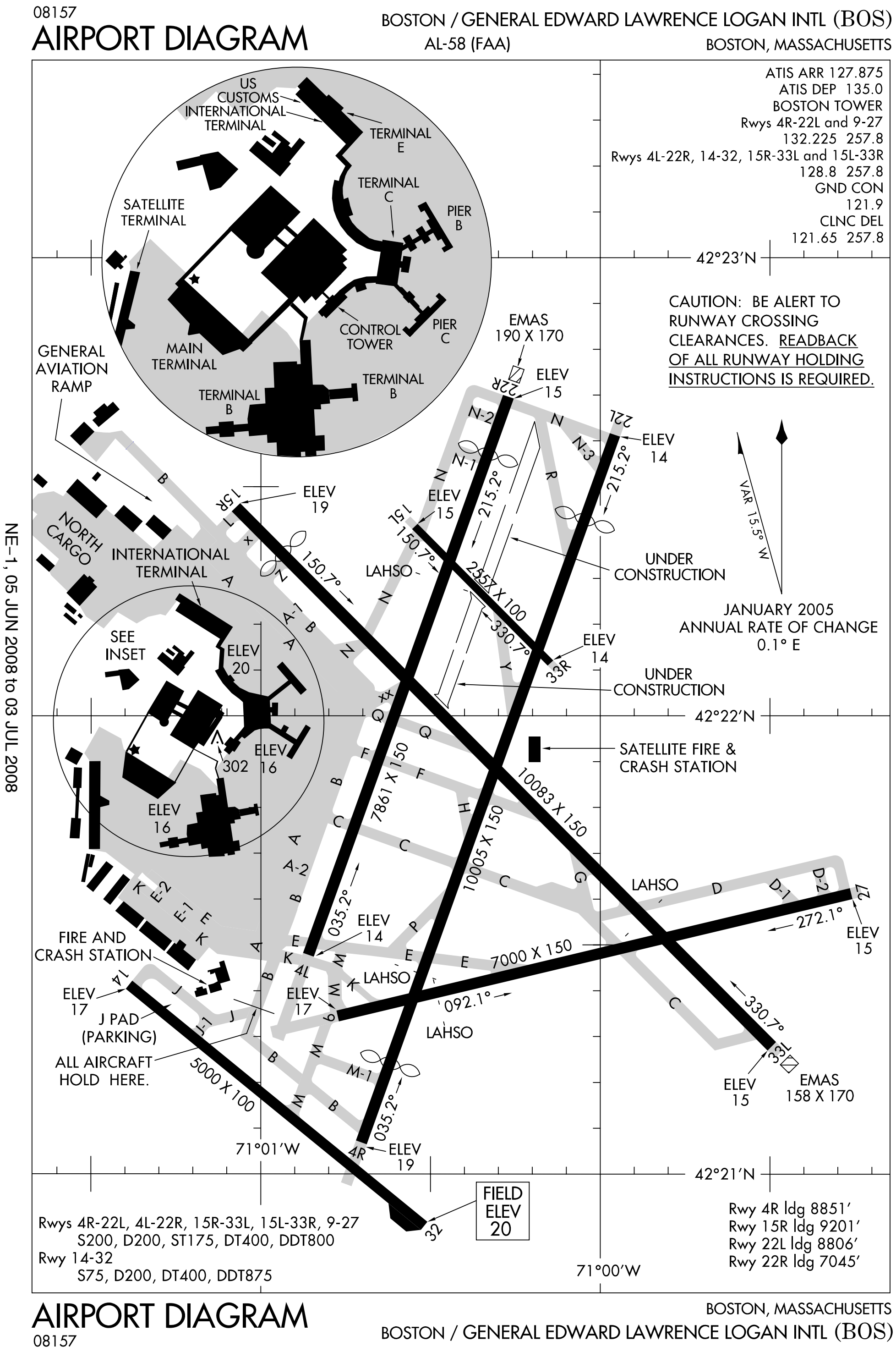
Bangor, Maine
Bangor International
ICAO Identifier KBGR



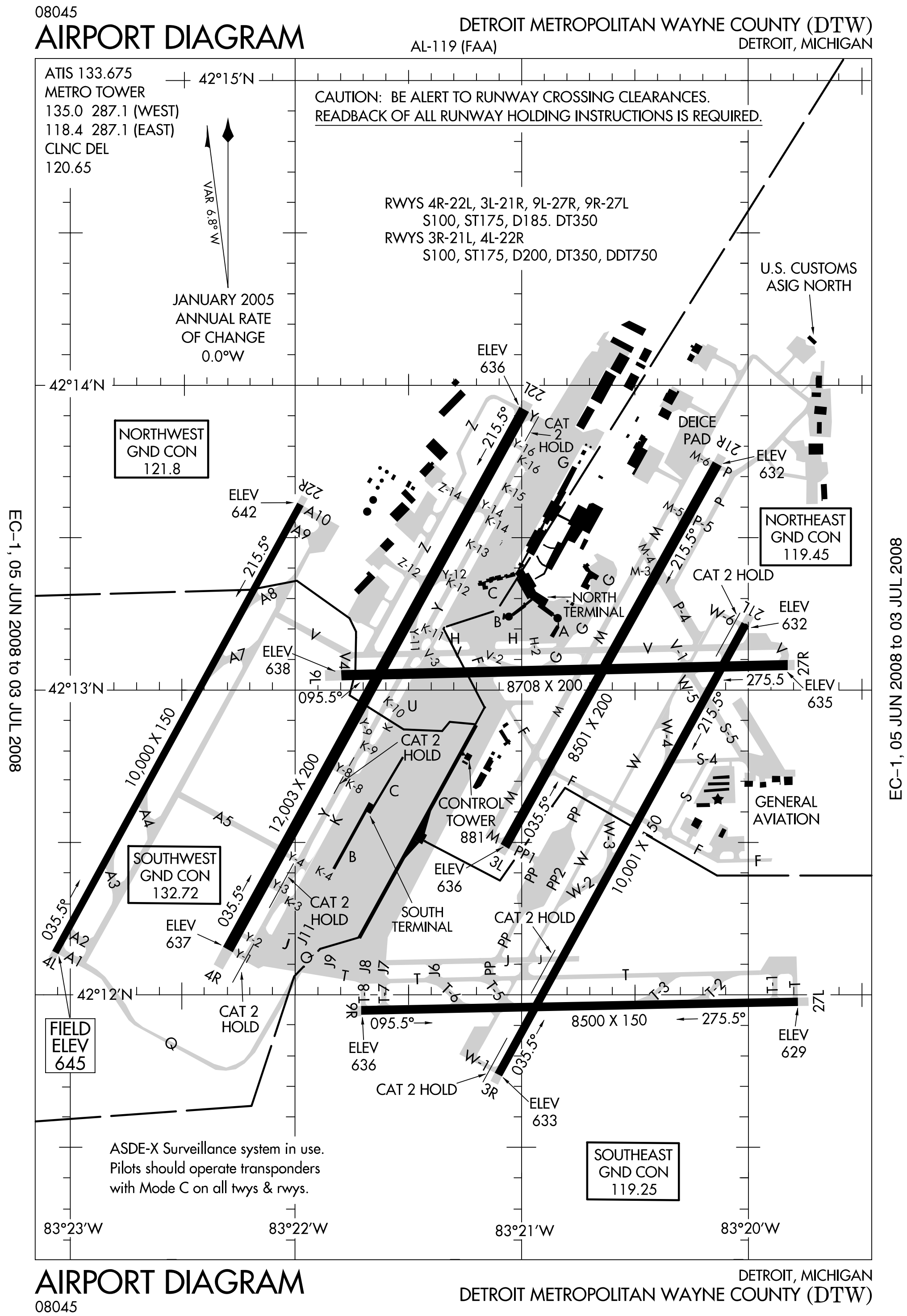
Baltimore, Maryland
Baltimore−Washington International Thurgood Marshall
ICAO Identifier KBWI



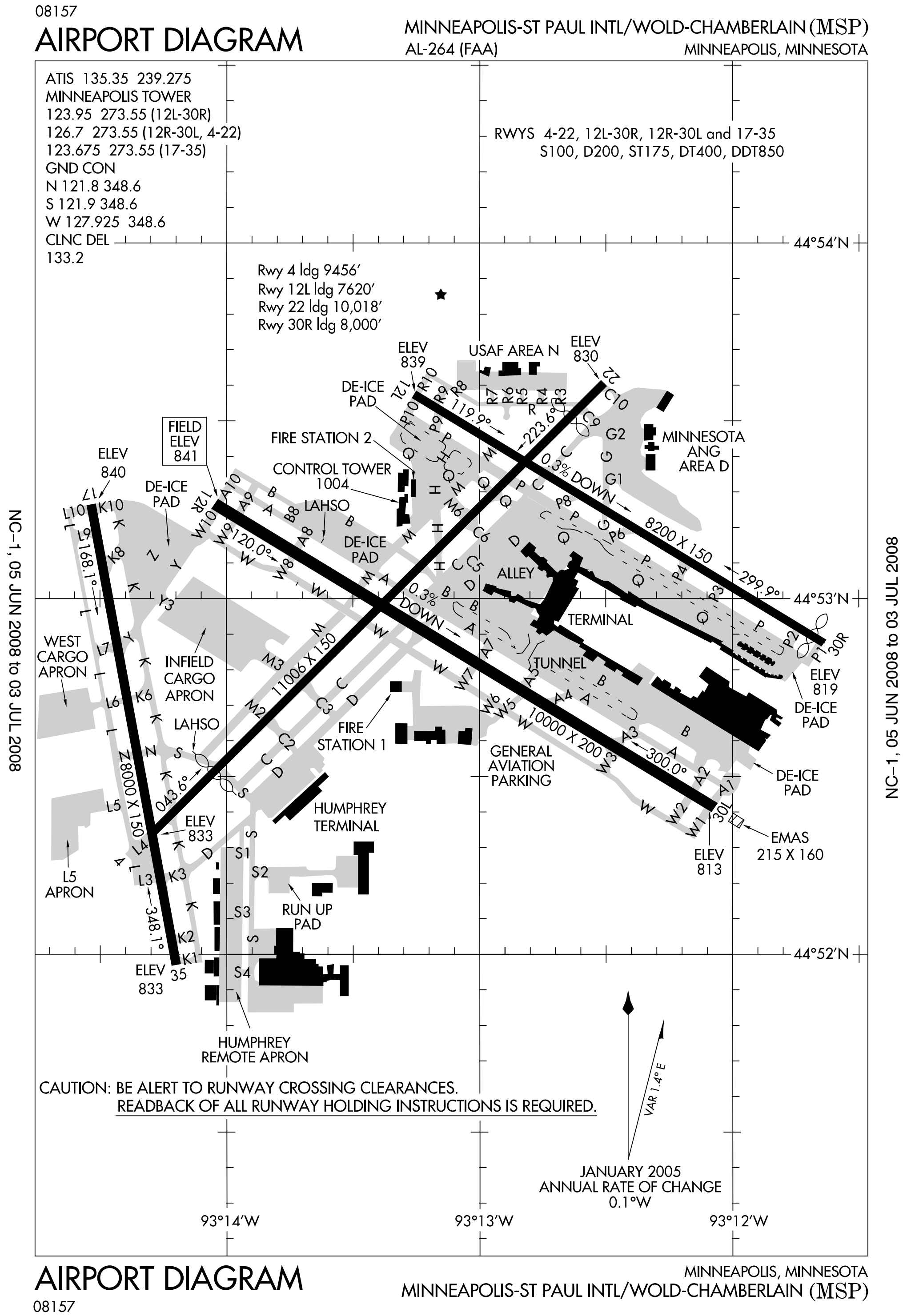
Boston, Massachusetts
General Edward Lawrence Logan International
ICAO Identifier KBOS



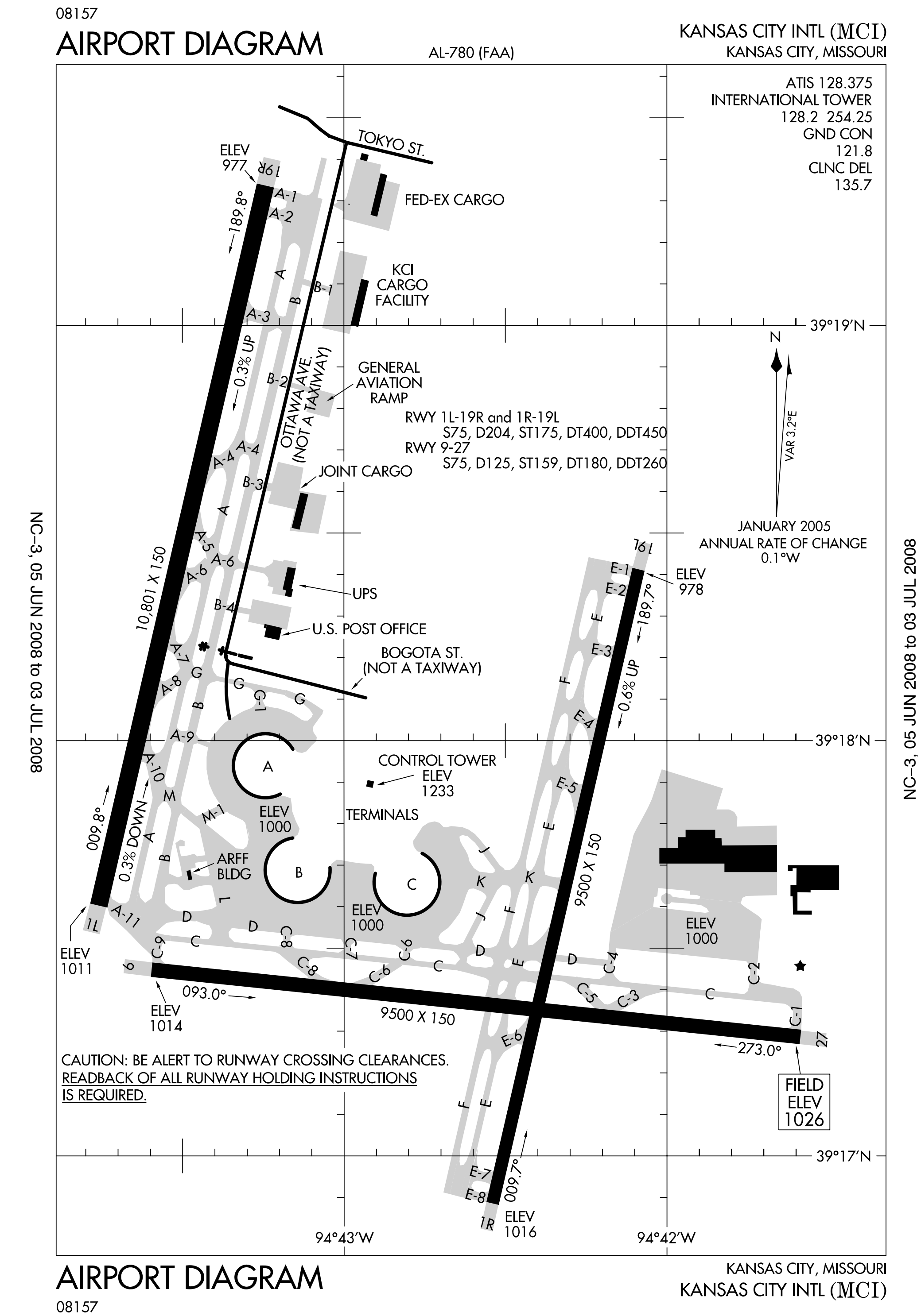
Detroit, Michigan
Detroit Metropolitan Wayne County
ICAO Identifier KDTW



