The Gleim FAR/AIM is published annually. Gleim keeps you up-to-date with FAA changes via online and email updates. Changes to the FARs can be released by the FAA at any time during the year. The AIM is updated by the FAA twice a year.

The Gleim updates are listed by the FAA release date. The effective date, which is sometimes the same as the release date, is provided as well.
June 12, 2015

Effective June 12, 2015

PART 61—CERTIFICATION: PILOTS, FLIGHT INSTRUCTORS, AND GROUND INSTRUCTORS

Sec. 61.3. On page 42, revise subparagraph (j)(1), remove subparagraph (j)(2), and redesignate subparagraph (j)(3) as follows:

(j)  (1) Age limitation. No person who holds a pilot certificate issued under this part may serve as a pilot on a civil airplane of U.S. registry in the following operations if the person has reached his or her 60th birthday or, in the case of operations with more than one pilot, his or her 65th birthday:

(2) Definitions.

Sec. 61.77. On page 69, revise subparagraph (e) introductory text, remove subparagraph (g), and redesignate subparagraphs (h) through (j) as subparagraphs (g) through (i) as follows:

(e) Age limitation. No person who holds a special purpose pilot authorization issued under this part may serve as a pilot on a civil airplane of U.S. registry in the following operations if the person has reached his or her 60th birthday or, in the case of operations with more than one pilot, his or her 65th birthday:

(f)  

(g) Expiration date.

(h) Renewal.

(i) Surrender.
May 19, 2015

The direct final rule published on March 26, 2015, at 80 FR 15887, is withdrawn, effective May 19, 2015.

PART 91—GENERAL OPERATING AND FLIGHT RULES

Appendix D to Part 91. On page 201, in Section 3, add entry as follows:

*        *        *        *        *
Section 3.        *
*        *        *        *        *
Chantilly, VA (Washington-Dulles International Airport)
*        *        *        *        *
Effective May 11, 2015, through May 11, 2017

PART 91—GENERAL OPERATING AND FLIGHT RULES

Sec. 91.1605. On pages 196 and 197, revise the paragraph title, revise subparagraphs (a) through (d), and add subparagraph (e) as follows:

Sec. 91.1605 Special Federal Aviation Regulation No. 77--Prohibition Against Certain Flights in the Baghdad (ORBB) Flight Information Region (FIR).

(a) Applicability. This rule applies to the following persons:
   (1) All U.S. air carriers and U.S. commercial operators;
   (2) All persons exercising the privileges of an airman certificate issued by the FAA, except such persons operating U.S.-registered aircraft for a foreign air carrier; and
   (3) All operators of aircraft registered in the United States, except where the operator of such aircraft is a foreign air carrier.

(b) Flight prohibition. No person may conduct flight operations in the Baghdad (ORBB) Flight Information Region (FIR), except as provided in paragraphs (c) and (d) of this section.

(c) Permitted operations. This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations in the ORBB FIR, provided that such flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality, and the person described in paragraph (a)), with the approval of the FAA, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: First, for those operations in support of U.S. government-sponsored activities; second, for those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

(d) Emergency situations. In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this section to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of parts 119, 121, 125, or 135, each person who deviates from this section must, within 10 days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office (FSDO) a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

(e) Expiration. This SFAR will remain in effect until May 11, 2017. The FAA may amend, rescind, or extend this SFAR as necessary.
PART 91—GENERAL OPERATING AND FLIGHT RULES

Appendix D to Part 91. On page 201, in Section 3, add entry as follows:

Section 3.

Chantilly, VA (Washington-Dulles International Airport)
March 24, 2015

Effective March 20, 2015

PART 91—GENERAL OPERATING AND FLIGHT RULES

Sec. 91.1603. On page 196, revise subparagraphs (c) and (e) as follows:

(c) Permitted operations. This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations within the Tripoli (HLLL) FIR under the following conditions:

1. Flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality, and the person described in paragraph (a) of this section), with the approval of the FAA, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: First, for those operations in support of U.S. government-sponsored activities; second, for those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

2. [Reserved]

(e) Expiration. This Special Federal Aviation Regulation will remain in effect until March 20, 2017. The FAA may amend, rescind, or extend this Special Federal Aviation Regulation as necessary.
NOTE: except for Secs. 121.368 and 135.426 which contain information collection requirements that have not been approved by the Office of Management and Budget (OMB). The FAA will publish a document in the Federal Register announcing the effective date.

PART 135—OPERATING REQUIREMENTS: COMMUTER AND ON DEMAND OPERATIONS AND RULES GOVERNING PERSONS ON BOARD SUCH AIRCRAFT

On page 317, add new Sec. 135.426 as follows:

Sec. 135.426 Contract maintenance.

(a) A certificate holder may arrange with another person for the performance of maintenance, preventive maintenance, and alterations as authorized in Sec. 135.437(a) only if the certificate holder has met all the requirements in this section. For purposes of this section—

(1) A maintenance provider is any person who performs maintenance, preventive maintenance, or an alteration for a certificate holder other than a person who is trained by and employed directly by that certificate holder.

(2) Covered work means any of the following:

(i) Essential maintenance that could result in a failure, malfunction, or defect endangering the safe operation of an aircraft if not performed properly or if improper parts or materials are used;

(ii) Regularly scheduled maintenance; or

(iii) A required inspection item on an aircraft.

(3) Directly in charge means having responsibility for covered work performed by a maintenance provider. A representative of the certificate holder directly in charge of covered work does not need to physically observe and direct each maintenance provider constantly, but must be available for consultation on matters requiring instruction or decision.

(b) Each certificate holder must be directly in charge of all covered work done for it by a maintenance provider.

(c) Each maintenance provider must perform all covered work in accordance with the certificate holder’s maintenance manual.

(d) No maintenance provider may perform covered work unless that work is carried out under the supervision and control of the certificate holder.

(e) Each certificate holder who contracts for maintenance, preventive maintenance, or alterations must develop and implement policies, procedures, methods, and instructions for the accomplishment of all contracted maintenance, preventive maintenance, and alterations. These policies, procedures, methods, and instructions must provide for the maintenance, preventive maintenance, and alterations to be performed in accordance with the certificate holder’s maintenance program and maintenance manual.

(f) Each certificate holder who contracts for maintenance, preventive maintenance, or alterations must ensure that its system for the continuing analysis and surveillance of the maintenance, preventive maintenance, and alterations carried out by a maintenance provider, as required by Sec. 135.431(a), contains procedures for oversight of all contracted covered work.

(g) The policies, procedures, methods, and instructions required by paragraphs (e) and (f) of this section must be acceptable to the FAA and included in the certificate holder’s maintenance manual, as required by Sec. 135.427(b)(10).

(h) Each certificate holder who contracts for maintenance, preventive maintenance, or alterations must provide to its FAA Certificate Holding District Office, in a format acceptable to the FAA, a list that includes the name and physical (street) address, or addresses, where the work is carried out for each maintenance provider that performs work for the certificate holder, and a description of the type of maintenance, preventive maintenance, or alteration that is to be performed at each location. The list must be updated with any changes, including additions or deletions, and the updated list provided to the FAA in a format acceptable to the FAA by the last day of each calendar month.

Sec. 135.427. On page 317, amend Sec. 135.427 by adding paragraph (b)(10) as follows:

* * * * *

(b) * * *

(10) Policies, procedures, methods, and instructions for the accomplishment of all maintenance, preventive maintenance, and alterations carried out by a maintenance provider. These policies, procedures, methods, and instructions must be acceptable to the FAA and ensure that, when followed by the maintenance provider, the maintenance, preventive maintenance, and alterations are performed in accordance with the certificate holder’s maintenance program and maintenance manual.

* * * * *
February 9, 2015

Effective February 9, 2015

PART 91—GENERAL OPERATING AND FLIGHT RULES

Sec. 91.225. On page 147, add the word “performance” to paragraphs (a)(1) and (b)(1) as follows:

(a) * * *
   (1) Meets the performance requirements in TSO-C166b, Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Information Service-Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz); and
   (2) * * *
(b) * * *
   (1) Meets the performance requirements in--
* * * * *
February 4, 2015

Effective February 4, 2015

PART 91—GENERAL OPERATING AND FLIGHT RULES

SFAR No. 87 Prohibition Against Certain Flights Within the Territory and Airspace of Ethiopia. On page 208, remove this SFAR.
January 15, 2015

Effective January 15, 2015

PART 61—CERTIFICATION: PILOTS, FLIGHT INSTRUCTORS, AND GROUND INSTRUCTORS

Sec. 61.65. The FAA rule change published December 3, 2014, is withdrawn. On page 64, revise paragraph (i) and delete paragraph (j) as follows:

* * * * * * *

(i) Use of an aviation training device. A maximum of 10 hours of instrument time received in an aviation training device may be credited for the instrument time requirements of this section if--

(1) The device is approved and authorized by the FAA;
(2) An authorized instructor provides the instrument time in the device;
(3) No more than 10 hours of instrument time in a flight simulator or flight training device was credited for the instrument time requirements of this section;
(4) A view-limiting device was worn by the applicant when logging instrument time in the device; and
(5) The FAA approved the instrument training and instrument tasks performed in the device.