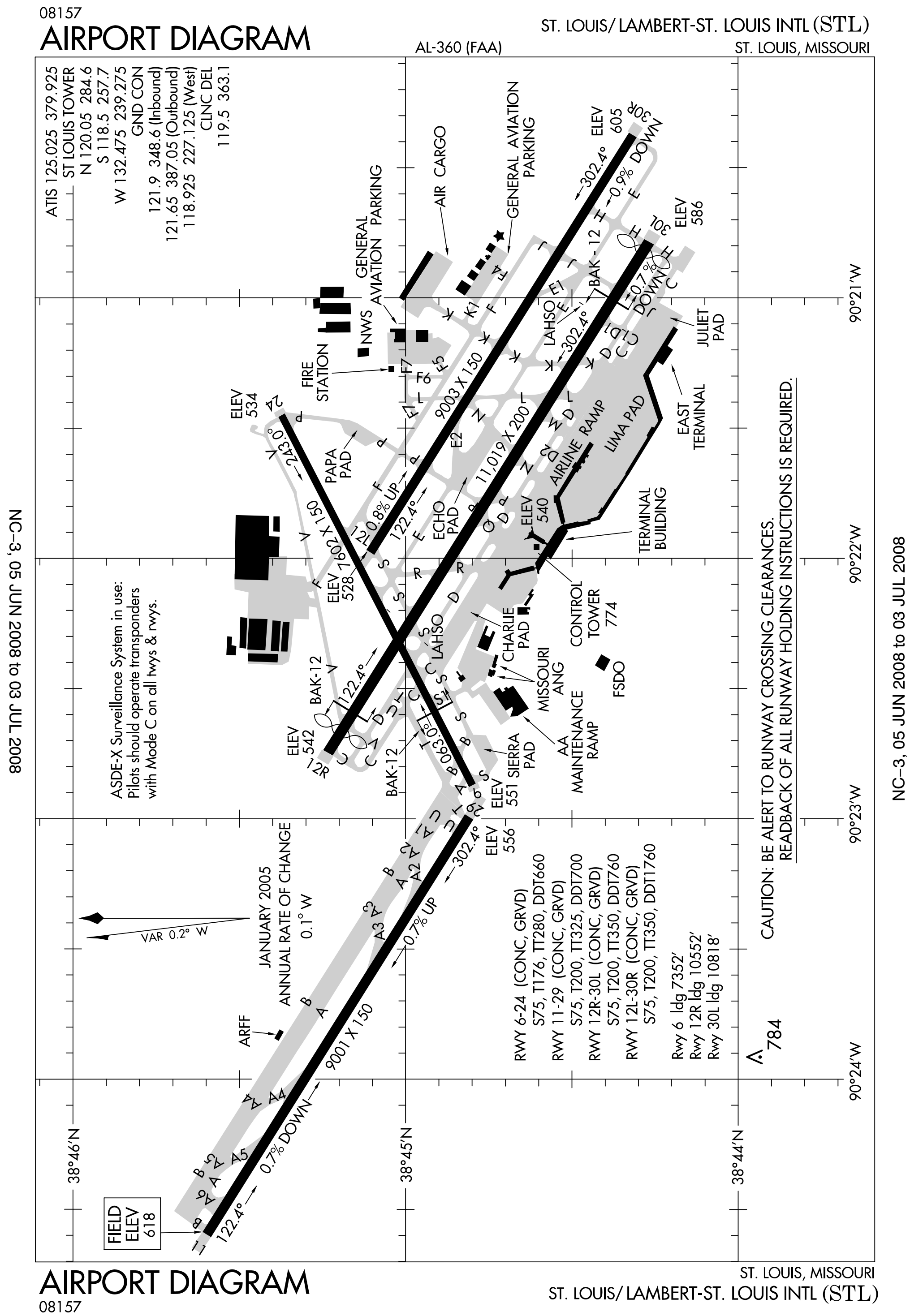
Minneapolis, Minnesota
Minneapolis−St. Paul International
(Wold−Chamberlain)
ICAO Identifier KMSP



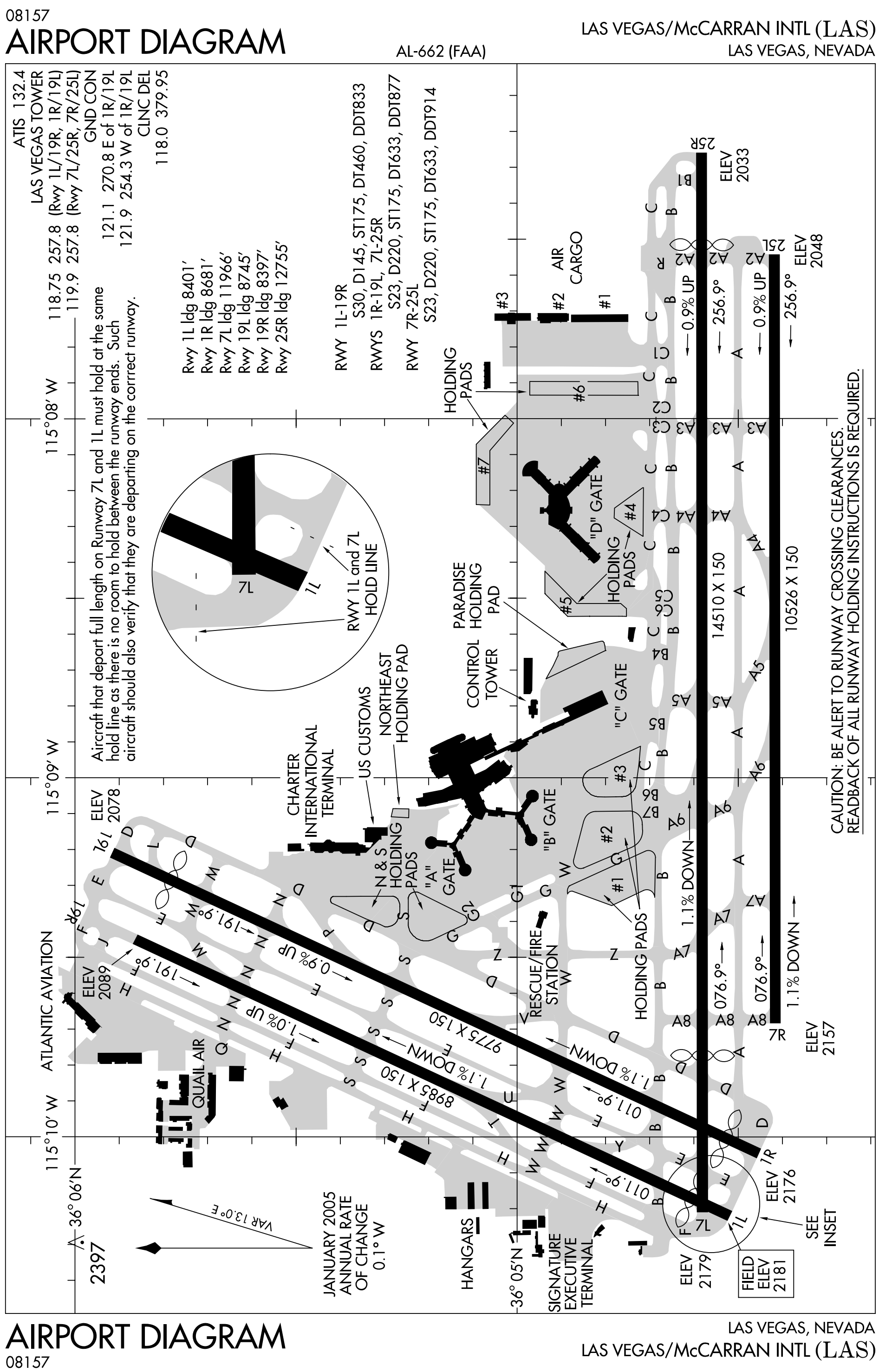
Kansas City, Missouri
Kansas City International
ICAO Identifier KMCI



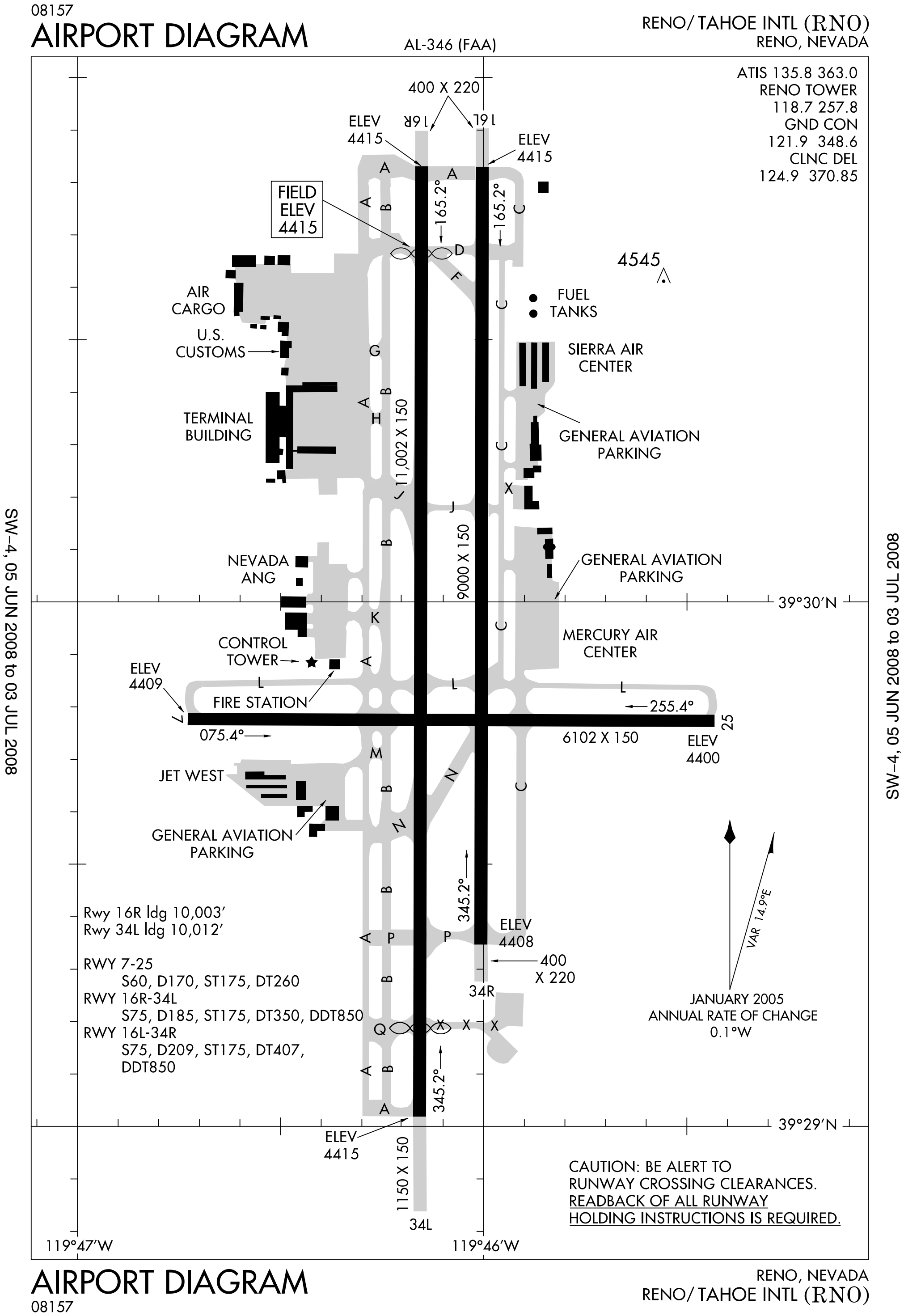
St. Louis, Missouri
Lambert−St. Louis International
ICAO Identifier KSTL



Las Vegas, Nevada
McCarren International
ICAO Identifier KLAS



Reno, Nevada
Reno/Tahoe International
ICAO Identifier KRNO



Newark, New Jersey
Newark Liberty International
ICAO Identifier KEWR

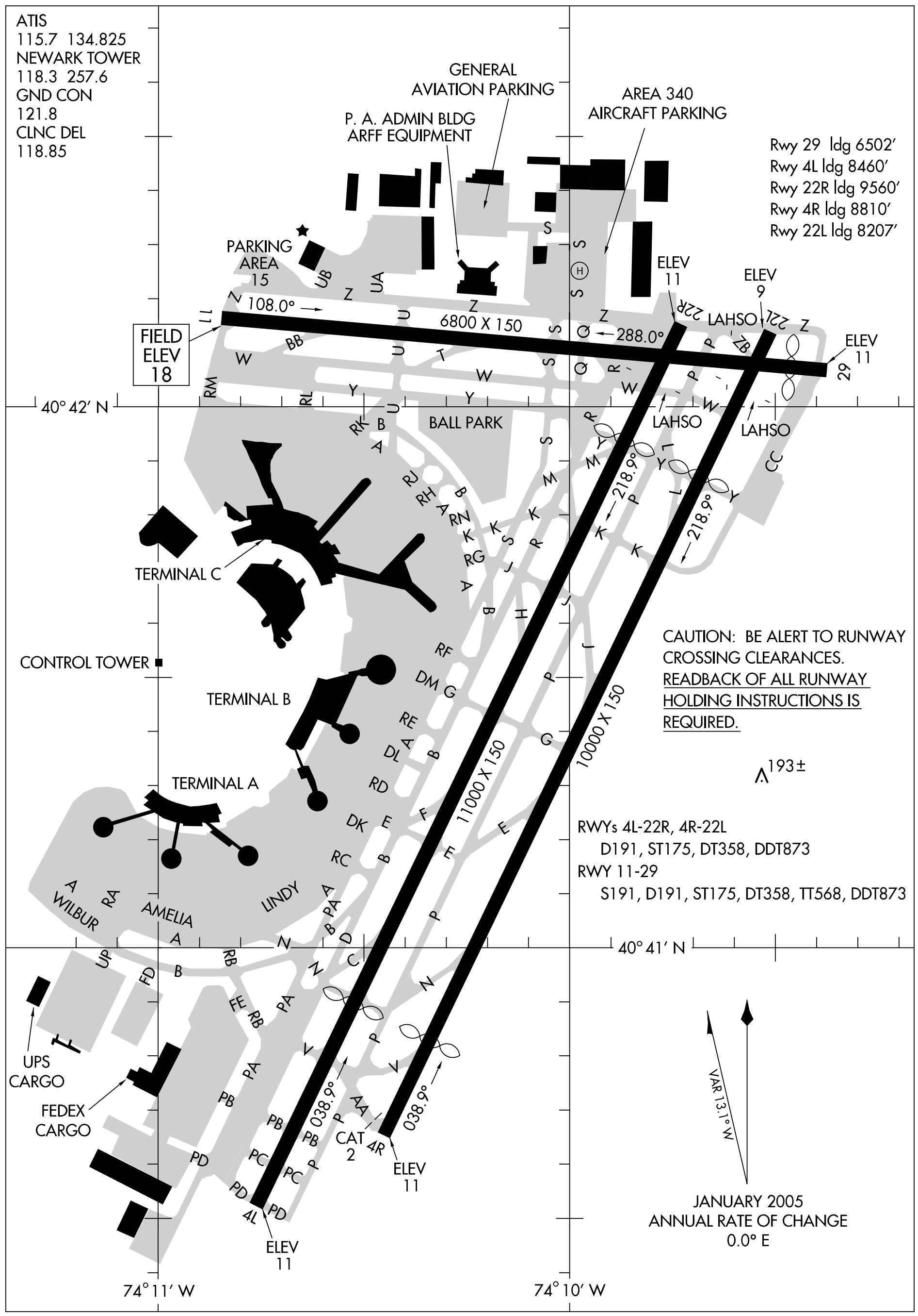
08157

AIRPORT DIAGRAM

AL-285 (FAA)