PART 141—PILOT SCHOOLS

Sec. 141.41. The FAA rule change published December 3, 2014, is withdrawn. On page 362, revise paragraphs (a)-(c) as follows:

An applicant for a pilot school certificate or a provisional pilot school certificate must show that its flight simulators, flight training devices, training aids, and equipment meet the following requirements:

(a) Flight simulators. Each flight simulator used to obtain flight training credit allowed for flight simulators in an approved pilot training course curriculum must--

(1) Be a full-size aircraft cockpit replica of a specific type of aircraft, or make, model, and series of aircraft;
(2) Include the hardware and software necessary to represent the aircraft in ground operations and flight operations;
(3) Use a force cueing system that provides cues at least equivalent to those cues provided by a 3 degree freedom of motion system;
(4) Use a visual system that provides at least a 45-degree horizontal field of view and a 30-degree vertical field of view simultaneously for each pilot; and
(5) Have been evaluated, qualified, and approved by the Administrator.

(b) Flight training devices. Each flight training device used to obtain flight training credit allowed for flight training devices in an approved pilot training course curriculum must--

(1) Be a full-size replica of instruments, equipment panels, and controls of an aircraft, or set of aircraft, in an open flight deck area or in an enclosed cockpit, including the hardware and software for the systems installed that is necessary to simulate the aircraft in ground and flight operations;
(2) Need not have a force (motion) cueing or visual system; and
(3) Have been evaluated, qualified, and approved by the Administrator.

(c) Training aids and equipment. Each training aid, including any audiovisual aid, projector, tape recorder, mockup, chart, or aircraft component listed in the approved training course outline, must be accurate and appropriate to the course for which it is used.
EXPLANATION OF CHANGES

1-1-14. USER REPORTS REQUESTED ON NAVAID OR GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) PERFORMANCE OR INTERFERENCE – This change provides an electronic option for reporting GNSS problems using the agency’s Global Positioning System (GPS) Anomaly Reporting Form.

1-1-18. GLOBAL POSITIONING SYSTEM (GPS) – This change updates the GPS chapter to reflect current policies and procedures.

1-1-19. WIDE AREA AUGMENTATION SYSTEM (WAAS) – This change updates the description of WAAS system components and the example Notices to Airmen (NOTAMs).

1-2-1. AREA NAVIGATION (RNAV); 1-2-2. REQUIRED NAVIGATION PERFORMANCE (RNP) – This change includes Performance-Based Navigation and introduces RNAV navigation specifications. Graphics have been updated as appropriate.

4-1-9. TRAFFIC ADVISORY PRACTICES OF AIRPORTS WITHOUT OPERATING CONTROL TOWERS – This change provides the procedural basis for carrying out CTAF practices in designated areas in Alaska as well as operations to/from airports without an airport traffic control tower.

4-5-7. AUTOMATIC DEPENDENT SURVEILLANCE BROADCAST (ADS-B) SERVICES – This change updates the title of subparagraph c to include “procedures” to clarify the intent of the paragraph, states that an aircraft’s flight identification (FLT ID) is transmitted by the ADS-B Out avionics, and explains the pilot’s responsibilities. This change also reflects a change in procedures for Mode S transponders.

4-6-6. GUIDANCE ON SEVERE TURBULENCE AND MOUNTAIN WAVE ACTIVITY (MWA) – This change adds Graphical Turbulence Guidance (GTG) as a source to help pilots ascertain the possibility of severe weather turbulence or MWA.

4-7-5. PROVISIONS FOR ACCOMMODATION OF NONRNP10 AIRCRAFT (AIRCRAFT NOT AUTHORIZED RNP 10 OR RNP 4); 4-7-8. FLIGHT PLANNING REQUIREMENTS; 5-1-1. PREFLIGHT PREPARATION; 5-1-9. INTERNATIONAL FLIGHT PLAN (FAA FORM 7233-4) – IFR FLIGHTS (FOR DOMESTIC OR INTERNATIONAL FLIGHTS) – This change implements revised procedures for operators of NonRNP10 aircraft for flight plan filing. En Route Automation System (ERAS) modified procedures for flight planning requirements reference information in Items 10 and 18. Tables 5-1-4 and 5-1-5 have been updated as appropriate.

5-4-15. SIMULTANEOUS PARALLEL ILS/RNAV/GLS APPROACHES (INDEPENDENT); SIMULTANEOUS CLOSE PARALLEL ILS/RNAV/GLS PRM APPROACHES (INDEPENDENT) AND SIMULTANEOUS OFFSET INSTRUMENT APPROACHES (SOIA) – This change clarifies the concepts depicted in the graphics and makes the language more consistent with descriptions in the text.

5-1-1. PREFLIGHT PREPARATION;
7-1-2. FAA WEATHER SERVICES;
7-1-3. USE OF AVIATION WEATHER PRODUCTS – This change adds Lockheed Martin Flight Services as a source of weather forecast services to pilots and updates their contact information.

7-1-3. USE OF AVIATION WEATHER PRODUCTS – This change removes subparagraph I because it contains information no longer necessary for pilots.

7-2-3. ALTIMETER ERRORS – This change updates guidance on cold temperature altimetry operations. It also adds a note to emphasize how non-standard temperatures impact Baro-VNAV equipment.

7-3-4. VORTEX BEHAVIOR – This change fixes a discrepancy between AC 90-23G, Aircraft Wake Turbulence, and the Aeronautical Information Manual.

9-1-2. OBTAINING AERONAUTICAL CHARTS – This change indicates that chart sales are made through FAA chart agents.

9-1-4. GENERAL DESCRIPTION OF EACH CHART SERIES – This change adds a description of the Helicopter Route Chart series and the U.S. VFR Wall Planning Chart. The name of the Sectional Raster Aeronautical Charts (SRAC) product was changed to digital-Visual Charts (d-VC), and the description was updated to reflect the recent product enhancements and the expanded compliment of charts. Minor editorial changes were made to clarify product descriptions and availability.

Entire Publication:

Editorial/format changes were made where necessary.
The Global Positioning System is a space-based radio navigation system used to determine precise three-dimensional (latitude, longitude, and elevation) positions anywhere on or near the Earth. GPS provides these positions in real-time and is available worldwide through a constellation of medium Earth orbit satellites. The system was initially developed by the U.S. Department of Defense for military uses, but was opened to civil use in the 1990s. GPS uses a network of at least 24 satellites (plus up to 5 additional spares), which orbit the Earth in an egg-shaped pattern called a Molniya orbit. As a result of this orbit, GPS users on the surface of the Earth can see at least 4 satellites at any time, even under adverse weather conditions.

2. System Description

(a) The GPS satellite constellation consists of 24 active satellites that orbit the Earth in inclined elliptical orbits. These orbits are divided into three planes, each containing eight satellites. The satellites are spaced around the Earth so that they provide coverage over the entire Earth's surface. Each satellite orbits the Earth approximately every 12 hours and is in view of a user on the surface of the Earth for about 6 hours. The satellites are equipped with atomic clocks that are highly accurate and stable. These clocks are used to synchronize the GPS signals and to determine the precise position of each satellite.

(b) Each GPS satellite transmits two frequencies on two different carrier waves: L1 and L2. The L1 frequency is at 1575.42 MHz, and the L2 frequency is at 1227.60 MHz. The two frequencies are used to improve the accuracy of the position determination. The L1 frequency is powered by a rubidium clock, while the L2 frequency is powered by an atomic clock. The use of these two frequencies allows for the determination of the position of the satellite relative to the position of the user and the correction of the errors that are caused by the ionosphere and the atmosphere.

(c) The GPS satellite constellation is maintained by the United States Air Force. The satellites are replaced on a regular basis to ensure that there is always a sufficient number of satellites in orbit to provide service. The satellites are launched in batches of 5, and the entire constellation is replaced every 9 years.

1-1-18 continued on next page
1-1-18. GLOBAL POSITIONING SYSTEM (GPS) – continued

1. VFR Operations

(a) GPS navigation has become an asset to VFR pilots by providing increased navigational capabilities and enhanced situational awareness. Although GPS has provided many benefits to the VFR pilot, care must be exercised to ensure that system capabilities are not exceeded. VFR pilots should integrate GPS navigation with electronic navigation (when possible), as well as pilotage and dead reckoning.

(b) GPS receivers used for VFR navigation vary from fully integrated IFR/VFR installation used to support VFR operations to hand-held devices. Pilots must understand the limitations of the receivers prior to using in flight to avoid misusing navigation information. (See TBL 1-1-6.) Most receivers are not intuitive. The pilot must learn the various keystrokes, knob functions, and displays that are used in the operation of the receiver. Some manufacturers provide computer-based tutorials or simulations of their receivers that pilots can use to become familiar with operating the equipment.

(c) When using GPS for VFR operations, RAIM capability, database currency, and antenna location are critical areas of concern.

(1) RAIM Capability. VFR GPS panel mount receivers and hand-held units have no RAIM alerting capability. This prevents the pilot from being alerted to the loss of the required number of satellites in view, or the detection of a position error. Pilots should use a systematic cross-check with other navigation techniques to verify position. Be suspicious of the GPS position if a disagreement exists between the two positions.

(2) Database Currency. Check the currency of the database. Databases must be updated for IFR operations and should be updated for all other operations. However, there is no requirement for databases to be updated for VFR navigation. It is not recommended to use a moving map with an outdated database in and around critical airspace. Pilots using an outdated database should verify waypoints using current aeronautical products; for example, Airport/Facility Directory, Sectional Chart, or En Route Chart.

(3) Antenna Location. The antenna location for GPS receivers used for IFR and VFR operations may differ. VFR antennae are typically placed for convenience more than performance, while IFR installations ensure a clear view is provided with the satellites. Antennae not providing a clear view have a greater opportunity to lose the satellite navigational signal. This is especially true in the case of hand-held GPS receivers. Typically, suction cups are used to place the GPS antennas on the inside of cockpit windows. While this method has great utility, the antenna location is limited to the cockpit or cabin which rarely provides a clear view of all available satellites. Consequently, signal losses may occur due to aircraft structure blocking satellite signals, causing a loss of navigation capability. These losses, coupled with a lack of RAIM capability, could present erroneous position and navigation information with no warning to the pilot. While the use of a hand-held GPS for VFR operations is not limited by regulation, modification of the aircraft, such as installing a panel- or yoke-mounted holder, is governed by 14 CFR Part 43. Consult with your mechanic to ensure compliance with the regulation and safe installation.

(d) Do not solely rely on GPS for VFR navigation. No design standard of accuracy or integrity is used for a VFR GPS receiver. VFR GPS receivers should be used in conjunction with other forms of navigation during VFR operations to ensure a correct route of flight is maintained. Minimize head-down time in the aircraft by being familiar with your GPS receiver’s operation and by keeping eyes outside scanning for traffic, terrain, and obstacles.

(e) VFR Waypoints

(1) VFR waypoints provide pilots with a supplementary tool to assist with position awareness while navigating visually in aircraft equipped with area navigation receivers. VFR waypoints should be used as a tool to supplement current navigation procedures. The uses of VFR waypoints include providing navigational aids for pilots unfamiliar with an area, waypoint definition of existing reporting points, enhanced navigation in and around Class B and Class C airspace, and enhanced navigation around Special Use Airspace. VFR pilots should rely on appropriate and current aeronautical charts published specifically for visual navigation. If operating in a terminal area, pilots should take advantage of the Terminal Area Chart available for that area, if published. The use of VFR waypoints does not relieve the pilot of any responsibility to comply with the operational requirements of 14 CFR Part 91.

(2) VFR waypoint names (for computer-entry and flight plans) consist of five letters beginning with the letters “VP” and are retrievable from navigation databases. The VFR waypoint names are not intended to be pronounceable, and they are not for use in ATC communications. On VFR charts, standalone VFR waypoints will be portrayed using the same four-point star symbol used for IFR waypoints. VFR waypoints collocated with visual check points on the chart will be identified by small magenta flag symbols. VFR waypoints collocated with visual check points will be pronounceable based on the name of the visual check point and may be used for ATC communications. Each VFR waypoint name will appear in parentheses adjacent to the geographic location on the chart. Latitude/longitude data for all established VFR waypoints may be found in the appropriate regional Airport/Facility Directory (A/FD).

(3) VFR waypoints may not be used on IFR flight plans. VFR waypoints are not recognized by the IFR system and will be rejected for IFR routing purposes.

(4) Pilots may use the five-letter identifier as a waypoint in the route of flight section on a VFR flight plan. Pilots may use the VFR waypoints only when operating under VFR conditions. The point may represent an intended course change or describe the planned route of flight. This VFR filing would be similar to how a VOR would be used in a route of flight.

(5) VFR waypoints intended for use during flight should be loaded into the receiver while on the ground. Once airborne, pilots should avoid programming routes or VFR waypoint chains into their receivers.

(6) Pilots should be vigilant to see and avoid other traffic when near VFR waypoints. With the increased use of GPS navigation and accuracy, expect increased traffic near VFR waypoints. Regardless of the class of airspace, monitor the available ATC frequency for traffic information on other aircraft operating in the vicinity. See Paragraph 7-5-2, VFR in Congested Areas, for more information.

1-1-18 continued on next page
1-1-18. GLOBAL POSITIONING SYSTEM (GPS) – continued

2. IFR Use of GPS

(a) General Requirements. Authorization to conduct any GPS operation under IFR requires:

(1) GPS navigation equipment used for IFR operations must be approved in accordance with the requirements specified in Technical Standard Order (TSO) TSO-C129(), TSO-C196(), TSO-C145(), or TSO-C146(), and the installation must be done in accordance with Advisory Circular AC 20-138(), Airworthiness Approval of Positioning and Navigation Systems. Equipment approved in accordance with TSO-C115a does not meet the requirements of TSO-C129. Visual flight rules (VFR) and hand-held GPS systems are not authorized for IFR navigation, instrument approaches, or as a principal instrument flight reference.

(2) Aircraft using un-augmented GPS (TSO-C129() or TSO-C196()) for navigation under IFR must be equipped with an alternate approved and operational means of navigation suitable for navigating the proposed route of flight. (Examples of alternate navigation equipment include VOR or DME/DME/IRU capability). Active monitoring of alternative navigation equipment is not required when RAIM is available for integrity monitoring. Active monitoring of an alternate means of navigation is required when the GPS RAIM capability is lost.

(3) Procedures must be established for use in the event that the loss of RAIM capability is predicted to occur. In situations where RAIM is predicted to be unavailable, the flight must rely on other approved navigation equipment, re-route to where RAIM is available, delay departure, or cancel the flight.

(4) The GPS operation must be conducted in accordance with the FAA-approved aircraft flight manual (AFM) or flight manual supplement. Flight crew members must be thoroughly familiar with the particular GPS equipment installed in the aircraft, the receiver operation manual, and the AFM or flight manual supplement. Operation, receiver presentation and capabilities of GPS equipment vary. Due to these differences, operation of GPS receivers of different brands, or even models of the same brand, under IFR should not be attempted without thorough operational knowledge. Most receivers have a built-in simulator mode, which allows the pilot to become familiar with operation prior to attempting operation in the aircraft.

(5) Aircraft navigating by IFR-approved GPS are considered to be performance-based navigation (PBN) aircraft and have special equipment suffixes. File the appropriate equipment suffix in accordance with TBL 5-1-3 on the ATC flight plan. If GPS equipment has special equipment suffixes, file the appropriate equipment suffix in accordance with TBL 5-1-3 on the ATC flight plan. If GPS equipment has special equipment suffixes, file the appropriate equipment suffix in accordance with TBL 5-1-3 on the ATC flight plan. If GPS equipment has special equipment suffixes, file the appropriate equipment suffix in accordance with TBL 5-1-3 on the ATC flight plan.

(6) Prior to any GPS IFR operation, the pilot must review appropriate NOTAMs and aeronautical information. (See GPS NOTAMs/Aeronautical Information).

(b) Database Requirements. The onboard navigation data must be current and appropriate for the region of intended operation and should include the navigation aids, waypoints, and relevant coded terminal airspace procedures for the departure, arrival, and alternate airfields.

(1) Further database guidance for terminal and en route requirements may be found in AC 90-100(), U.S. Terminal and En Route Area Navigation (RNAV) Operations.

(2) Further database guidance on Required Navigation Performance (RNP) instrument approach operations, RNP terminal, and RNP en route requirements may be found in AC 90-109(), Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System.

(3) All approach procedures to be flown must be retrievable from the current airborne navigation database supplied by the equipment manufacturer or other FAA-approved source. The system must be able to retrieve the procedure by name from the aircraft navigation database, not just as a manually entered series of waypoints. Manual entry of waypoints using latitude/longitude or place/bearing is not permitted for approach procedures.