NEWARK LIBERTY INTL (EWR)
NEWARK, NEW JERSEY

NE-2, 05 JUN 2008 to 03 JUL 2008

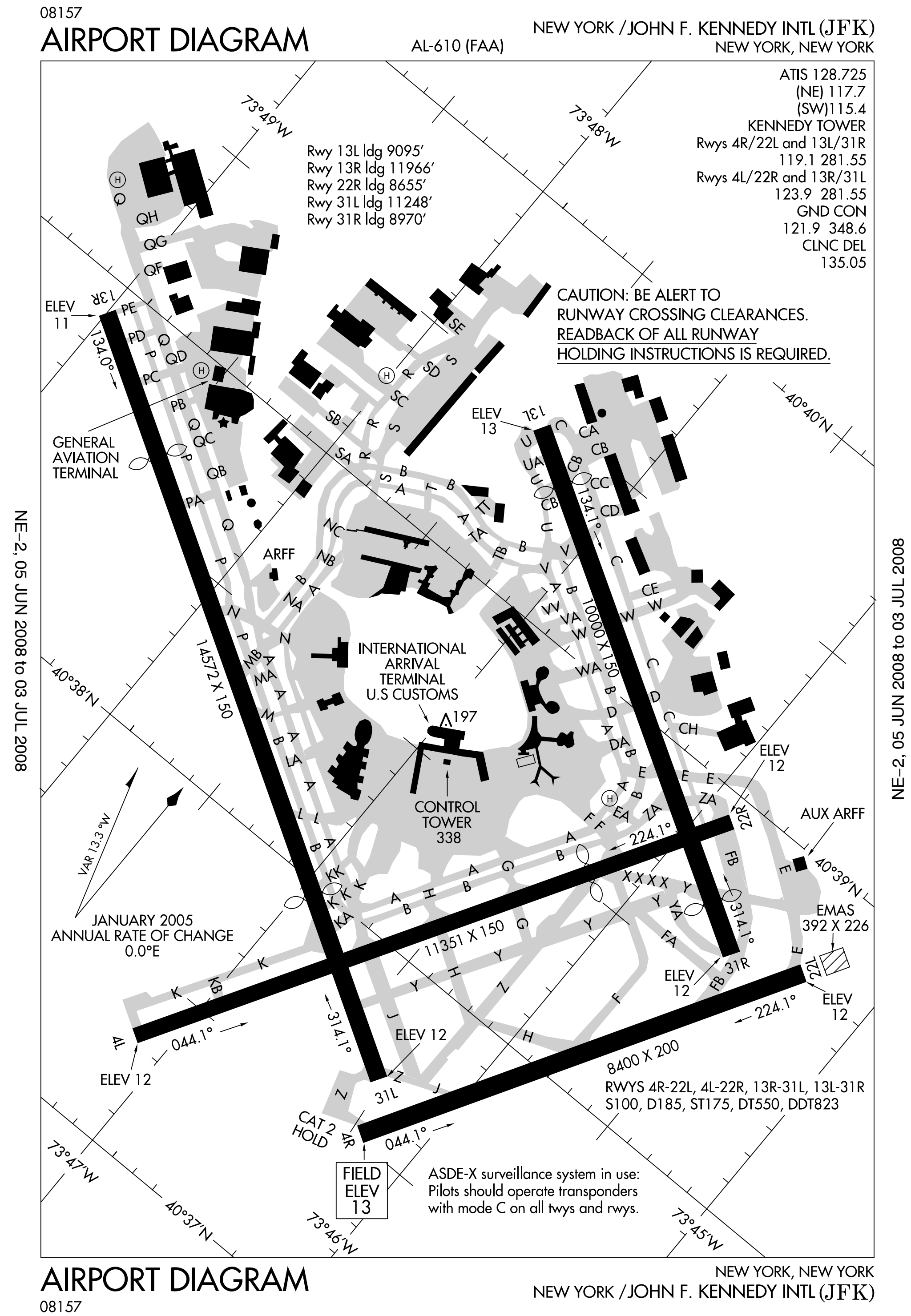


NE-2, 05 JUN 2008 to 03 JUL 2008

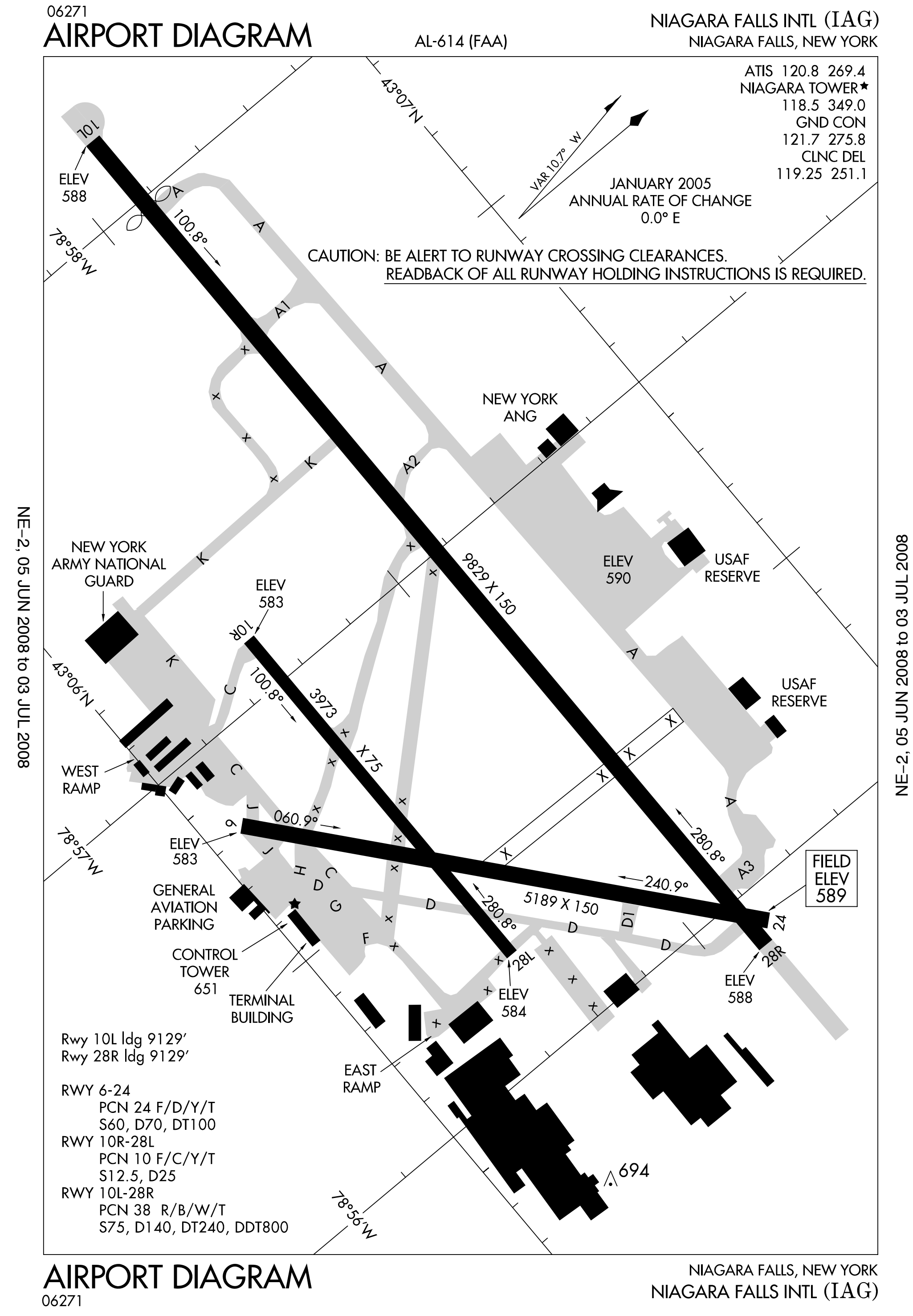
AIRPORT DIAGRAM
08157

NEWARK, NEW JERSEY
NEWARK LIBERTY INTL (EWR)

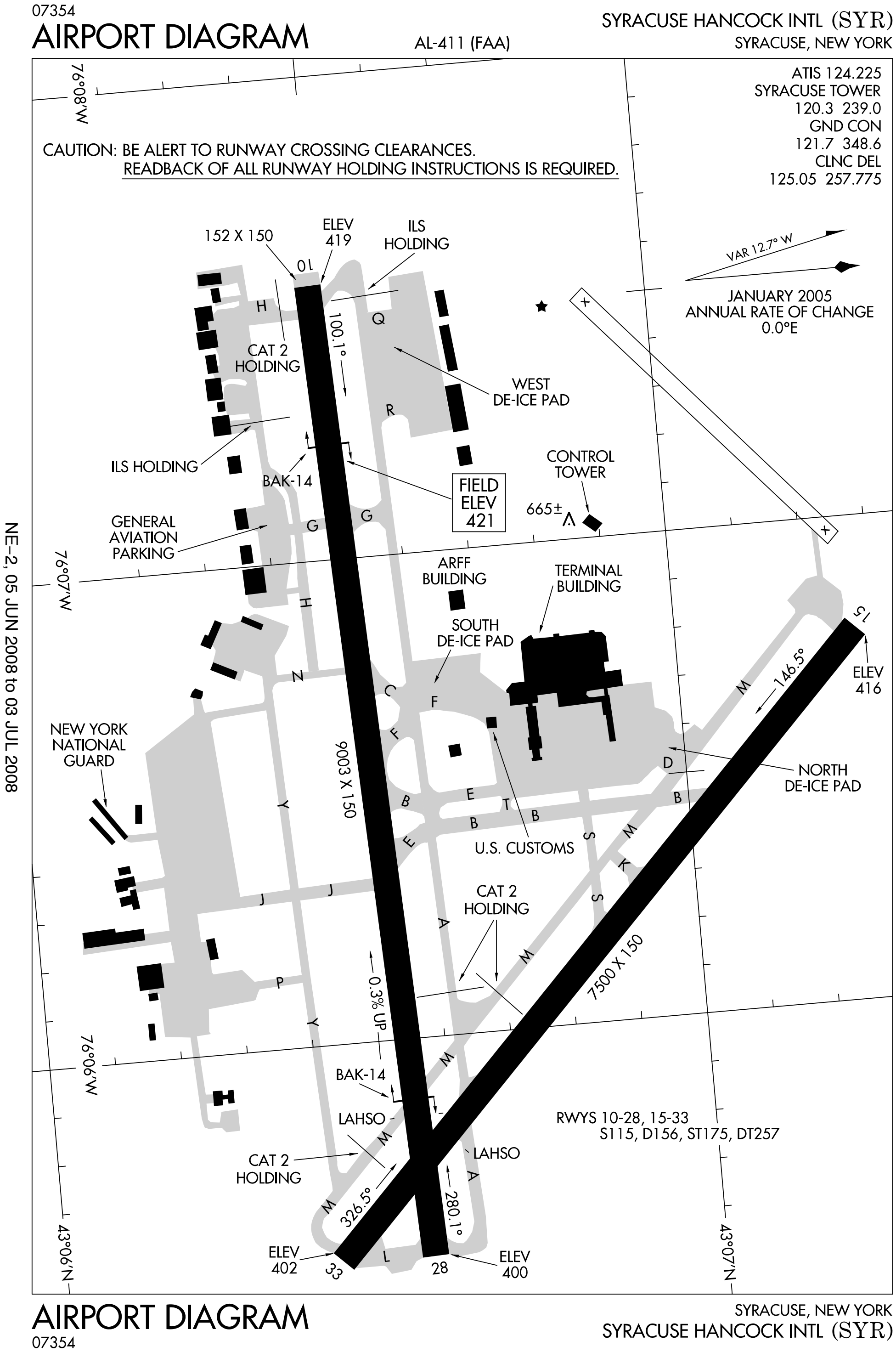
New York, New York
John F. Kennedy International
ICAO Identifier KJFK



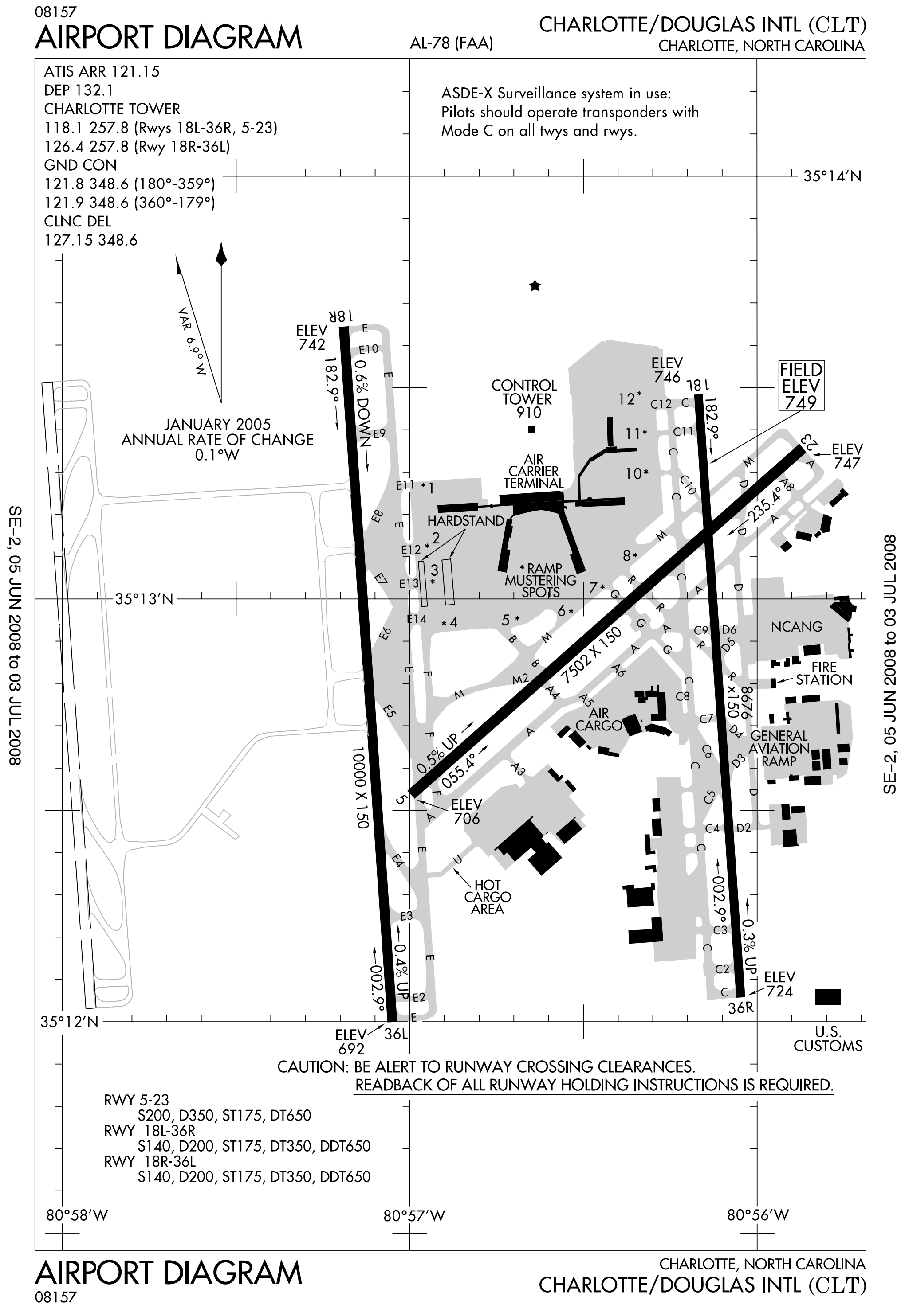
Niagara Falls, New York
Niagara Falls International
ICAO Identifier KIAG



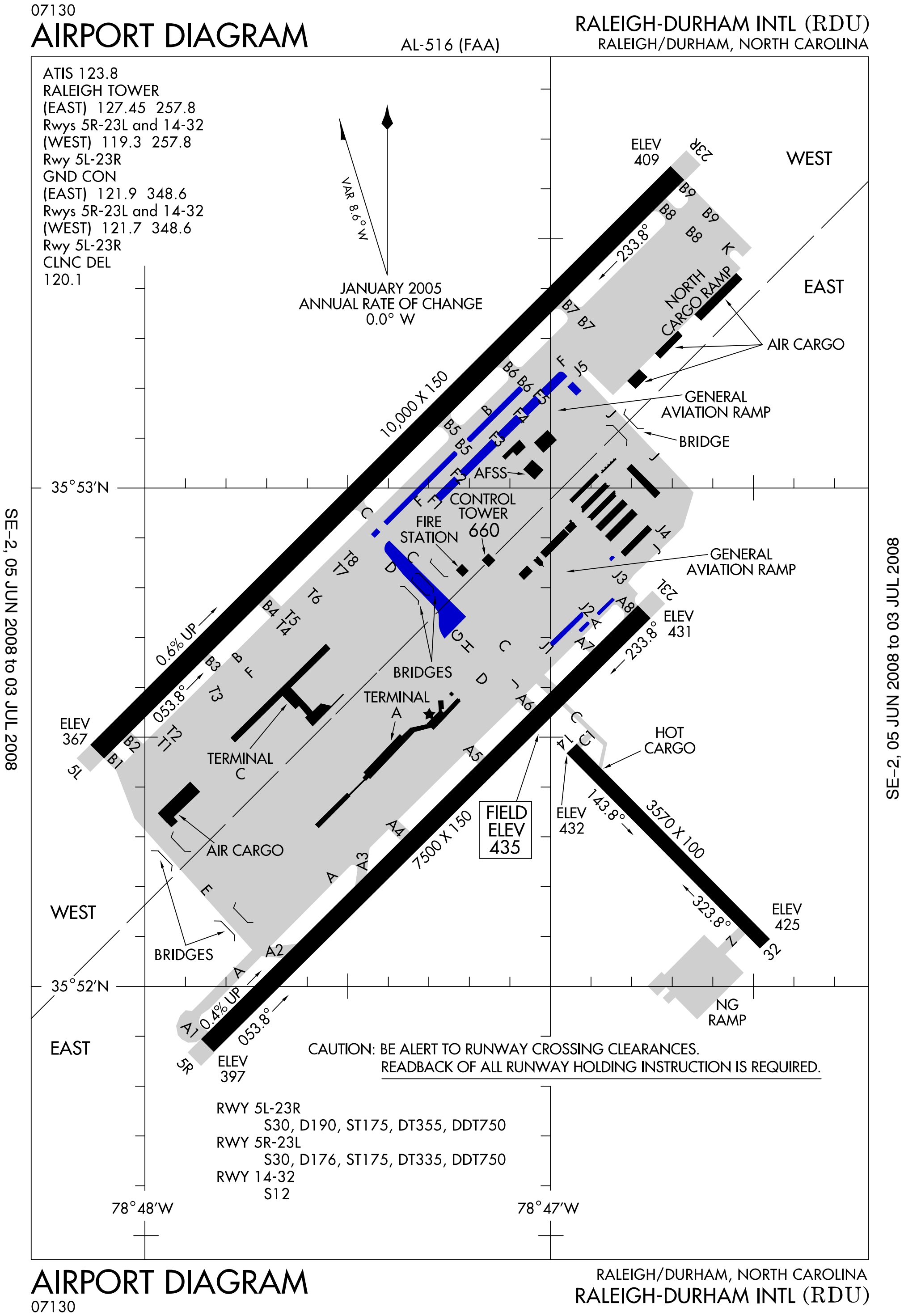
Syracuse, New York
Syracuse Hancock International
ICAO Identifier KSYR