(4) Prior to using a procedure or waypoint retrieved from the airborne navigation database, the pilot should verify the validity of the database. This verification should include the following preflight and inflight steps:

[a] Preflight:

[1] Determine the date of database issuance, and verify that the date/time of proposed use is before the expiration date/time.

[b] Inflight:

[1] Determine that the waypoints and transition names coincide with names found on the procedure chart. Do not use waypoints which do not exactly match the spelling shown on published procedure charts.

[2] Determine that the waypoints are logical in location, and their orientation to each other as found on the procedure chart, both laterally and vertically.

NOTE–There is no specific requirement to check each waypoint latitude and longitude, type of waypoint and/or altitude constraint, only the general relationship of waypoints in the procedure, or the logic of an individual waypoint’s location.

(3) If the cursory check of procedure logic or individual waypoint location, specified in [b] above, indicates a potential error, do not use the retrieved procedure or waypoint until a verification of latitude and longitude, waypoint type, and altitude constraints indicate full conformity with the published data.

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

[a] During domestic operations for commerce or for hire, operators must have a second navigation system capable of reversion or contingency operations.

[b] Operators must have two independent navigation systems appropriate to the route to be flown, or one system that is suitable and a second, independent backup capability that allows the operator to proceed safely and land at a different airport, and the aircraft must have sufficient fuel (reference 14 CFR 121.349, 125.203, 129.17, and 135.165). These rules ensure the safety of the operation by preventing a single point of failure.

1-1-18 continued on next page
1-1-18. GLOBAL POSITIONING SYSTEM (GPS) – continued

NOTE–

An aircraft approved for multi-sensor navigation and equipped with a single navigation system must maintain an ability to navigate or proceed safely in the event that any one component of the navigation system fails, including the flight management system (FMS). Retaining a FMS-independent VOR capability would satisfy this requirement.

[c] The requirements for a second system apply to the entire set of equipment needed to achieve the navigation capability, not just the individual components of the system such as the radio navigation receiver. For example, to use two RNAV systems (e.g., GPS and DME/DME/IRU) to comply with the requirements, the aircraft must be equipped with two independent radio navigation receivers and two independent navigation computers (e.g., flight management systems (FMS)). Alternatively, to comply with the requirements using a single RNAV system with an installed and operable VOR capability, the VOR capability must be independent of the FMS.

[d] To satisfy the requirement for two independent navigation systems, if the primary navigation system is GPS-based, the second system must be independent of GPS (for example, VOR or DME/DME/IRU). This allows continued navigation in case of failure of the GPS or WAAS services. Recognizing that GPS interference and test events resulting in the loss of GPS services have become more common, the FAA requires operators conducting IFR operations under 14 CFR 121.349, 125.203, 129.17 and 135.65 to retain a non-GPS navigation capability consisting of either DME/DME, IRU, or VOR for en route and terminal operations, and VOR and ILS for final approach. Since this system is to be used as a reversionary capability, single equipage is sufficient.

3. Oceanic, Domestic, En Route, and Terminal Area Operations

(a) Conduct GPS IFR operations in oceanic areas only when approved avionics systems are installed. TSO-C196() users and TSO-C129() GPS users authorized for Class A1, A2, B1, B2, C1, or C2 operations may use GPS in place of another approved means of long-range navigation, such as dual INS. (See TBL 1-1-5 and TBL 1-1-6.) Aircraft with a single installation GPS, meeting the above specifications, are authorized to operate on short oceanic routes requiring one means of long-range navigation (reference AC 20-136(A), Appendix 1).

(b) Conduct GPS domestic, en route, and terminal IFR operations only when approved avionics systems are installed. Pilots may use GPS via TSO-C129() authorized for Class A1, B1, B3, C1, or C3 operations GPS via TSO-C196(); or GPS/WAAS with either TSO-C145() or TSO-C146(). When using TSO-C129() or TSO-C196() receivers, the avionics necessary to receive all of the ground-based facilities appropriate for the route to the destination airport and any required alternate airport must be installed and operational. Ground-based facilities necessary for these routes must be operational.

1) GPS en route IFR operations may be conducted in Alaska outside the operational service volume of ground-based navigation aids when a TSO-C145() or TSO-C146() GPS/wide area augmentation system (WAAS) system is installed and operating. WAAS is the U.S. version of a satellite-based augmentation system (SBAS).

[a] In Alaska, aircraft may operate on GNSS Q-routes with GPS (TSO-C129 () or TSO-C196 () equipment while the aircraft remains in Air Traffic Control (ATC) radar surveillance or with GPS/WAAS (TSO-C145 () or TSO-C146 ()) which does not require ATC radar surveillance.

[b] In Alaska, aircraft may only operate on GNSS T-routes with GPS/WAAS (TSO-C145 () or TSO-C146 ()) equipment.

(2) Ground-based navigation equipment is not required to be installed and operating for en route IFR operations when using GPS/WAAS navigation systems. All operators should ensure that an alternate means of navigation is available in the unlikely event the GPS/WAAS navigation system becomes inoperative.

(3) Q-routes and T-routes outside Alaska. Q-routes require system performance currently met by GPS, GPS/WAAS, or DME/DME/IRU RNAV systems that satisfy the criteria discussed in AC 90-100(), U.S. Terminal and En Route Area Navigation (RNAV) Operations. T-routes require GPS or GPS/WAAS equipment.

REFERENCE–

AIM Paragraph 5-3-4, Airways and Route Systems

(c) GPS IFR approach/departure operations can be conducted when approved avionics systems are installed and the following requirements are met:

(1) The aircraft is TSO-C145() or TSO-C146() or TSO-C196() or TSO-C129() in Class A1, B1, B3, C1, or C3; and

(2) The approach/departure must be retrievable from the current airborne navigation database in the navigation computer. The system must be able to retrieve the procedure by name from the aircraft navigation database. Manual entry of waypoints using latitude/longitude or place/ bearing is not permitted for approach procedures.

(3) The authorization to fly instrument approaches/ departures with GPS is limited to U.S. Airspace.

(4) The use of GPS in any other airspace must be expressly authorized by the FAA Administrator.

(5) GPS instrument approach/departure operations outside the U.S. must be authorized by the appropriate sovereign authority.

4. Departures and Instrument Departure Procedures (DPs)

The GPS receiver must be set to terminal (±1 NM) CDI sensitivity and the navigation routes contained in the database in order to fly published IFR charted departures and DPs. Terminal RAIM should be automatically provided by the receiver. (Terminal RAIM for departure may not be available unless the waypoints are part of the active flight plan rather than proceeding direct to the first destination.) Certain segments of a DP may require some manual intervention by the pilot, especially when radar vectored to a course or required to intercept a specific course to a waypoint. The database may not contain all of the transitions or departures from all runways and some GPS receivers do not contain DPs in the database. It is necessary that helicopter procedures be flown at 70 knots or less since helicopter departure procedures and missed approaches use a 20:1 obstacle clearance surface (OCS), which is double the fixed-wing OCS, and turning areas are based on this speed as well.

1-1-18 continued on next page
5. GPS Instrument Approach Procedures

(a) GPS overlay approaches are designated non-precision instrument approach procedures that pilots are authorized to fly using GPS avionics. Localizer (LOC), localizer type directional aid (LDA), and simplified directional facility (SDF) procedures are not authorized. Overlay procedures are identified by the "name of the procedure" and "or GPS" (e.g., "VOR/DME or GPS RWY 15") in the title. Authorized procedures must be retrievable from a current onboard navigation database. The navigation database may also enhance position orientation by displaying a map containing information on conventional NAVID approaches. This approach information should not be confused with a GPS overlay approach (see the receiver operating manual, AFM, or AFM Supplement for details on how to identify these approaches in the navigation database).

NOTE—
Overlay approaches do not adhere to the design criteria described in Paragraph 5-4-5m, Area Navigation (RNAV) Instrument Approach Charts, for stand-alone GPS approaches. Overlay approach criteria is based on the design criteria used for ground-based NAVID approaches.

(b) Stand-alone approach procedures specifically designed for GPS systems have replaced many of the original overlay approaches. All approaches that contain "GPS" in the title (e.g., "VOR or GPS RWY 24," "GPS RWY 24," or "RNAV (GPS) RWY 24") can be flown using GPS. GPS-equipped aircraft do need underlying ground-based NAVIDs or associated aircraft avionics to fly the approach. Monitoring the underlying approach with ground-based NAVIDs is suggested when able. Existing overlay approaches may be requested using the GPS title; for example, the VOR or GPS RWY 24 may be requested as "GPS RWY 24." Some GPS procedures have a Terminal Arrival Area (TAA) with an underlining RNAV approach.

(c) For flight planning purposes, TSO-C129() and TSO-C196()-equipped users (GPS users) whose navigation systems have fault detection and exclusion (FDE) capability, who perform a preflight RAIM prediction for the approach integrity at the airport where the RNAV (GPS) approach will be flown, and have proper knowledge and any required training and/or approval to conduct a GPS-based IAP, may file based on a GPS-based IAP at either the destination or the alternate airport, but not at both locations. At the alternate airport, pilots may plan for:

1. Lateral navigation (LNAV) or circling minimum descent altitude (MDA);
2. LNAV/vertical navigation (LNAV/VNAV) DA, if equipped with and using approved barometric vertical navigation (baro-VNAV) equipment;
3. RNP 0.3 DA on an RNAV (RNP) IAP, if they are specifically authorized users using approved baro-VNAV equipment and the pilot has verified required navigation performance (RNP) availability through an approved prediction program.
4. If the above conditions cannot be met, any required alternate airport must have an approved instrument approach procedure other than GPS-based that is anticipated to be operational and available at the estimated time of arrival, and which the aircraft is equipped to fly.

(e) Procedures for Accomplishing GPS Approaches

1. An RNAV (GPS) procedure may be associated with a Terminal Arrival Area (TAA). The basic design of the RNAV procedure is the "T" design or a modification of the "T" (See Paragraph 5-4-5d, Terminal Arrival Area (TAA), for complete information).

2. Pilots cleared by ATC for an RNAV (GPS) approach should fly the full approach from an Initial Approach Waypoint (IAWP) or feeder fix. Randomly joining an approach at an intermediate fix does not assure terrain clearance.

3. When an approach has been loaded in the navigation system, GPS receiver will give an "arm" annunciation 30 NM straight line distance from the airport/heliport reference point. Pilots should arm the approach mode at this time if not already armed (some receivers arm automatically). Without arming, the receiver will not change from en route CDI and RAIM sensitivity of ±5 NM either side of centerline to ±1 NM terminal sensitivity. Where the IAWP is inside this 30 mile point, a CDI sensitivity change will occur once the approach mode is armed and the aircraft is inside 30 NM. Where the IAWP is beyond 30 NM from the airport/heliport reference point and the approach is armed, the CDI sensitivity will not change until the aircraft is within 30 miles of the airport/heliport reference point. Feeder route obstacle clearance is predicated on the receiver being in terminal ±1 NM) CDI sensitivity and RAIM within 30 NM of the airport/heliport reference point; therefore, the receiver should always be armed (if required) not later than the 30 NM annunciation.

4. The pilot must be aware of what bank angle/turk rate the particular receiver uses to compute turn anticipation, and whether wind and airspeed are included in the receiver's calculations. This information should be in the receiver operating manual. Over or under banking the turn onto the final approach course may significantly delay getting on course and may result in high descent rates to achieve the next segment altitude.

5. When within 2 NM of the Final Approach Waypoint (FAWP) with the approach mode armed, the approach mode will switch to active, which results in RAIM and CDI changing to approach sensitivity. Beginning 2 NM prior to the FAWP, the full scale CDI sensitivity will smoothly change from ±1 NM to ±0.3 NM at the FAWP. As sensitivity changes from ±1 NM to ±0.3 NM approaching the FAWP, with the CDI not centered, the corresponding increase in CDI displacement may give the impression that the aircraft is moving further away from the intended course even though it is on an acceptable intercept heading. Referencing the digital track displacement information (cross track error), if it is available in the approach mode, may help the pilot remain position oriented in this situation. Being established on the final approach course prior to the beginning of the sensitivity change at 2 NM will help prevent problems in interpreting the CDI display during ramp down. Therefore, requesting or accepting vectors which will cause the aircraft to intercept the final approach course within 2 NM of the FAWP is not recommended.

6. When receiving vectors to final, most receiver operating manuals suggest placing the receiver in the non-sequencing mode on the FAWP and manually setting the course. This provides an extended final approach course in cases where the aircraft is vectored onto the final approach course outside of any existing segment which is aligned with the runway. Assigned altitudes must be maintained until established on a published segment of the approach. Required altitudes at waypoints outside the FAWP or stepdown fixes must be considered. Calculating the distance to the FAWP may be required in order to descend at the proper location.
(7) Overriding an automatically selected sensitivity during an approach will cancel the approach mode annunciation. If the approach mode is not armed by 2 NM prior to the FAWP, the approach mode will not become active at 2 NM prior to the FAWP, and the equipment will flag. In these conditions, the RAIM and CDI sensitivity will not ramp down, and the pilot should not descend to MDA, but fly to the MAWP and execute a missed approach. The approach active annunciator and/or the receiver should be checked to ensure the approach mode is active prior to the FAWP.

(8) Do not attempt to fly an approach unless the procedure in the onboard database is current and identified as “GPS” on the approach chart. The navigation database may contain information about non-overlay approach procedures that enhances position orientation generally by providing a map, while flying these approaches using conventional NAVAIDs. This approach information should not be confused with a GPS overlay approach (see the receiver operating manual, AFM, or AFM Supplement for details on how to identify these procedures in the navigation database). Flying point to point on the approach does not assure compliance with the published approach procedure. The proper RAIM sensitivity will not be available and the CDI sensitivity will not automatically change to ±0.3 NM. Manually setting CDI sensitivity does not automatically change the RAIM sensitivity on some receivers. Some existing non-precision approach procedures cannot be coded for use with GPS and will not be available as overlays.

(9) Pilots should pay particular attention to the exact operation of their GPS receivers for performing holding patterns and in the case of overlay approaches, operations such as procedure turns. These procedures may require manual intervention by the pilot to stop the sequencing of waypoints by the receiver and to resume automatic GPS navigation sequencing once the maneuver is complete. The same waypoint may appear in the route of flight more than once consecutively (for example, IAWP, FAWP, MAHWP on a procedure turn). Care must be exercised to ensure that the receiver is sequenced to the appropriate waypoint for the segment of the procedure being flown, especially if one or more fly-overs are skipped (for example, FAWP rather than IAWP if the procedure turn is not flown). The pilot may have to sequence past one or more fly-overs of the same waypoint in order to start GPS automatic sequencing at the proper place in the sequence of waypoints.

(10) Incorrect inputs into the GPS receiver are especially critical during approaches. In some cases, an incorrect entry can cause the receiver to leave the approach mode.

(11) A fix on an overlay approach identified by a DME fix will not be in the waypoint sequence on the GPS receiver unless there is a published name assigned to it. When a name is assigned, the along track distance (ATD) to the waypoint may be zero rather than the DME stated on the approach chart. The pilot should be alert for this on any overlay procedure where the original approach used DME.

(12) If a visual descent point (VDP) is published, it will not be included in the sequence of waypoints. Pilots are expected to use normal piloting techniques for beginning the visual descent, such as ATD.

(13) Unnamed stepdown fixes in the final approach segment may or may not be coded in the waypoint sequence of the aircraft’s navigation database and must be identified using ATD. Stepdown fixes in the final approach segment of RNAV (GPS) approaches are being named, in addition to being identified by ATD. However, GPS avionics may or may not accommodate waypoints between the FAF and MAP. Pilots must know the capabilities of their GPS equipment and continue to identify stepdown fixes using ATD when necessary.

(1) A GPS missed approach requires pilot action to sequence the receiver past the MAWP to the missed approach portion of the procedure. The pilot must be thoroughly familiar with the activation procedure for the particular GPS receiver installed in the aircraft and must initiate appropriate action after the MAWP. Activating the missed approach prior to the MAWP will cause CDI sensitivity to immediately change to terminal (±1 NM) sensitivity and the receiver will continue to navigate to the MAWP. The receiver will not sequence past the MAWP. Turns should not begin prior to the MAWP. If the missed approach is not activated, the GPS receiver will display an extension of the inbound final approach course and the ATD will increase from the MAWP until it is manually sequenced after crossing the MAWP.

(2) Missed approach routings in which the first track is via a course rather than direct to the next waypoint require additional action by the pilot to set the course. Being familiar with all of the inputs required is especially critical during this phase of flight.

(g) GPS NOTAMs/Aeronautical Information

(1) GPS satellite outages are issued as GPS NOTAMs both domestically and internationally. However, the effect of an outage on the intended operation cannot be determined unless the pilot has a RAIM availability prediction program which allows excluding a satellite which is predicted to be out of service based on the NOTAM information.