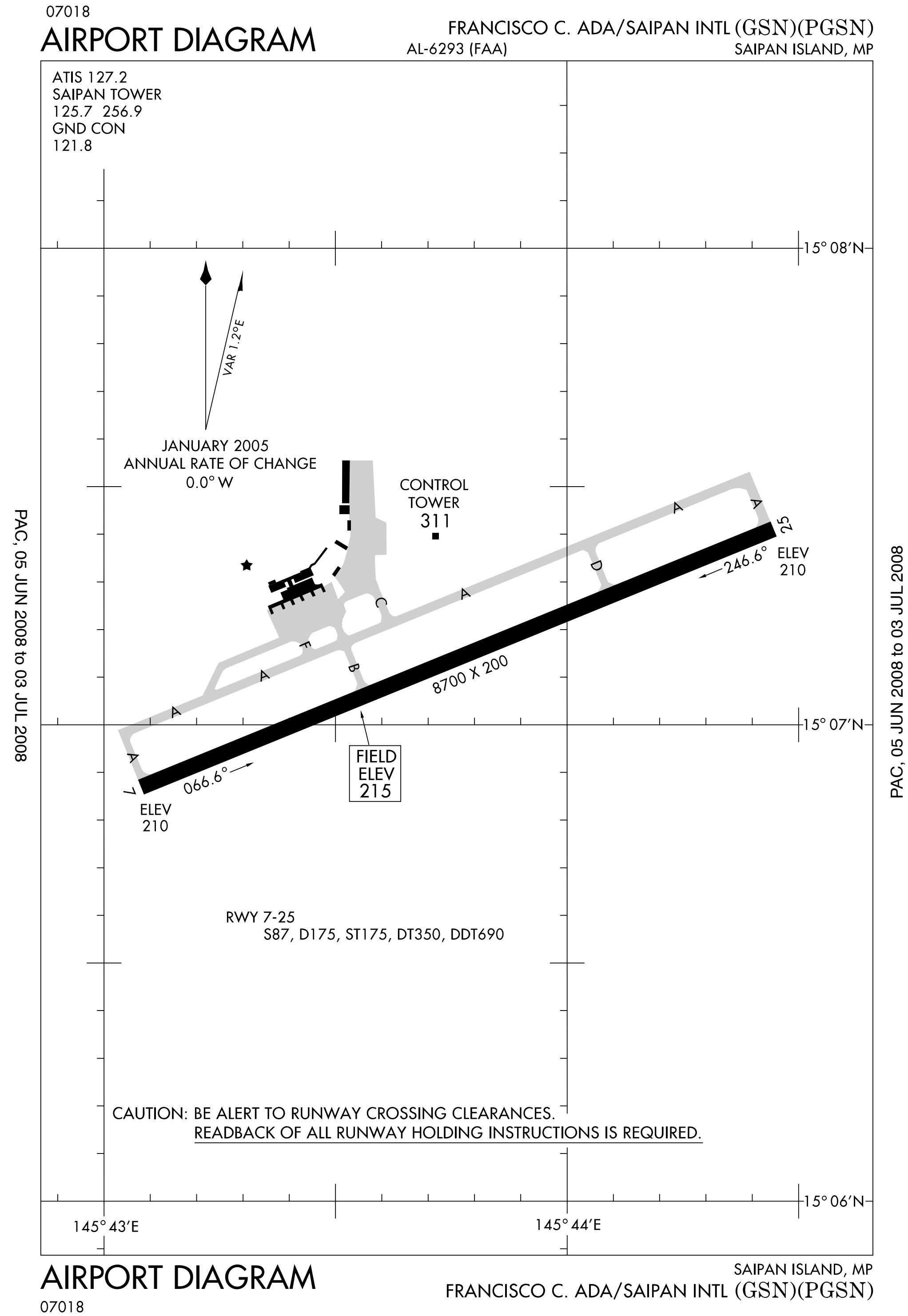
Charlotte, North Carolina
Charlotte/Douglas International
ICAO Identifier KCLT



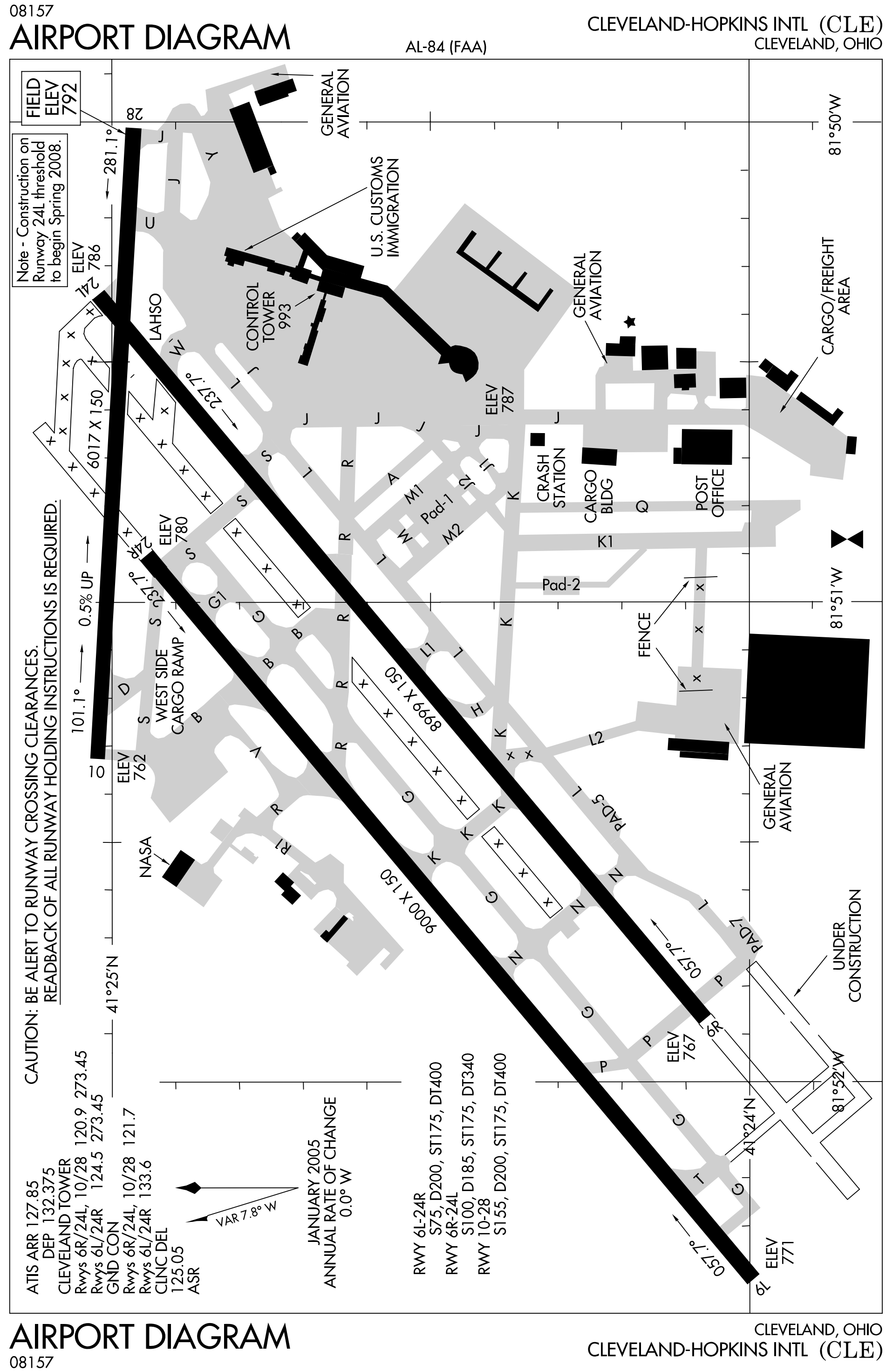
Raleigh−Durham, North Carolina
Raleigh−Durham International
ICAO Identifier KRDU



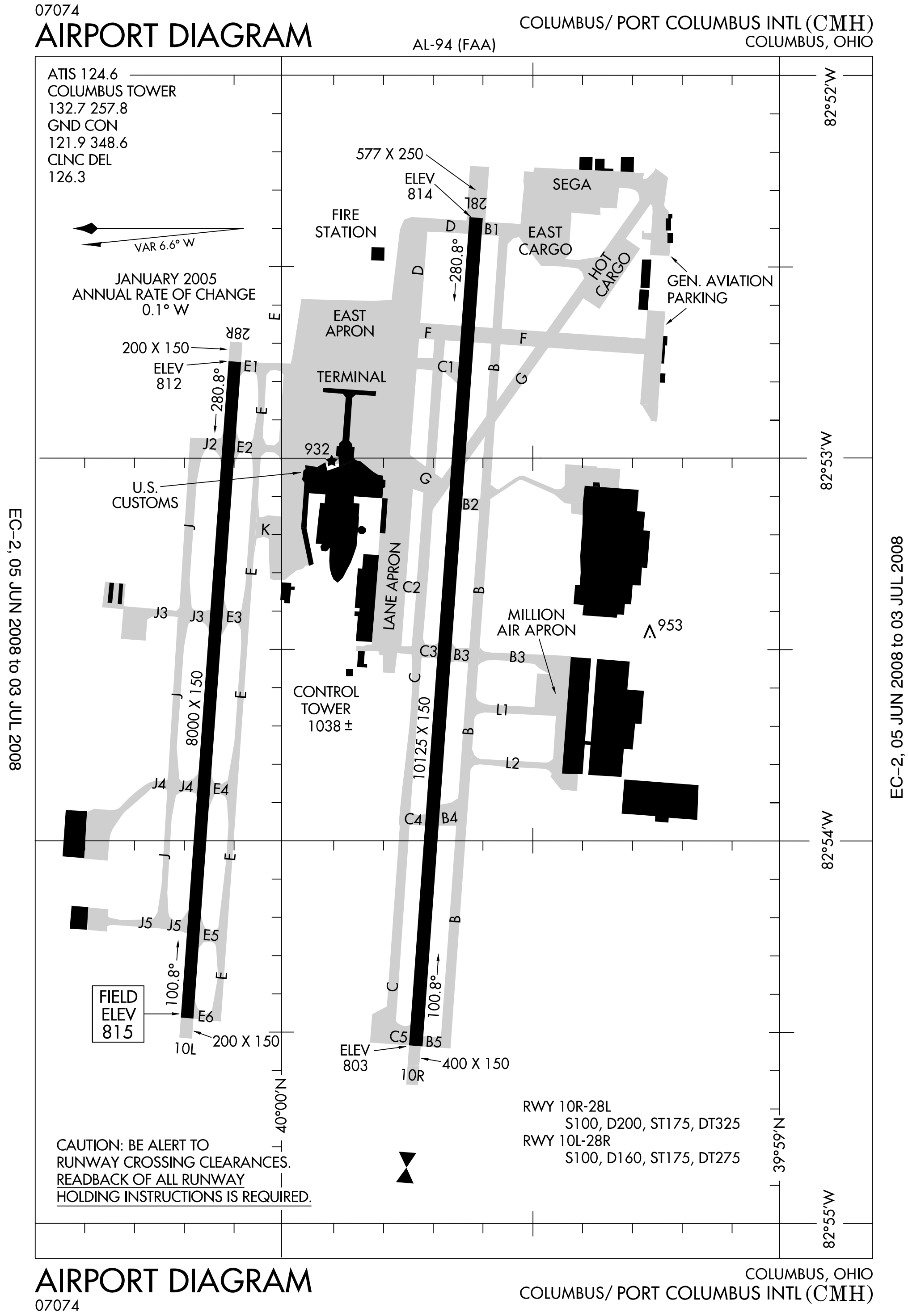
North Mariana Islands
Saipan Island
Francisco C. Ada/Saipan International
ICAO Identifier PGSN



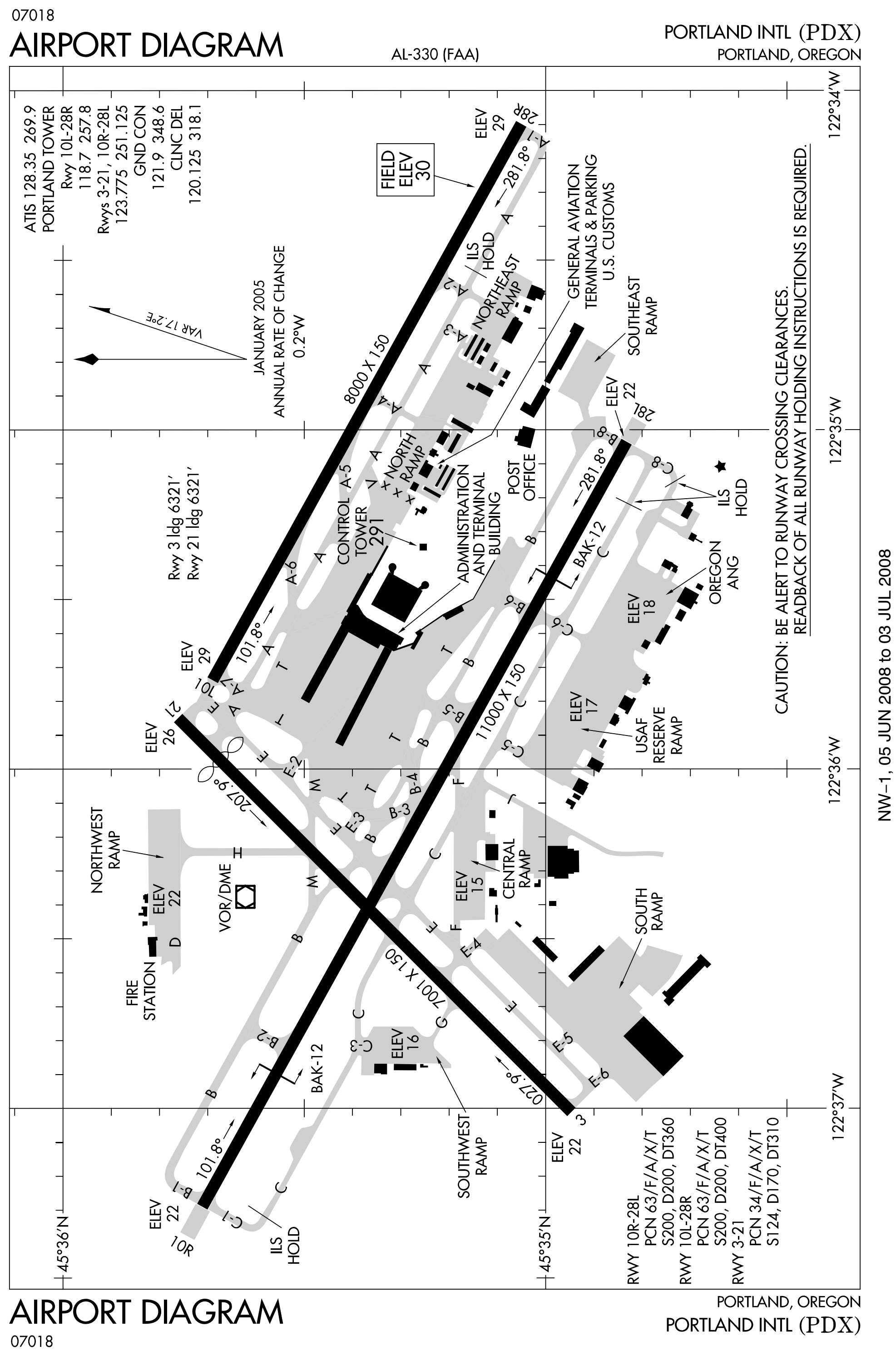
Cleveland, Ohio
Cleveland−Hopkins International
ICAO Identifier KCLE



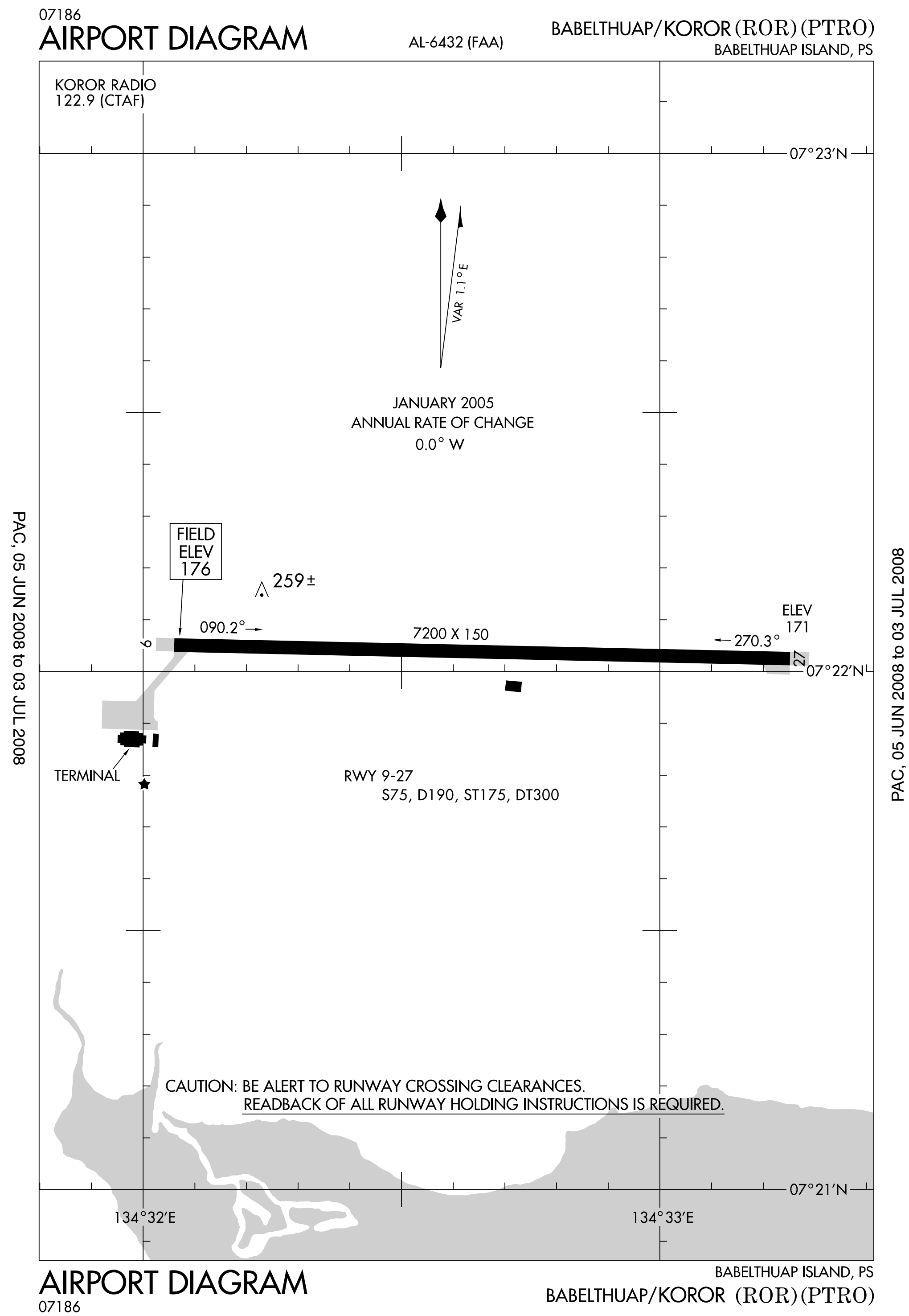
Columbus, Ohio
Port Columbus International
ICAO Identifier KCMH