(2) The terms UNRELIABLE and MAY NOT BE AVAILABLE are used in conjunction with GPS NOTAMs. Both UNRELIABLE and MAY NOT BE AVAILABLE are advisories to pilots indicating the expected level of service may not be available. UNRELIABLE does not mean there is a problem with GPS signal integrity. If GPS service is available, pilots may continue operations. If the LNAV or LNAV/VNAV service is available, pilots may use the displayed level of service to fly the approach. GPS operation may be NOTAMed UNRELIABLE or MAY NOT BE AVAILABLE due to testing or anomalies. (Pilots are encouraged to report GPS anomalies, including degraded operation and/or loss of service, as soon as possible, reference paragraph 1-1-14.) When GPS testing NOTAMs are published and testing is actually occurring, Air Traffic Control will advise pilots requesting or cleared for a GPS or RNAV (GPS) approach that GPS may not be available and request intentions. If pilots have reported GPS anomalies, Air Traffic Control will request the pilot’s intentions and/or clear the pilot for an alternate approach, if available and operational.

EXAMPLE–

The following is an example of a GPS testing NOTAM: GIPS 06/001 ZAB NAV GPS (INCLUDING WAAS, GBAS, AND ADS-B) MAY NOT BE AVAILABLE WITHIN A 468NM RADIUS CENTERED AT 330702N1062540W (TCS 093044) FL400-UNL DECREASING IN AREA WITH A DECREASE IN ALTITUDE DEFINED AS: 425NM RADIUS AT FL250, 360NM RADIUS AT 10000FT, 354NM RADIUS AT 4000FT AGL, 327NM RADIUS AT 50FT AGL. 1406070300-1406071200.
1-1-18. GLOBAL POSITIONING SYSTEM (GPS) – continued

(3) Civilian pilots may obtain GPS RAIM availability information for non-precision approach procedures by: using a manufacturer-supplied RAIM prediction tool; or using the generic tool at www.raimprediction.net. The FAA is developing a replacement prediction tool at www.sapt.faa.gov scheduled for transition in 2014. Pilots can also request GPS RAIM aeronautical information from a flight service station during preflight briefings. GPS RAIM aeronautical information can be obtained for a period of 3 hours (for example, if you are scheduled to arrive at 1215 hours, then the GPS RAIM information is available from 1100 to 1400 hours) or a 24-hour timeframe at a particular airport. FAA briefers will provide RAIM information for a period of 1 hour before to 1 hour after the ETA hour, unless a specific timeframe is requested by the pilot. If flying a published GPS departure, a RAIM prediction should also be requested for the departure airport.

(4) The military provides airfield specific GPS RAIM NOTAMs for non-precision approach procedures at military airfields. These RAIM outages. Failure to sequence may be an indication of the detection of a satellite anomaly, failure to arm the receiver, equipment failure, etc. The RAIM aeronautical information should be considered advisory only. Refer to the receiver operating manual for specific indications and instructions associated with loss of RAIM prior to the FAF.

(5) If the RAIM flag/status annunciation appears after the FAWP, the pilot should initiate a climb and execute the missed approach. The GPS receiver may continue to operate after a RAIM flag/status annunciation appears, but the navigation information should be considered advisory only. Refer to the receiver operating manual for operating mode information during a RAIM annunciation.

(i) Waypoints

(1) GPS receivers navigate from one defined point to another retrieved from the aircraft’s onboard navigational database. These points are waypoints (5-letter pronounceable name), existing VHF intersections, DME fixes with 5-letter pronounceable names and 3-letter NAVAID IDs. Each waypoint is a geographical location defined by a latitude/longitude geographic coordinate. These 5-letter waypoints, VHF intersections, 5-letter pronounceable DME fixes and 3-letter NAVAID IDs are published on various FAA aeronautical navigation products (IFR Enroute Charts, VFR Charts, Terminal Procedures Publications, etc.).

(2) A Computer Navigation Fix (CNF) is also a point defined by a latitude/longitude coordinate and is required to support Performance-Based Navigation (PBN) operations. The GPS receiver uses CNFs in conjunction with waypoints to navigate from point to point. However, CNFs are not recognized by ATC. ATC uses the database and does not use CNFs for air traffic control purposes. CNFs are defined by a latitude/longitude coordinate and are for advisory purposes only. Pilots are not to use CNFs for point to point navigation (proceed direct), filing a flight plan, or in aircraft/ATC communications. CNFs that do appear on aeronautical charts allow pilots increased situational awareness by identifying points in the aircraft database route of flight with points on the aeronautical chart. CNFs are random five-letter identifiers, not pronounceable like waypoints and placed in parenthesis. Eventually, all CNFs will begin with the letters “CF” followed by three consonants (for example, CFWBG). This five-letter identifier will be found next to an “x” on enroute charts and possibly on an approach chart. On instrument approach procedures (charts) in the terminal procedures publication, CNFs may represent unnamed DME fixes, beginning and ending points of DME arcs, and sensor (ground-based signal i.e., VOR, NDB, ILS) final approach fixes on GPS overlay approaches. These CNFs provide the GPS with points on the procedure that allow the overlay approach to mirror the ground-based sensor approach. These points should only be used by the GPS system for navigation and should not be used by pilots for any other purpose on the approach. The CNF concept has not been adopted or recognized by the International Civil Aviation Organization (ICAO).

(3) GPS approaches use fly-over and fly-by waypoints to join route segments on an approach. Fly-by waypoints connect the two segments by allowing the aircraft to turn prior to the current course. This is known as turn anticipation and is compensated for in the airspace and terrain clearances. The MAWP and the missed approach holding waypoint (MAHWP) are normally the only two waypoints on the approach that are not fly-by waypoints. Fly-over waypoints are used when the aircraft must overfly the waypoint prior to a turn to the new course. The symbol for a fly-over waypoint is a circled waypoint. Some waypoints may have dual use; for example, a fly-over/flow point when used as an IF for a NoPT route and as a fly-over waypoint when used as an AF. Flow points may also be used as an IAF/IF. Hold-in-lieu of. When this occurs, the less restrictive (fly-by) symbology will be charted. Overlay approach charts and some early stand-alone GPS approach charts may not reflect this convention.

1-1-18 continued on next page
1-1-18. GLOBAL POSITIONING SYSTEM (GPS) – continued

(4) Unnamed waypoints for each airport will be uniquely identified in the database. Although the identifier may be used at different airports (for example, RW36 will be the identifier at each airport with a runway 36), the actual point, at each airport, is defined by a specific latitude/longitude coordinate.

(5) The runway threshold waypoint, normally the MAWP, may have a five-letter identifier (for example, SNEEZ) or be coded as RW## (for example, RW36, RW36L). MAWP's located at the runway threshold are being changed to the RW## identifier, while MAWPs not located at the threshold will have a five-letter identifier. This may cause the approach chart to differ from the aircraft database until all changes are complete. The runway threshold waypoint is also used as the center of the Minimum Safe Altitude (MSA) on most GPS approaches.

(i) Position Orientation.

Pilots should pay particular attention to position orientation while using GPS. Distance and track information are provided to the next active waypoint, not to a fixed navigation aid. Receivers may sequence when the pilot is not flying along an active route, such as when being vectored or deviating for weather, due to the proximity to another waypoint in the route. This can be prevented by placing the receiver in the non-sequencing mode. When the receiver is in the non-sequencing mode, bearing and distance are provided to the selected waypoint and the receiver will not sequence to the next waypoint in the route until placed back in the auto sequence mode or the pilot selects a different waypoint. The pilot may have to compute the ATD to stepdown fixes and other points on overlay approaches, due to the receiver showing ATD to the next waypoint rather than DME to the VOR or ILS ground station.

(k) Impact of Magnetic Variation on PBN Systems

(1) Differences may exist between PBN systems and the charted magnetic courses on ground-based NAVAID instrument flight procedures (IFP), enroute charts, approach charts, and Standard Instrument Departure/Standard Terminal Arrival (SID/STAR) charts. These differences are due to the magnetic variation used to calculate the magnetic course. Every leg of an instrument procedure is first computed along a desired ground track with reference to true north. A magnetic variation correction is then applied to the true course in order to calculate a magnetic course for publication. The type of procedure will determine what magnetic variation value is added to the true course. A ground-based NAVAID IFP applies the facility magnetic variation of record to the true course to get the charted magnetic course. Magnetic courses on PBN procedures are calculated two different ways. SID/STAR procedures use the airport magnetic variation of record, while IFR enroute charts use magnetic reference bearing. PBN systems make a correction to true north by adding a magnetic variation calculated with an algorithm based on aircraft position, or by adding the magnetic variation coded in their navigational database. This may result in the PBN system and the procedure designer using a different magnetic variation, which causes the magnetic course charted on the IFP plate to be different. It is important to understand, however, that PBN systems, (with the exception of VOR/DME RNAV equipment) navigate by reference to true north and display magnetic course only for pilot reference. As such, a properly functioning PBN system, containing a current and accurate navigational database, should fly the correct ground track for any loaded instrument procedure. Note differences in displayed magnetic course that may be attributed to magnetic variation application. Should significant differences between the approach chart and the PBN system avionics’ application of the navigation database arise, the published approach chart, supplemented by NOTAMs, holds precedence.

(2) The course into a waypoint may not always be 180 degrees different from the course leaving the previous waypoint, due to the PBN system avionics’ computation of geodesic paths, distance between waypoints, and differences in magnetic variation application. Variations in distances may also occur since PBN system distance-to-waypoint values are ATDs computed to the next waypoint and the DME values published on underlying procedures are slant-range distances measured to the station. This difference increases with aircraft altitude and proximity to the NAVAID.

(l) GPS Familiarization

Pilots should practice GPS approaches in visual meteorological conditions (VMC) until thoroughly proficient with all aspects of their equipment (receiver and installation) prior to attempting flight in instrument meteorological conditions (IMC). Pilots should be proficient in the following areas:

(1) Using the receiver autonomous integrity monitoring (RAIM) prediction function;

(2) Inserting a DP into the flight plan, including setting terminal CDI sensitivity, if required, and the conditions under which terminal RAIM is available for departure;

(3) Programming the destination airport;

(4) Programming and flying the approaches (especially procedure turns and arcs);

(5) Changing to another approach after selecting an approach;

(6) Programming and flying “direct” missed approaches;

(7) Programming and flying “routed” missed approaches;

(8) Entering, flying, and exiting holding patterns, particularly on approaches with a second waypoint in the holding pattern;

(9) Programming and flying a “route” from a holding pattern;

(10) Programming and flying an approach with radar vectors to the intermediate segment;

(11) Indication of the actions required for RAIM failure both before and after the FAWP; and

(12) Programming a radial and distance from a VOR (often used in departure instructions).

1-1-19. WIDE-AREA AUGMENTATION SYSTEMS (WAAS): On pages 475-478, revise subparagraphs a., b., c., and d. as follows:

a. General

1. The FAA developed the WAAS to improve the accuracy, integrity and availability of GPS signals. WAAS will allow GPS to be used, as the aviation navigation system, from takeoff through approach when it is complete. WAAS is a critical component of the FAA’s strategic objective for a seamless satellite navigation system for civil aviation, improving capacity and safety.

1-1-19 continued on next page
1. The International Civil Aviation Organization (ICAO) has defined Standards and Recommended Practices (SARPs) for satellite-based augmentation systems (SBAS) such as WAAS. Japan, India, and Europe are building similar systems: EGNOS, the European Geostationary Navigation Overlay System; India’s GPS and Geo-Augmented Navigation (GAGAN) system; and Japan’s Multi-functional Transport Satellite (MTSAT)-based Satellite Augmentation System (MSAS). The merging of these systems will create an expansive navigation capability similar to GPS, but with greater accuracy, availability, and integrity.

2. Unlike traditional ground-based navigation aids, WAAS will cover a more extensive service area. Precisely surveyed wide-area reference stations (WRS) are linked to form the U.S. WAAS network. Signals from the GPS satellites are monitored by these WRSs to determine satellite clock and ephemeris corrections and to model the propagation effects of the ionosphere. Each station in the network relays the data to a wide-area master station (WMS) where the correction information is computed. A correction message is prepared and uplinked to a geostationary orbit satellite (GEO) via a GEO uplink subsystem (GUS) which is located at the ground earth station (GES). The message is then broadcast on the same frequency as GPS (L1, 1575.42 MHz) to WAAS receivers within the broadcast coverage area of the WAAS GEO.

3. WAAS receivers certified prior to TSO-C145b and TSO-C146b, even if they have LPV capability, do not contain LP capability unless the receiver has been upgraded. Receivers capable of flying LP procedures must contain a statement in the Aircraft Flight Manual (AFM), AFM Supplement, or Approved Supplemental Flight Manual stating that the receiver has LP capability, as well as the capability for the other WAAS and GPS approach procedure types.

4. **General Requirements**

   1. WAAS avionics must be certified in accordance with Technical Standard Order (TSO) TSO-C145, Stand-Alone Airborne Navigation Equipment Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS); or TSO-C146, Stand-Alone Airborne Navigation Equipment Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS), and installed in accordance with Advisory Circular (AC) 20-138, Airworthiness Approval of Positioning and Navigation Systems.

   2. **EXAMPLE**

      IFDC FDC NAV WAAS VNAV/LPV/LP MINIMA MAY NOT BE AVBL 1306111330-1306141930EST

      or

      IFDC FDC NAV WAAS VNAV/LPV MINIMA NOT AVBL, WAAS LP MINIMA MAY NOT BE AVBL 1306021200-1306031200EST

   WAAS MAY NOT BE AVBL NOTAMs are predictive in nature and published for flight planning purposes. Upon commencing an approach at locations NOTAMed WAAS MAY NOT BE AVBL, if the WAAS avionics indicate LNAV/VNAV or LPV service is unavailable, then vertical guidance may be used to complete the approach using the displayed level of service. Should an outage occur during the approach, reversion to LNAV minima or an alternate instrument approach procedure may be required. When GPS testing NOTAMs are published and testing is actually occurring, Air Traffic Control will advise pilots requesting or cleared for a GPS or RNAV (GPS) approach that GPS may not be available and request intentions. If pilots have reported GPS anomalies, Air Traffic Control will request the pilot’s intentions and/or clear the pilot for an alternate approach, if available and operational.

   (b) WAAS area-wide NOTAMs are originated when WAAS assets are out of service and impact the service area. Area-wide WAAS NOT AVAILABLE (AVBL) NOTAMs indicate loss or malfunction of the WAAS system. In flight, Air Traffic Control will advise pilots requesting a GPS or RNAV (GPS) approach of WAAS NOT AVBL NOTAMs if not contained in the ATIS broadcast.
1-1-19. WIDE-AREA AUGMENTATION SYSTEMS (WAAS) – continued

EXAMPLE–
For unscheduled loss of signal or service, an example NOTAM is:
!FDC FDC NAV WAAS NOT AVBL 1311160600-1311191200EST.

For scheduled loss of signal or service, an example NOTAM is:
!FDC FDC NAV WAAS NOT AVBL 1312041015-1312082000EST.

(c) Site-specific WAAS MAY NOT BE AVBL NOTAMs indicate an expected level of service; for example, LNAV/VNAV, LP, or LPV may not be available. Pilots must request site-specific WAAS NOTAMs during flight planning. In flight, Air Traffic Control will not advise pilots of WAAS MAY NOT BE AVBL NOTAMs.

NOTE–
Though currently unavailable, the FAA is updating its prediction tool software to provide this site-service in the future.

(d) Most of North America has redundant coverage by two or more geostationary satellites. One exception is the northern slope of Alaska. If there is a problem with the satellite providing coverage to this area, a NOTAM similar to the following example will be issued:

EXAMPLE–
IFDC 4/3406 (PAZA A0173/14) ZAN NAV WAAS SIGNAL MAY NOT BE AVBL NORTH OF LINE FROM 7000N150000W TO 6400N164000W. RMK WAAS USERS SHOULD CONFIRM RA IMAVABILITY FOR IFR OPERATIONS IN THIS AREA. T ROUTES IN THIS SECTOR NOT AVBL. ANY REQUIRED ALTERNATE AIRPORT IN THIS AREA MUST HAVE AN AP PROVED INSTRUMENT APPROACH PROCEDURE OTHER THAN GPS THAT IS ANTICIPATED TO BE OPERATIONAL AND AVAILABLE AT THE ESTIMATED TIME OF ARRIVAL AND WHICH THE AIRCRAFT IS EQUIPPED TO FLY. 1406030812-1406050812EST.

6. When GPS-testing NOTAMs are published and testing is actually occurring, Air Traffic Control will advise pilots requesting or cleared for a GPS or RNAV (GPS) approach that GPS may not be available and request intentions. If pilots have reported GPS anomalies, Air Traffic Control will request the pilot’s intentions and/or clear the pilot for an alternate approach, if available and operational.

EXAMPLE–
Here is an example of a GPS testing NOTAM: !GPS 06/001 ZAB NAV GPS (INCLUDING WAAS, GBAS, AND ADS-B) MAY NOT BE AVAILABLE WITHIN A 468NM RADIUS CENTERED AT 330702N1062540W (TCS 093044) FL400-UNL. DECREASING IN AREA WITH A DECREASE IN ALTITUDE DEFINED AS: 425NM RADIUS AT FL250, 360NM RADIUS AT 10000FT, 354NM RADIUS AT 4000FT AGL, 327NM RADIUS AT 10000FT, AGL. 1406070300-1406071200.