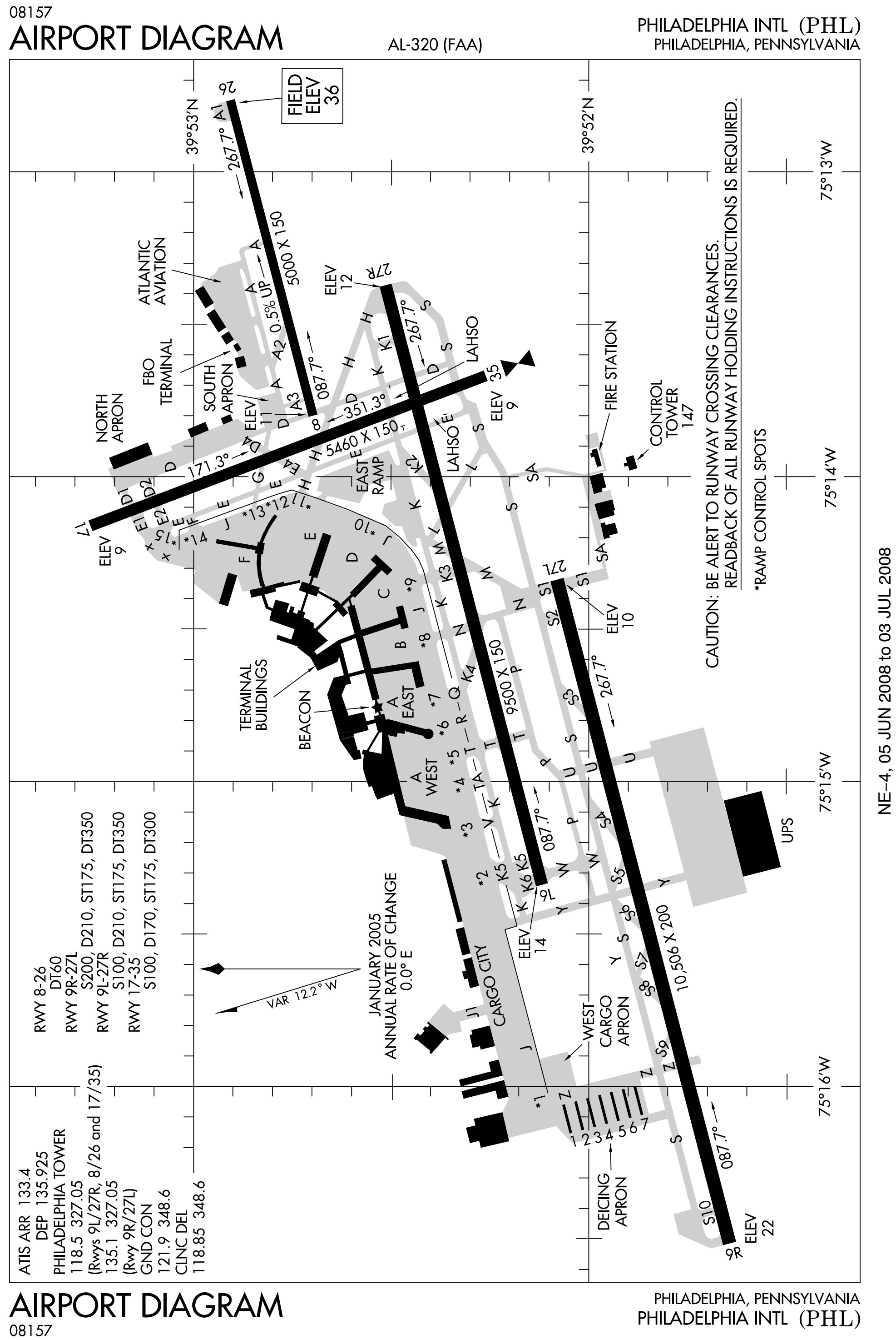
Portland, Oregon
Portland International
ICAO Identifier KPDX



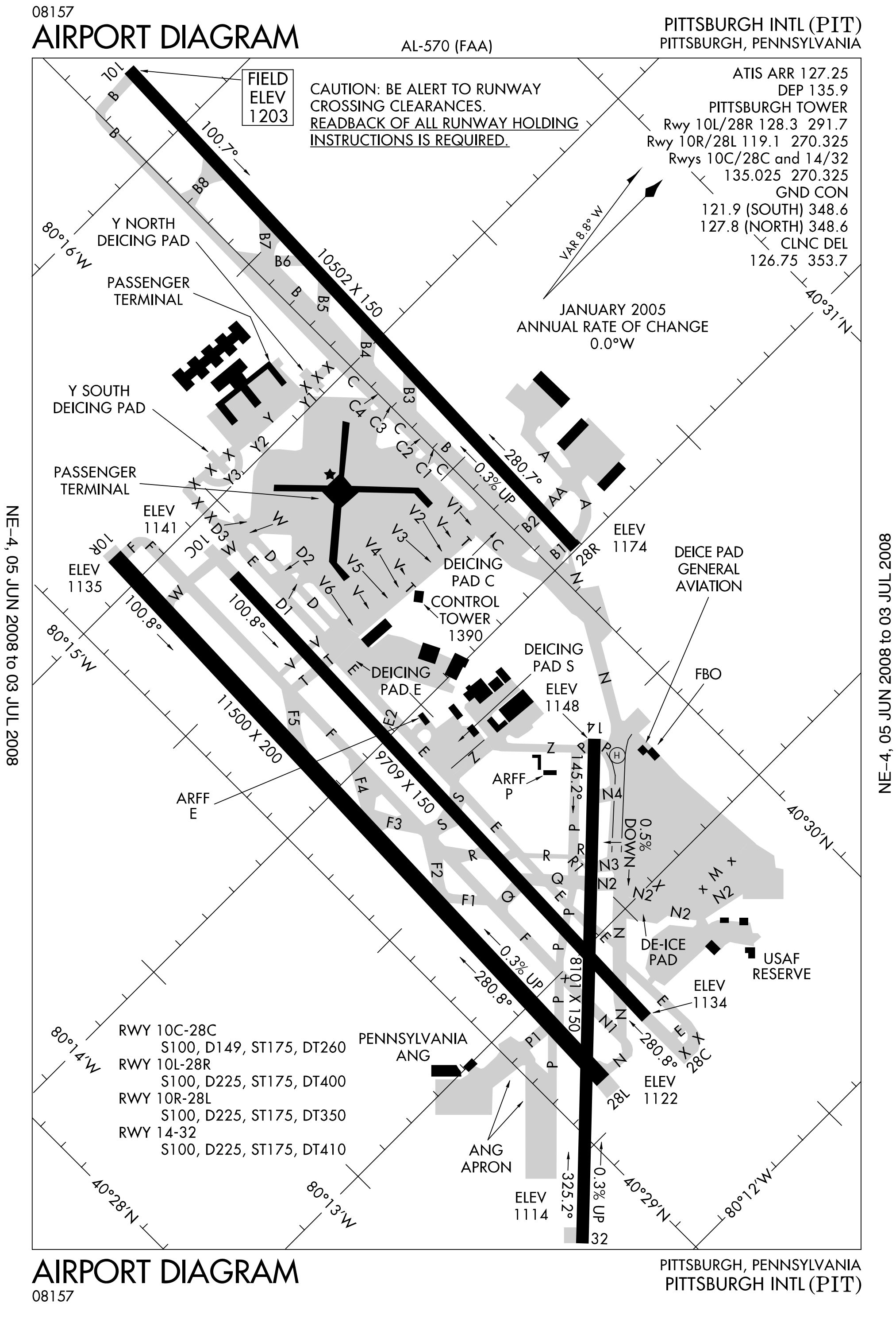
Babelthuap Island
Babelthuap/Koror
ICAO Identifier PTRO



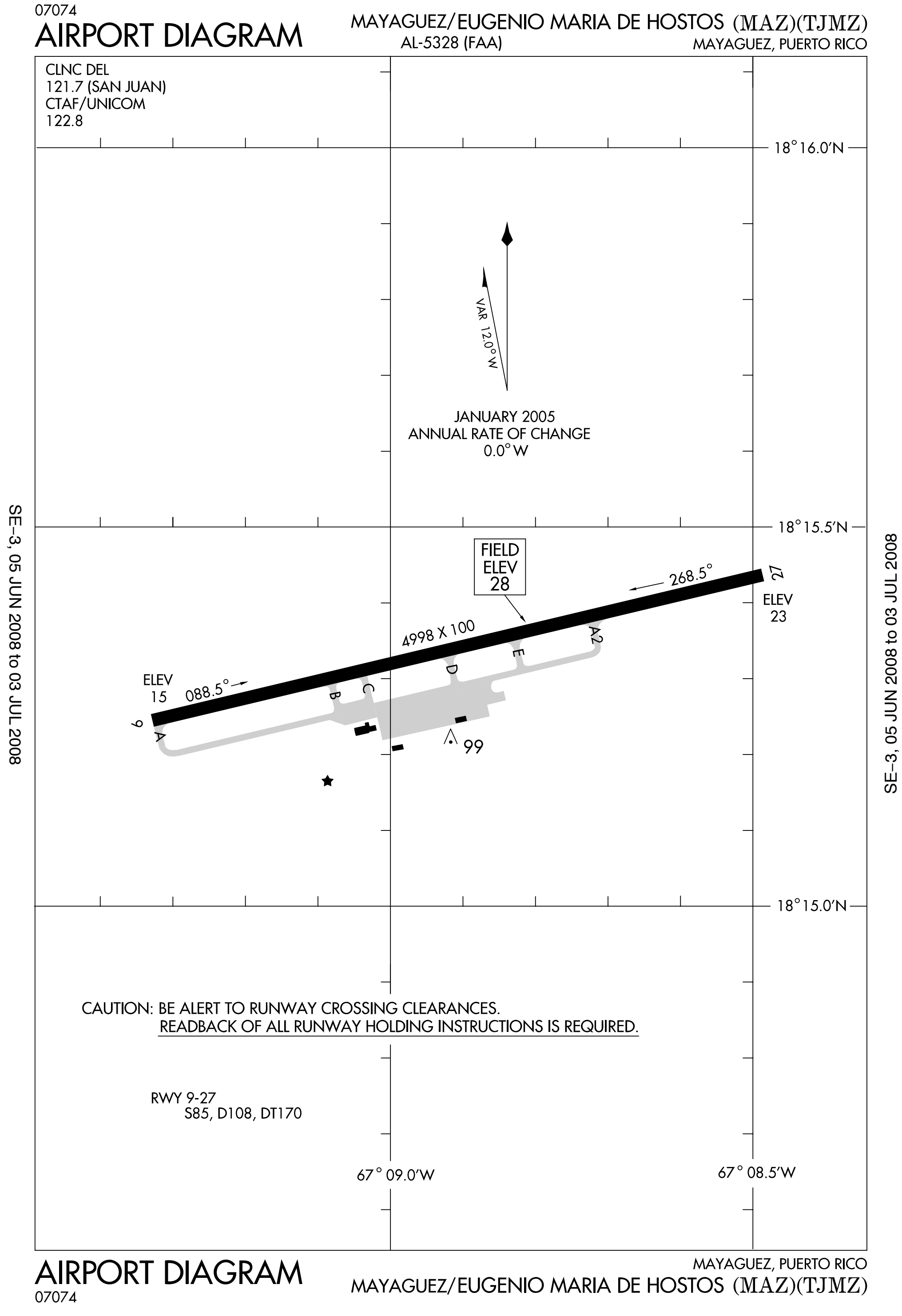
Philadelphia, Pennsylvania
Philadelphia International
ICAO Identifier KPHL



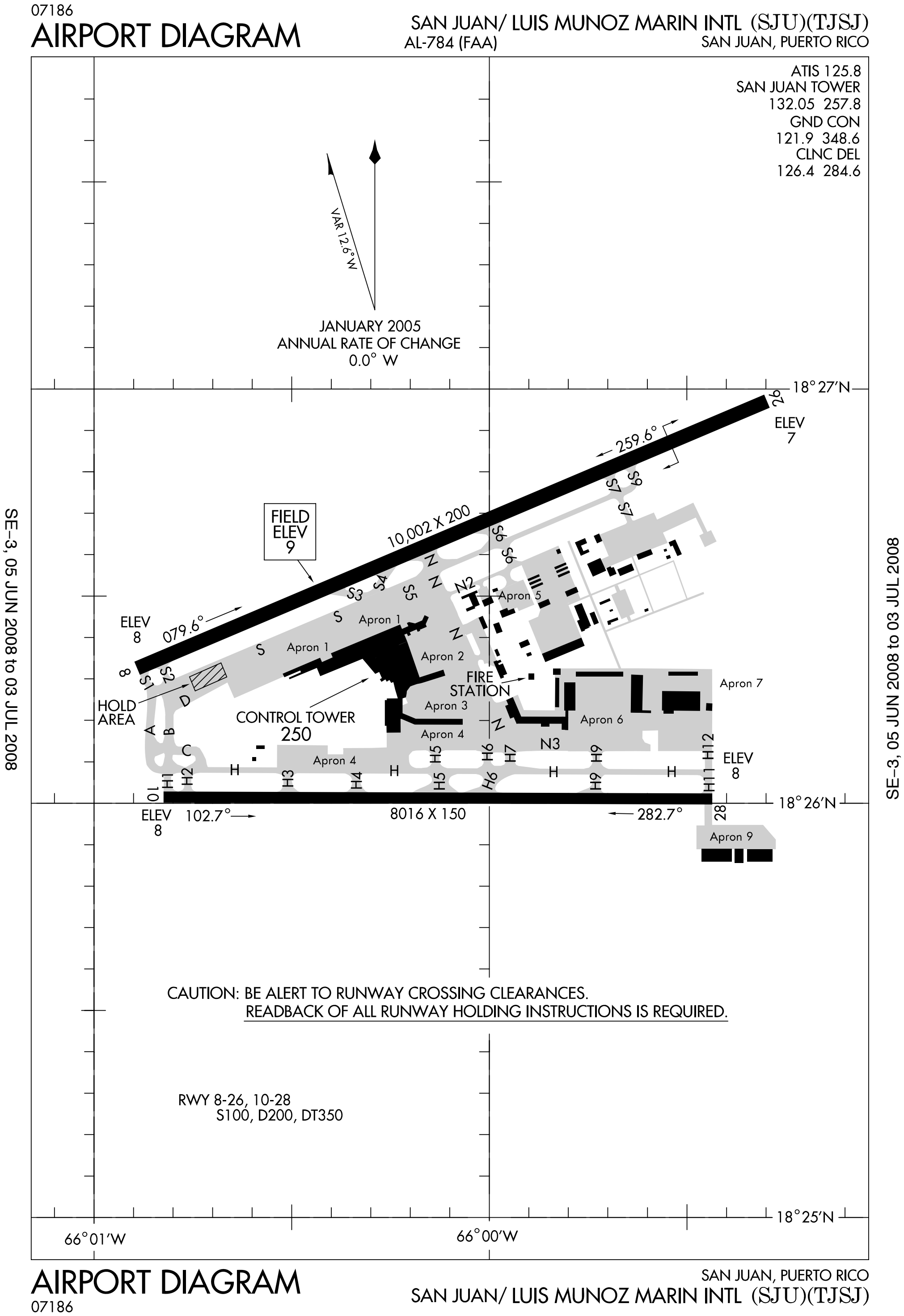
Pittsburgh, Pennsylvania
Pittsburgh International
ICAO Identifier KPIT



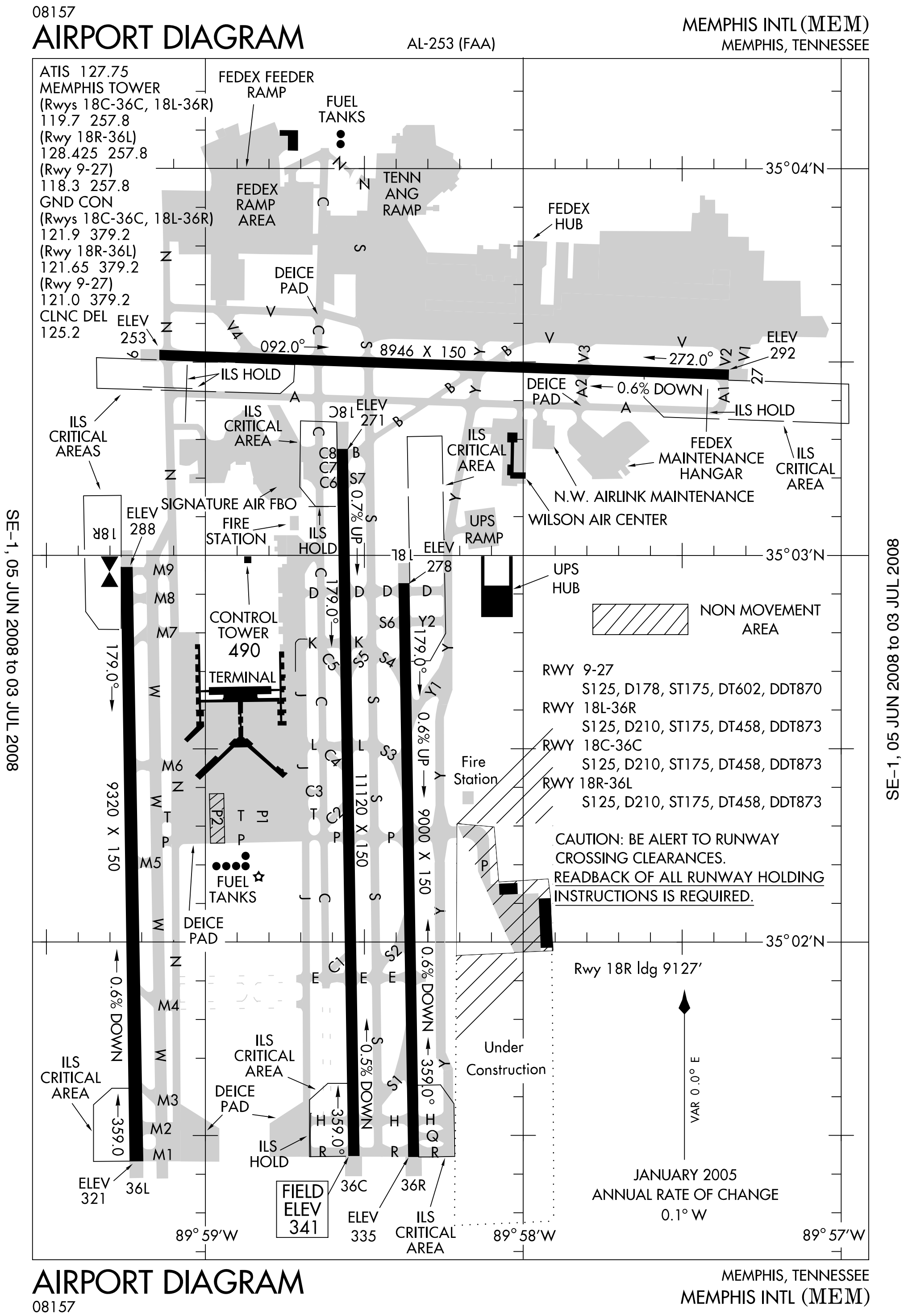
Mayaguez, Puerto Rico
Eugenio Maria De Hostos
ICAO Identifier TJMZ



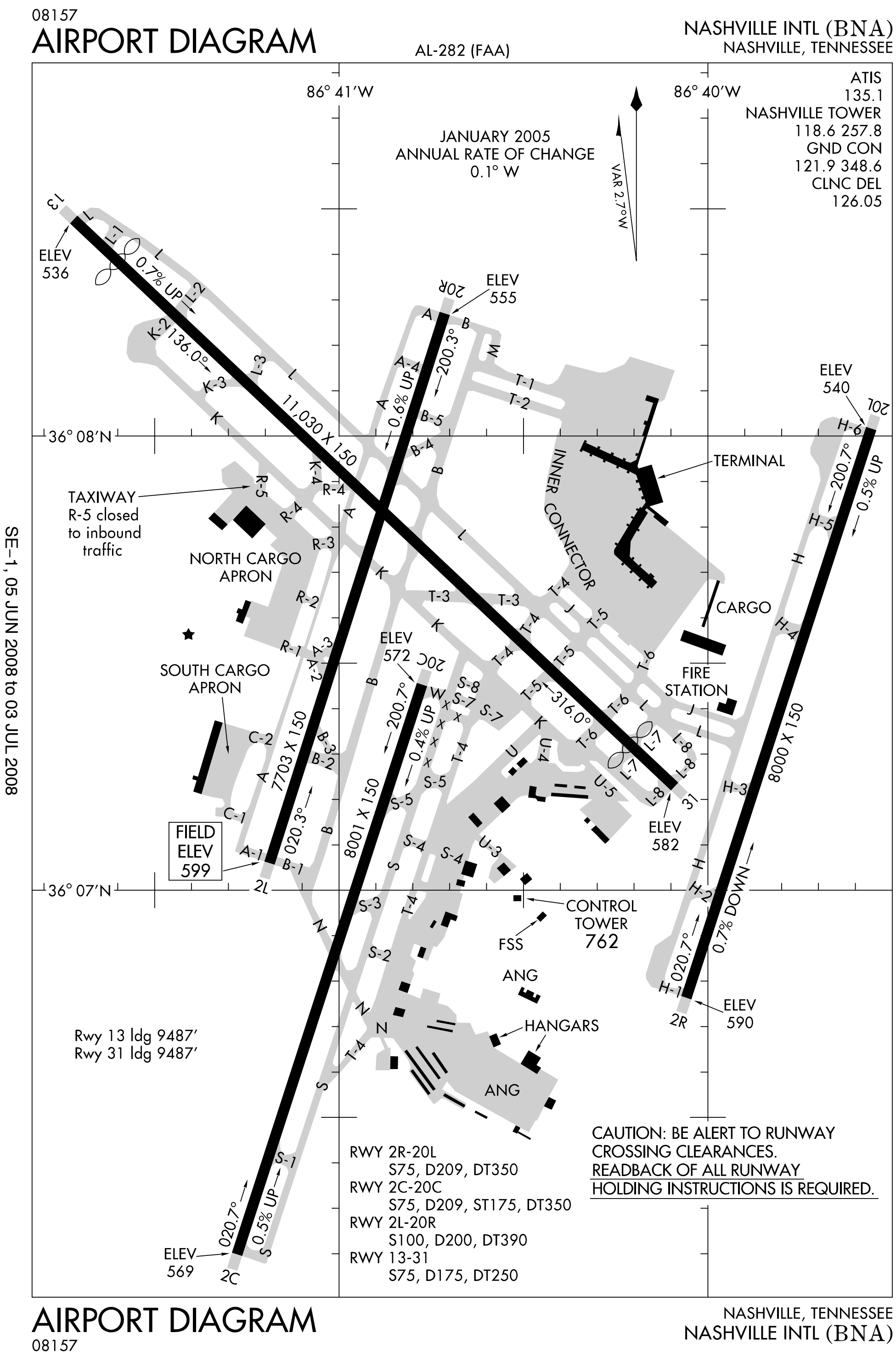
San Juan, Puerto Rico
Luis Munoz Marin International
ICAO Identifier TJSJ



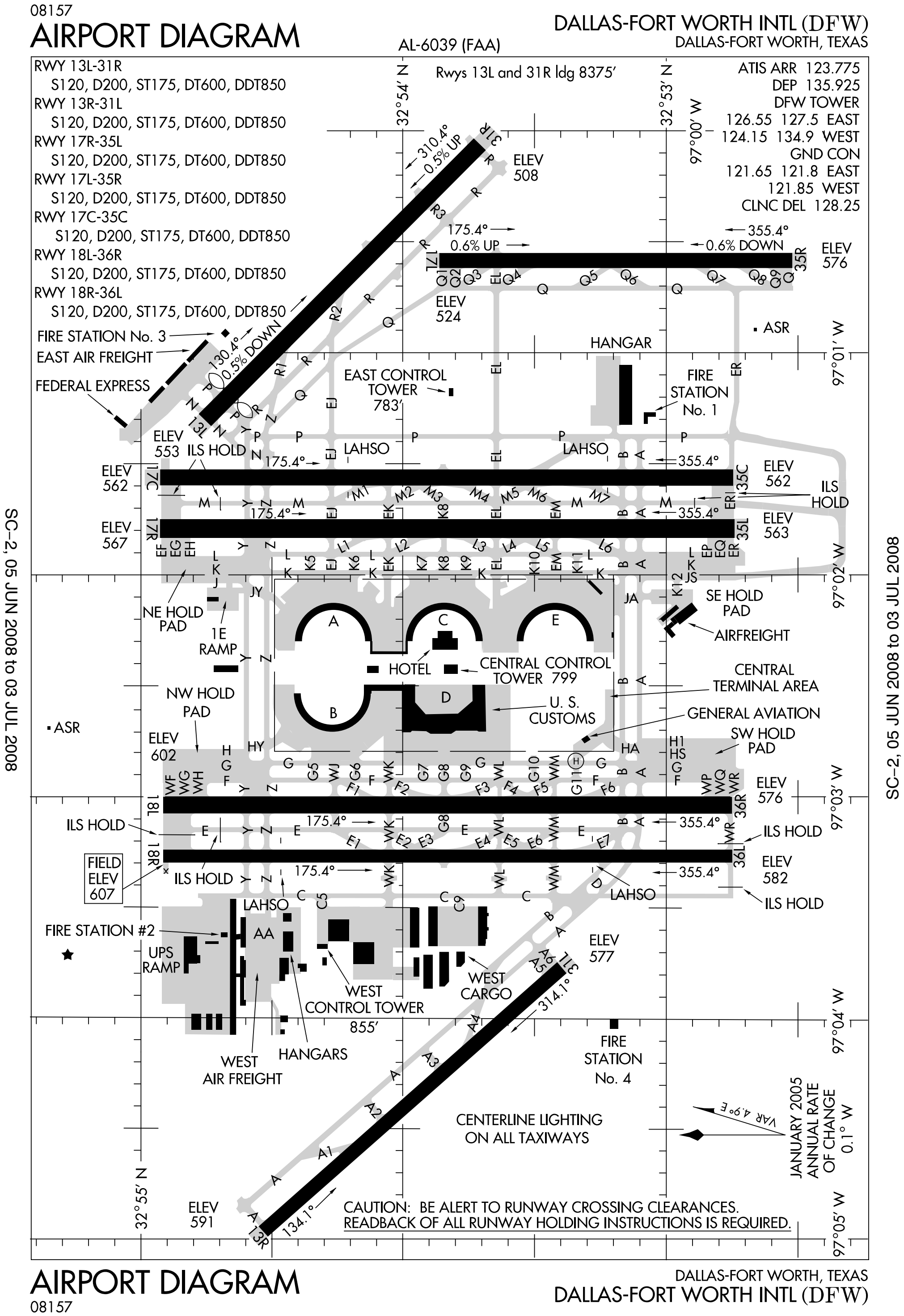
Memphis, Tennessee
Memphis International
ICAO Identifier KMEM



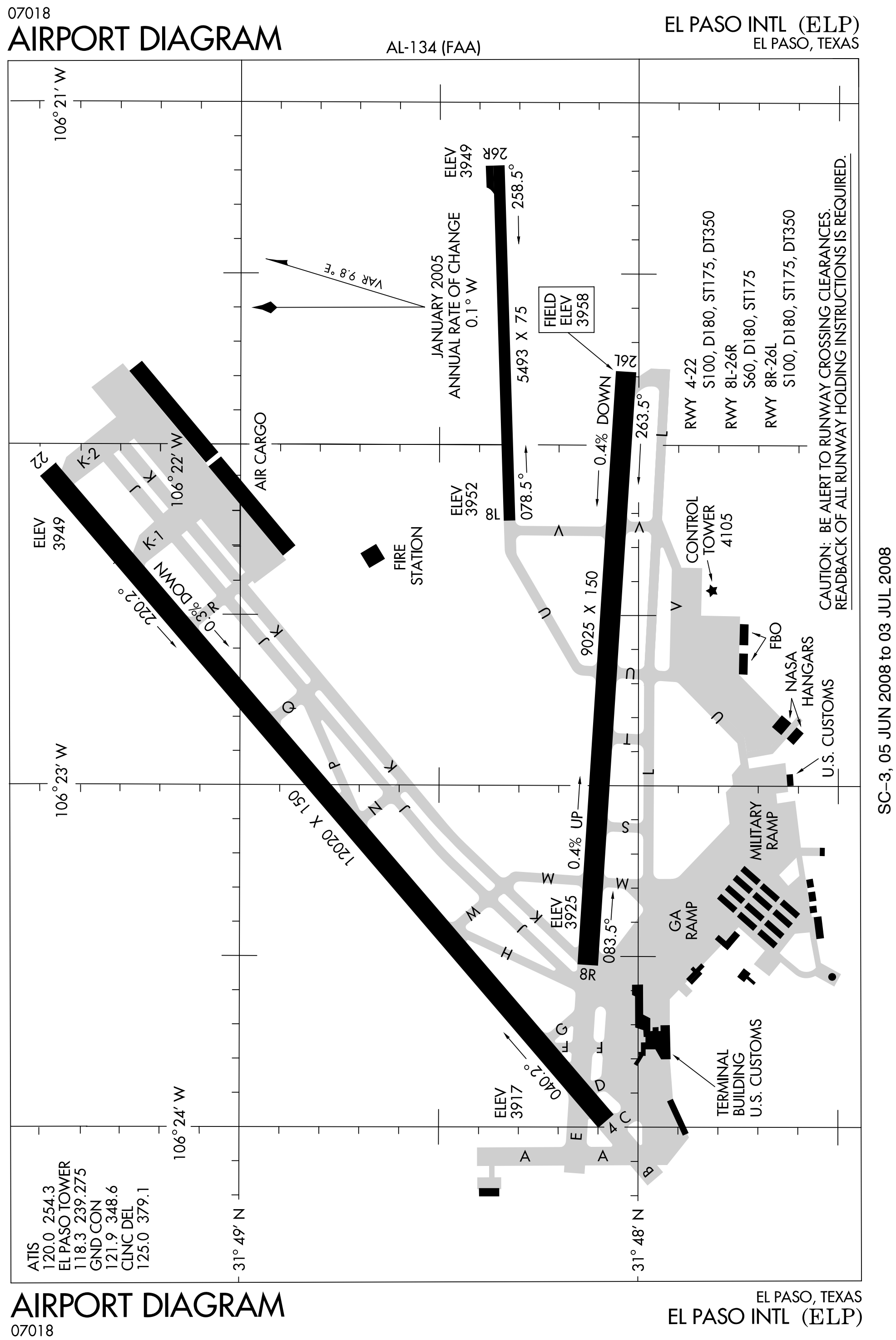
Nashville, Tennessee
Nashville International
ICAO Identifier KBNA



Dallas, Texas
Dallas−Fort Worth International
ICAO Identifier KDFW



El Paso, Texas
El Paso International
ICAO Identifier KELP



Houston, Texas
George Bush Intercontinental/Houston
ICAO Identifier KIAH

08045
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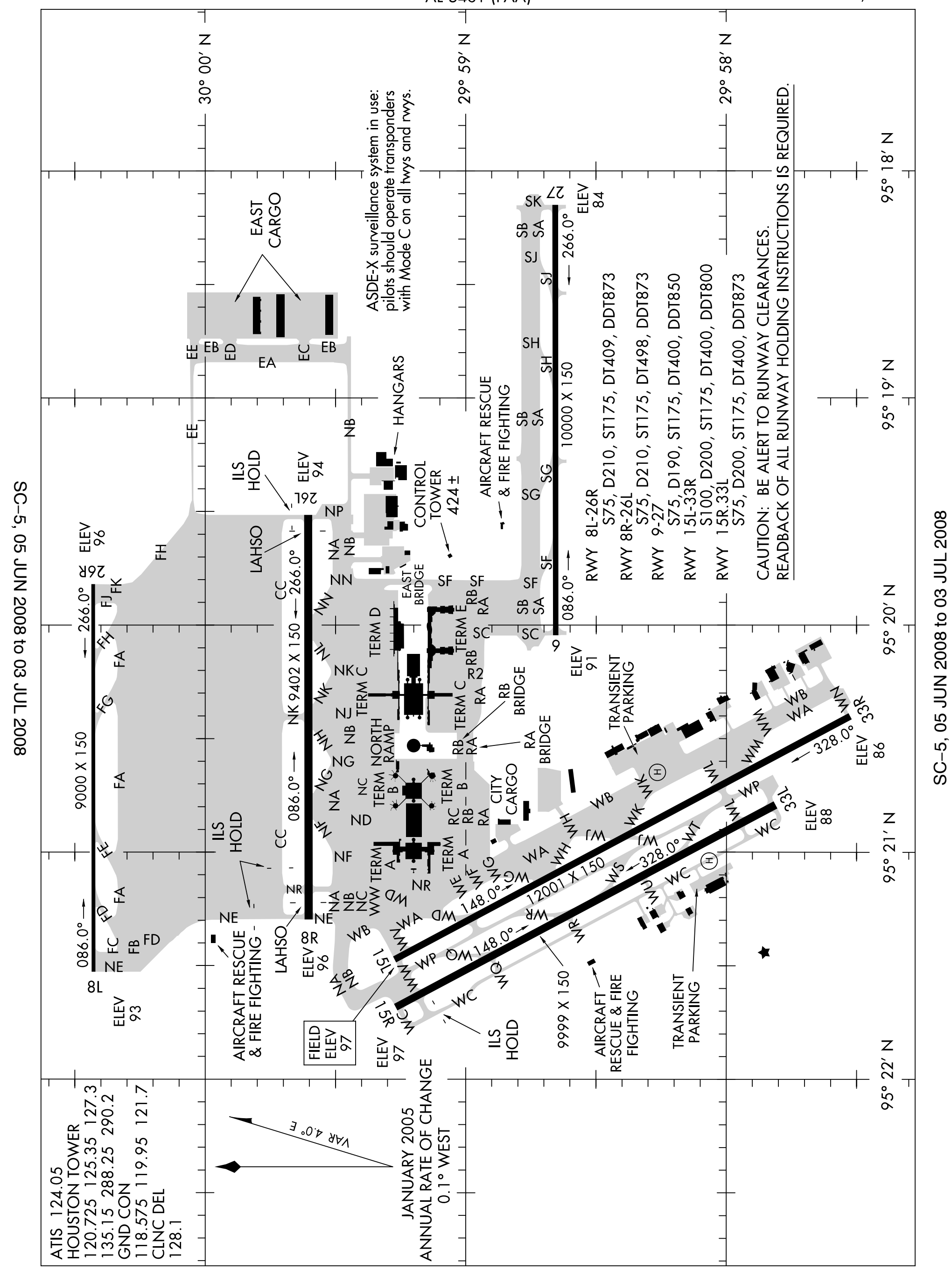
AL-5461 (FAA)
HOUSTON, TEXAS



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08045

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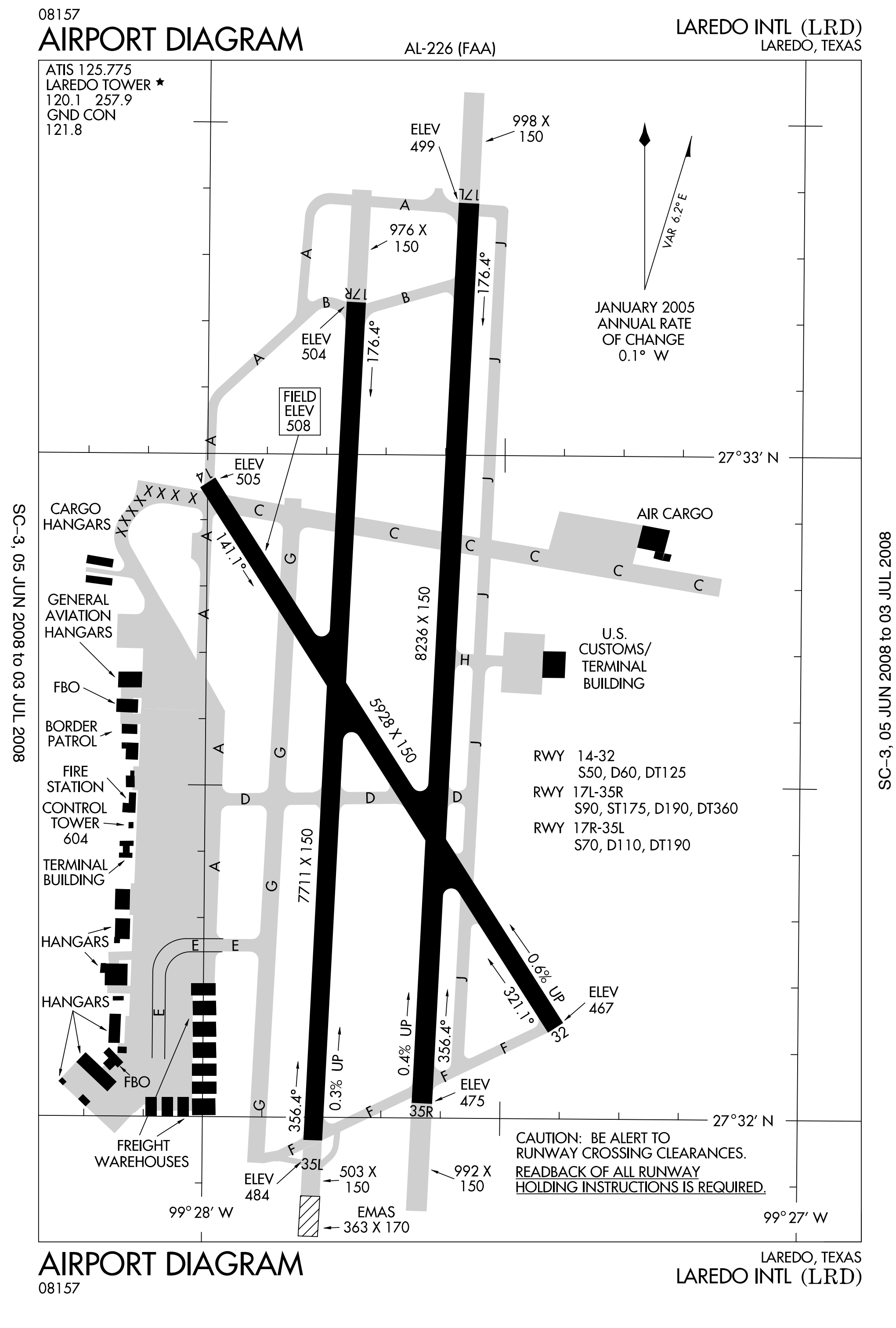

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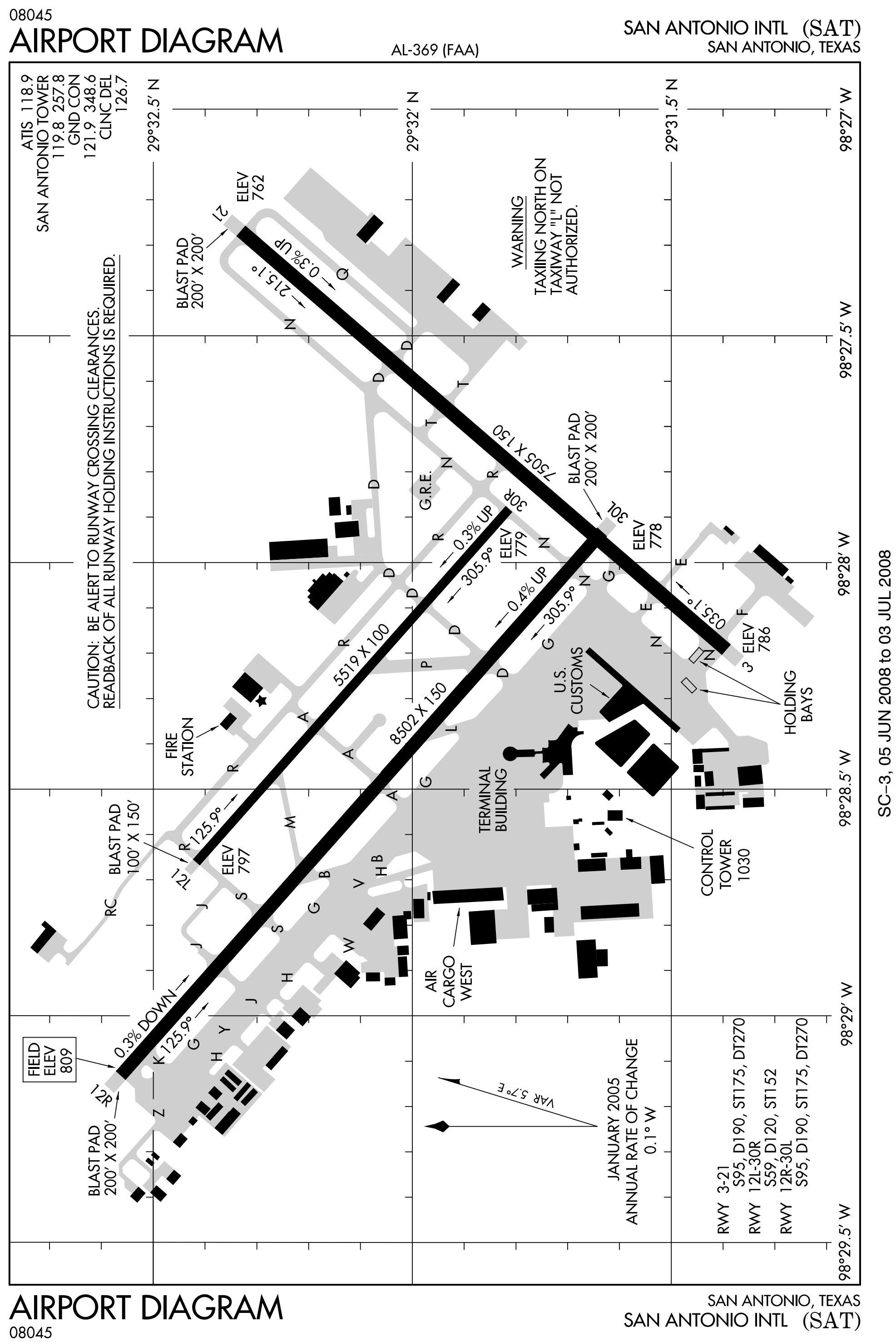

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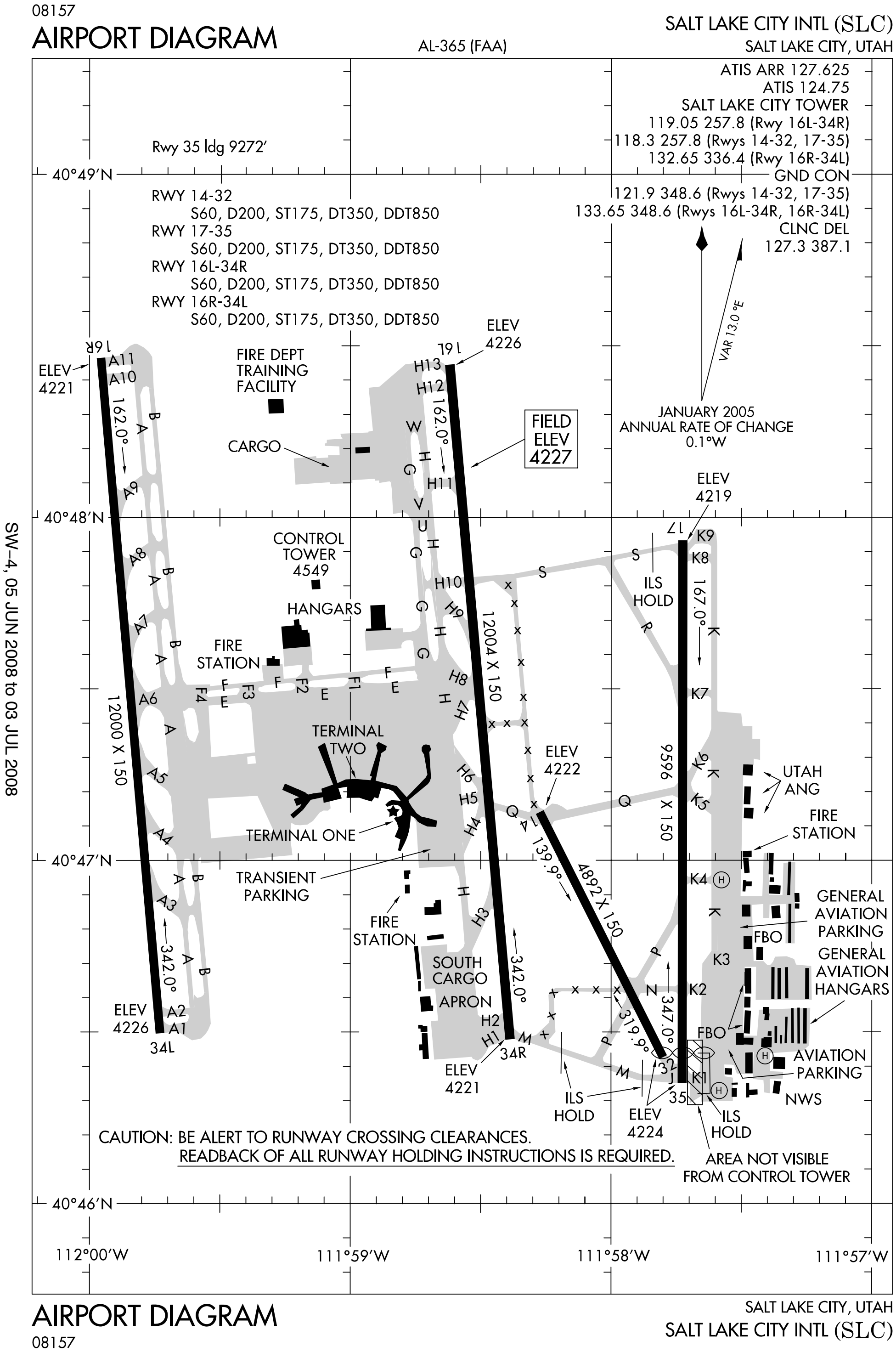

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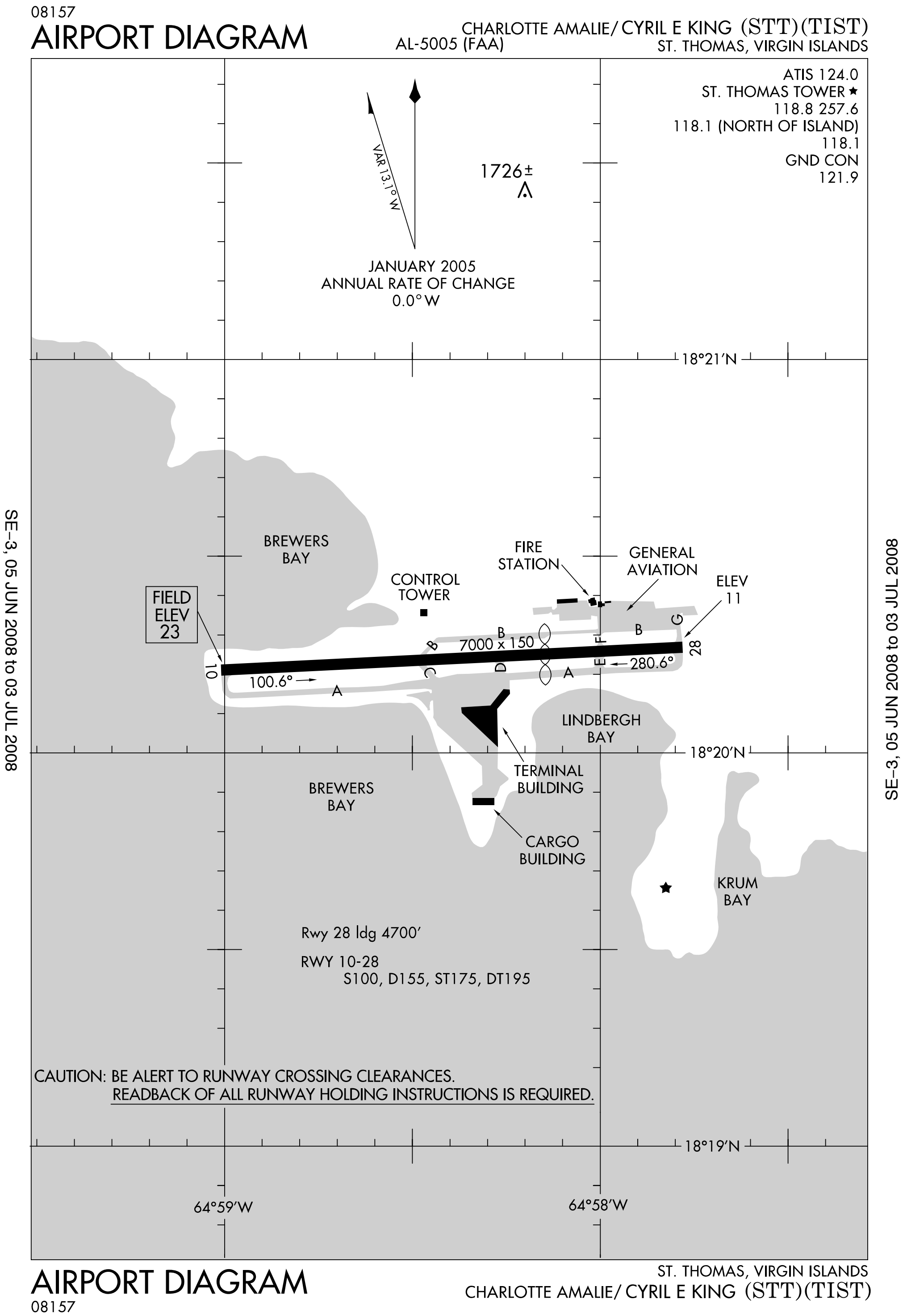
Cyril E. King
ICAO Identifier TIST



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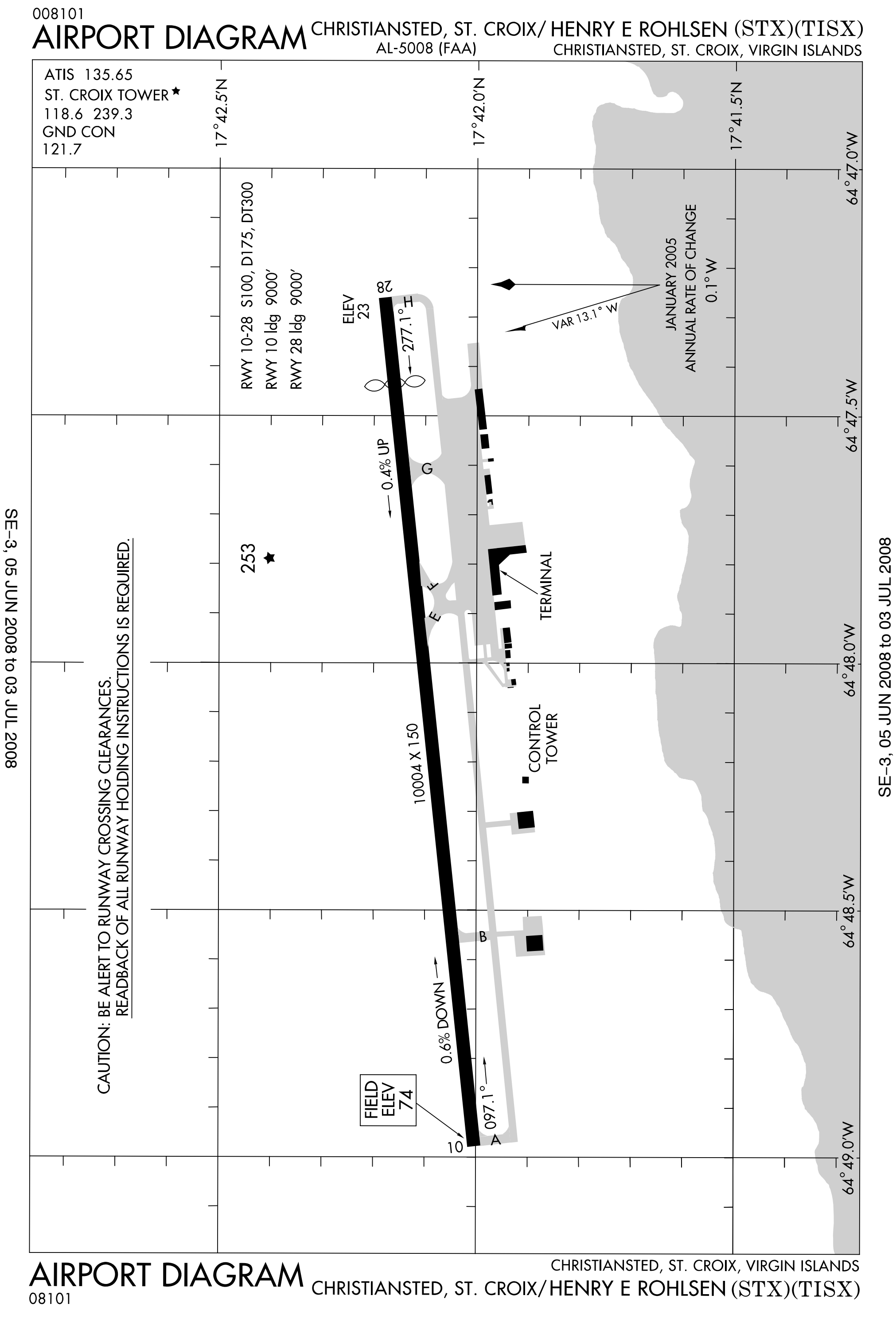

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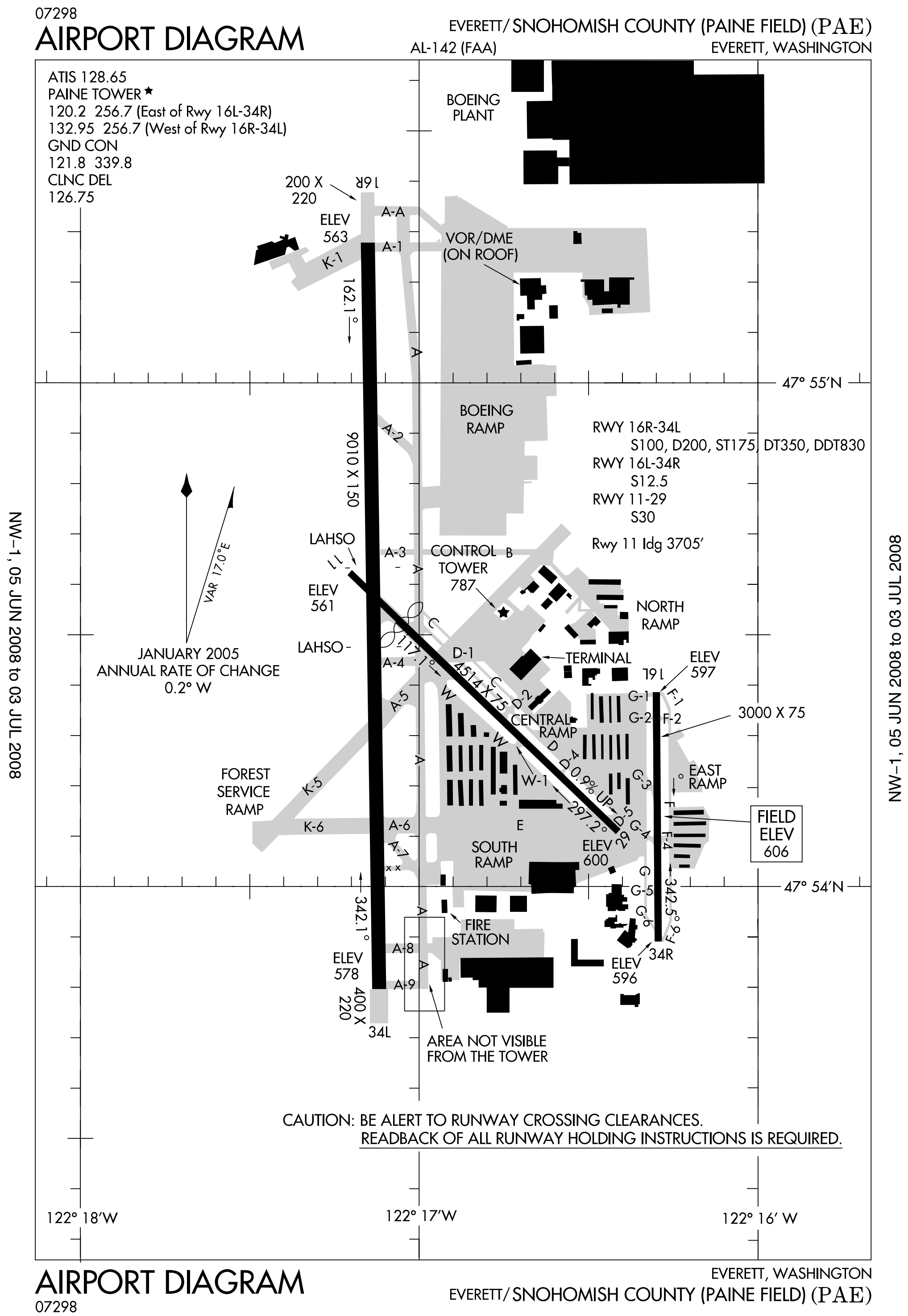

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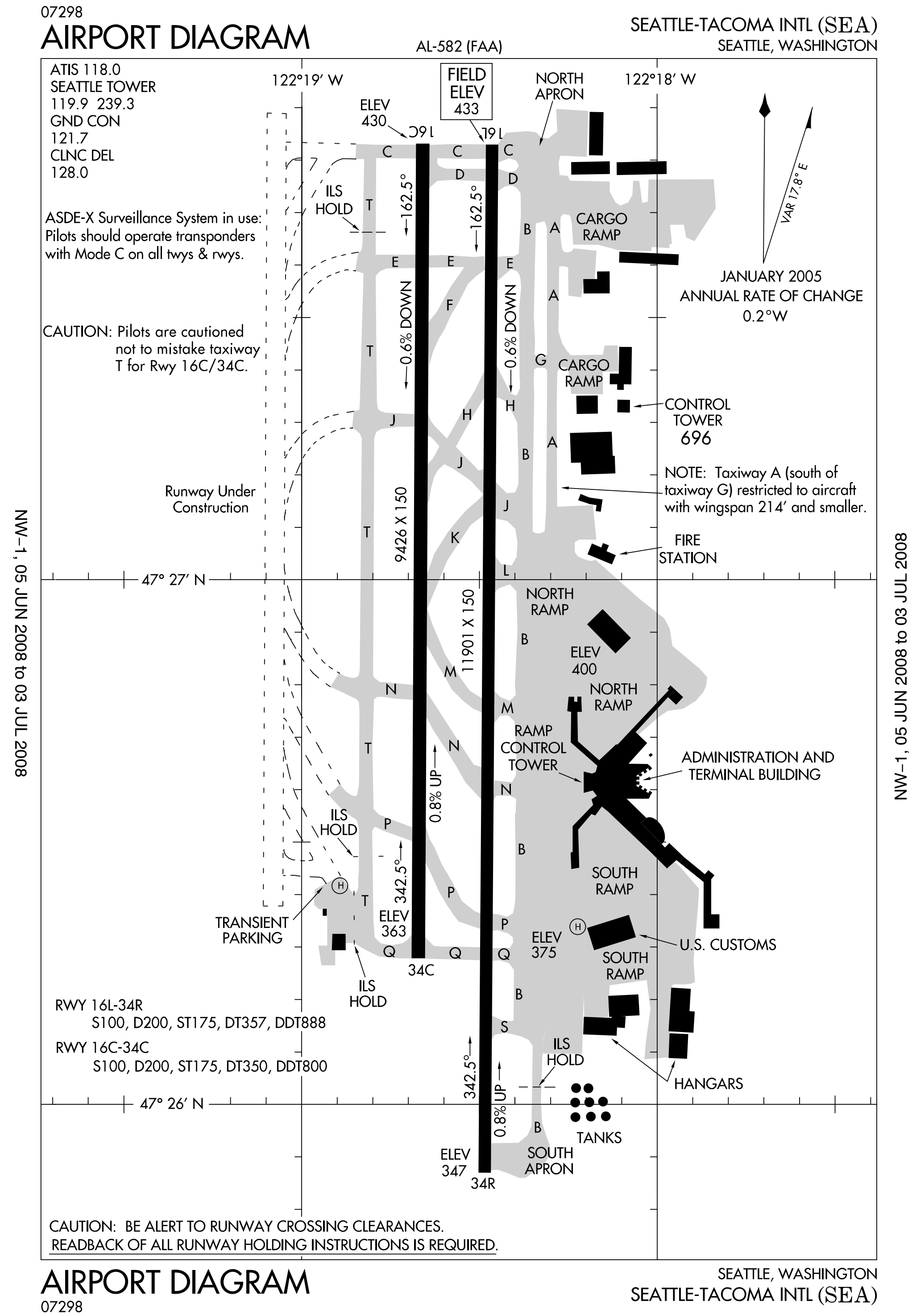

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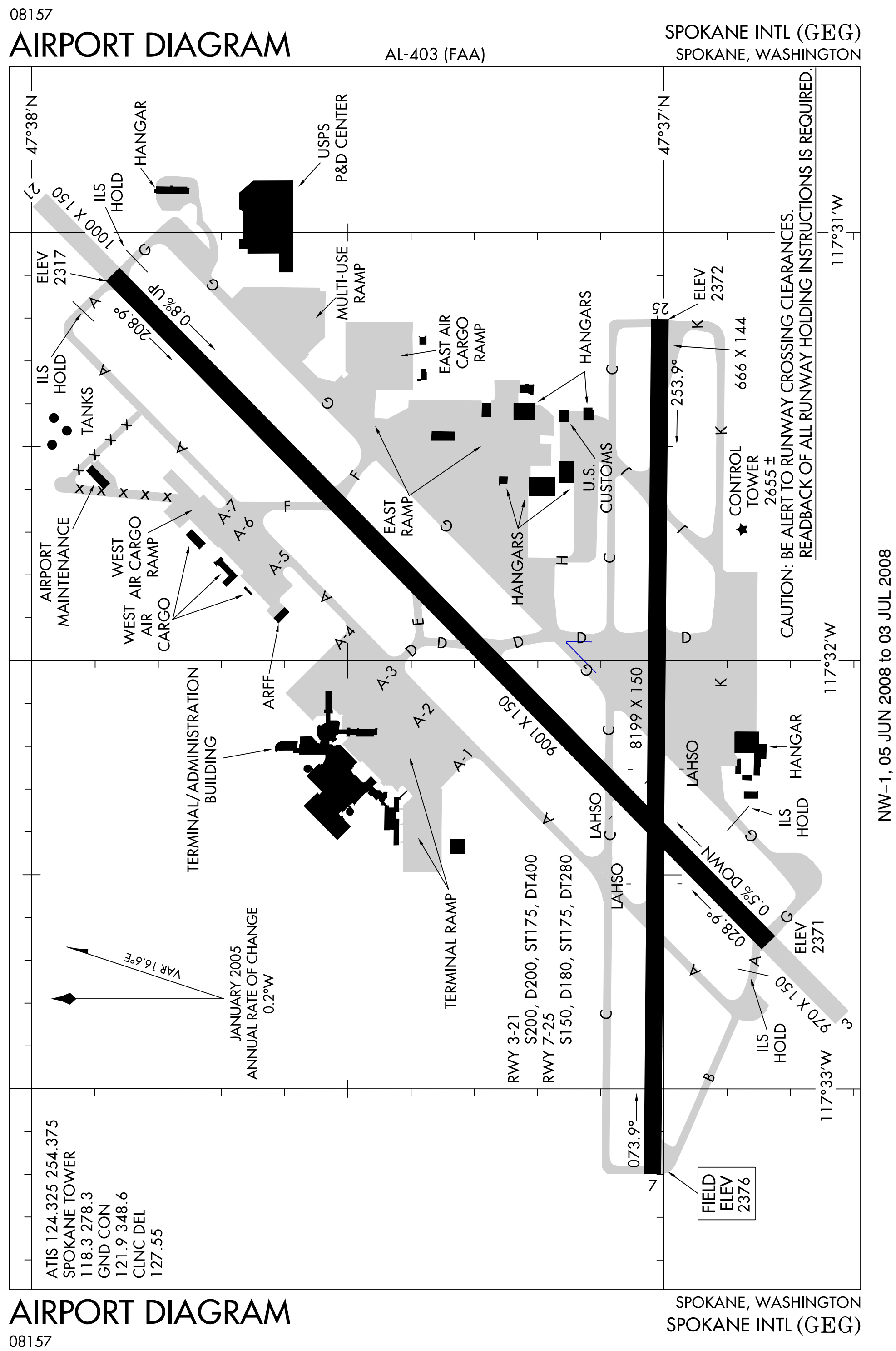

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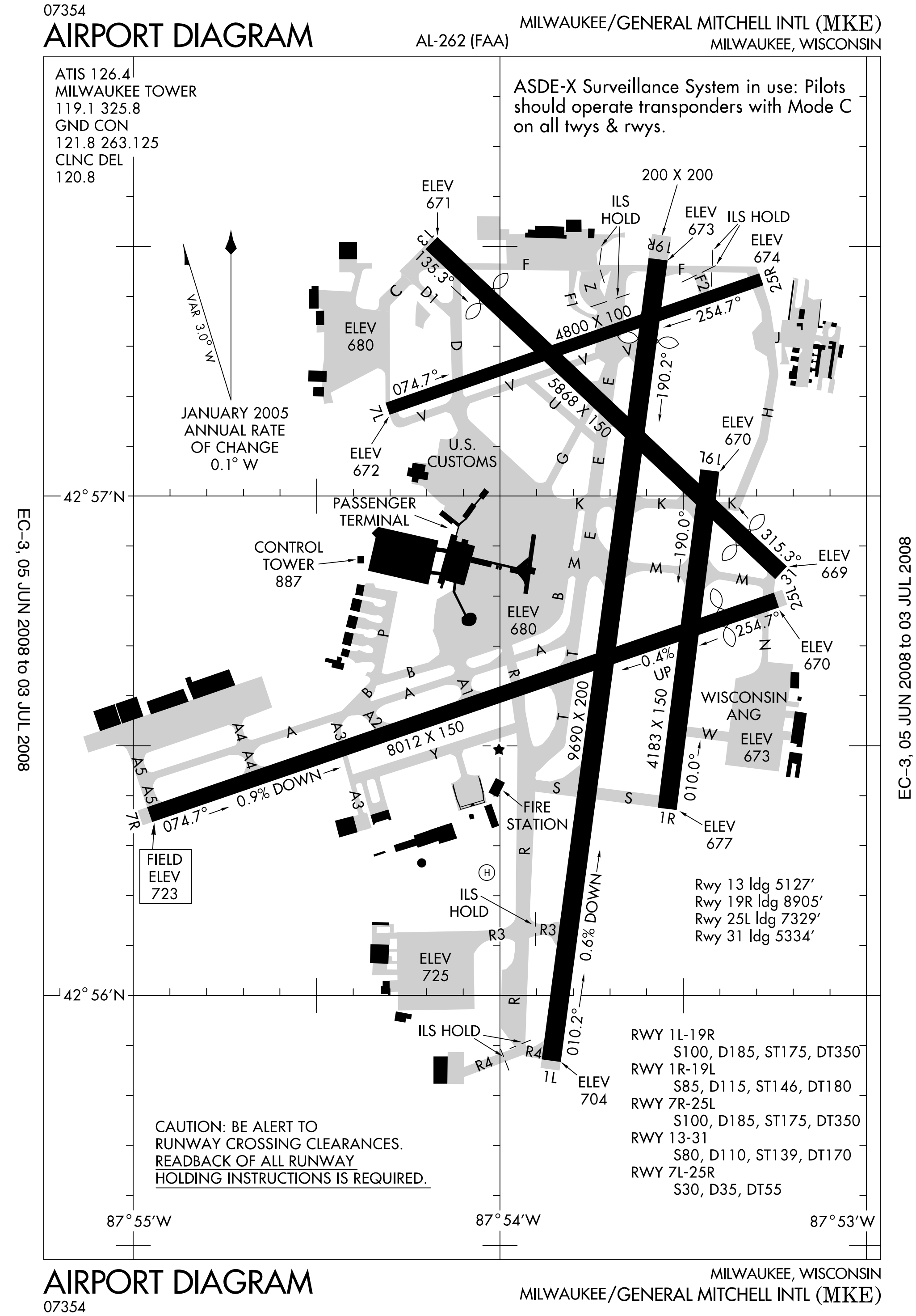

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