7. When the approach chart is annotated with the W symbol, site-specific WAAS MAY NOT BE AVBL NOTAMs or Air Traffic advisories are not provided for outages in WAAS LNAV/VNAV and LPV vertical service. *   *   *

NOTE–
Area-wide WAAS NOT AVBL NOTAMs apply to all airports in the WAAS NOT AVBL area designated in the NOTAM, including approaches at airports where an approach chart is annotated with the W symbol.

8. GPS/WAAS was developed to be used within GEO coverage over North America without the need for other radio navigation equipment appropriate to the route of flight to be flown. Outside the WAAS coverage or in the event of a WAAS failure, GPS/WAAS equipment reverts to GPS-only operation and satisfies the requirements for basic GPS equipment. (See paragraph 1-1-18 for these requirements).

9. Unlike TSO-C129 avionics, which were certified as a supplement to other means of navigation, WAAS avionics are evaluated without reliance on other navigation systems. As such, installation of WAAS avionics does not require the aircraft to have other equipment appropriate to the route to be flown. (See paragraph 1-1-18d for more information on equipment requirements.)

(a) Pilots with WAAS receivers may flight plan to use any instrument approach procedure authorized for use with their WAAS avionics as the planned approach at a required alternate, with the following restrictions. When using WAAS at an alternate airport, flight planning must be based on flying the RNAV (GPS) LNAV or circling minima line, or minima on a GPS approach procedure, or conventional approach procedure with “or GPS” in the title. Code of Federal Regulation (CFR) Part 91 non-precision weather requirements must be used for planning. *   *   *

d.   *   *   *
   *   *   *   *   *

5. The WAAS scaling is also different than GPS TSO-C129(1) in the initial portion of the missed approach. Two differences occur here. First, the scaling abruptly changes from the approach scaling to the missed approach scaling, at approximately the departure end of the runway or when the pilot selects missed approach guidance rather than ramping as GPS does. Second, when the first leg of the missed approach is a Track to Fix (TF) leg aligned within 3 degrees of the inbound course, the receiver will change to 0.3 NM linear sensitivity until the turn initiation point for the first waypoint in the missed approach procedure, at which time it will abruptly change to terminal (±1 NM) sensitivity. This allows the elimination of close in obstacles in the early part of the missed approach that may otherwise cause the DA to be raised.

1-1-19 continued on next page
1-1-19. WIDE-AREA AUGMENTATION SYSTEMS (WAAS) – continued

6. There are two ways to select the final approach segment of an instrument approach. Most receivers use menus where the pilot selects the airport, the runway, the specific approach procedure, and finally the IAF, there is also a channel number selection method. The pilot enters a unique 5-digit number provided on the approach chart, and the receiver recalls the matching final approach segment from the aircraft database. A list of information including the available IAFs is displayed and the pilot selects the appropriate IAF. The pilot should confirm that the correct final approach segment was loaded by cross checking the Approach ID, which is also provided on the approach chart.

7. The Along-Track Distance (ATD) during the final approach segment of an LNAV procedure (with a minimum descent altitude) will be to the MAWP. On LNAV/VNAV and LPV approaches to a decision altitude, there is no missed approach waypoint so the along-track distance is displayed to a point normally located at the runway threshold. In most cases, the MAWP for the LNAV approach is located on the runway threshold at the centerline, so these distances will be the same. This distance will always vary slightly from any ILS DME that may be present, since the ILS DME is located further down the runway. Initiation of the missed approach on the LNAV/VNAV and LPV approaches is still based on reaching the decision altitude without any of the items listed in 14 CFR Section 91.175 being visible, and must not be delayed while waiting for the ATD to reach zero. The WAAS receiver, unlike a GPS receiver, will...

Section 2. PERFORMANCE-BASED NAVIGATION (PBN) AND AREA NAVIGATION (RNAV)

1-2-1. PERFORMANCE-BASED NAVIGATION (PBN) AND AREA NAVIGATION (RNAV): On pages 479-480, revise the section and paragraph titles to the above and revise subparagraphs a. and b., add new Figure 1-2-1 and renumber and Figures 1-2-1 through 1-2-5 as follows:

a. Introduction to PBN. As air travel has evolved, methods of navigation have improved to give operators more flexibility. Under the umbrella of area navigation, there are legacy and performance-based navigation (PBN) methods, see FIG 1-2-1. The legacy methods include operations incorporating systems approved under AC 90-45, Approval of Area Navigation Systems for Use in the U.S. National Airspace System, which allows two-dimensional area navigation (2D RNAV) within the U.S. National Airspace System (NAS). AC 90-45 describes 2D RNAV in terms of both VOR/DME dependent systems and self-contained systems such as Inertial Navigation Systems (INS). Many operators have upgraded their systems to obtain the benefits of PBN. Within PBN there are two main categories of navigation methods: area navigation (RNAV) and required navigation performance (RNP). For an aircraft to meet the requirements of RNAV, a specified RNAV accuracy must be met 95 percent of the flight time. RNP is an RNAV system that includes onboard performance monitoring and alerting capability (for example, Receiver Autonomous Integrity Monitoring (RAIM)). PBN also introduces the concept of navigation specifications (Nav Specs) which are a set of aircraft and aircrew requirements needed to support a navigation application within a defined airspace concept. For both RNP and RNAV designations, the numerical designation refers to the lateral navigation accuracy in nautical miles which is expected to be achieved at least 95 percent of the flight time by the population of aircraft operating within the airspace, route, or procedure. This information is introduced in International Civil Aviation Organization’s (ICAO) Doc 9613, Performance-based Navigation (PBN) Manual (Fourth Edition, 2013) and the FAA Advisory Circular (AC) 90-105A, Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System and in Remote and Oceanic Airspace (expected publication date in late 2014) further develops this story.
1-2-1. PERFORMANCE-BASED NAVIGATION (PBN) AND AREA NAVIGATION (RNAV) – continued

b. Area Navigation (RNAV)

1. General. RNAV is a method of navigation that permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these. In the future, there will be an increased dependence on the use of RNAV in lieu of routes defined by ground-based navigation aids. RNAV routes and terminal procedures, including departure procedures (DPs) and standard terminal arrivals (STARs), are designed with RNAV systems in mind. There are several potential advantages of RNAV routes and procedures:

   (a) Time and fuel savings;
   (b) Reduced dependence on radar vectoring, altitude, and speed assignments allowing a reduction in required ATC radio transmissions; and
   (c) More efficient use of airspace. In addition to information found in this manual, guidance for domestic RNAV DPs, STARs, and routes may also be found in Advisory Circular 90-100(), U.S. Terminal and En Route Area Navigation (RNAV) Operations.

2. RNAV Operations. RNAV procedures, such as DPs and STARs, demand strict pilot awareness and maintenance of the procedure centerline. Pilots should possess a working knowledge of their aircraft navigation system to ensure RNAV procedures are flown in an appropriate manner. In addition, pilots should have an understanding of the various waypoint and leg types used in RNAV procedures; these are discussed in more detail below.

   (a) Waypoints. A waypoint is a predetermined geographical position that is defined in terms of latitude/longitude coordinates. Waypoints may be a simple named point in space or associated with existing navaids, intersections, or fixes. A waypoint is most often used to indicate a change in direction, speed, or altitude along the desired path. RNAV procedures make use of both fly-over and fly-by waypoints.

   (1) Fly-by waypoints. Fly-by waypoints are used when an aircraft should begin a turn to the next course prior to reaching the waypoint separating the two route segments. This is known as turn anticipation.

   (2) Fly-over waypoints. Fly-over waypoints are used when the aircraft must fly over the point prior to starting a turn.

NOTE—
FIG 1-2-2 illustrates several differences between a fly-by and a fly-over waypoint.
1-2-1. PERFORMANCE-BASED NAVIGATION (PBN) AND AREA NAVIGATION (RNAV) – continued

(3) **Course to Fix.** A Course to Fix (CF) leg is a path that terminates at a fix with a specified course at that fix. **Narrative:** “on course 150 to ALPHA WP.” See FIG 1-2-5.

(4) **Radius to Fix.** A Radius to Fix (RF) leg is defined as a constant radius circular path around a defined turn center that terminates at a fix. See FIG 1-2-6.

---

**FIG 1-2-3**

**FIG 1-2-4**

**FIG 1-2-5**

**FIG 1-2-6**
1-2-1. PERFORMANCE-BASED NAVIGATION (PBN) AND AREA NAVIGATION (RNAV) – continued

(5) Heading. A Heading leg may be defined as, but not limited to, a Heading to Altitude (VA), Heading to DME range (VD), and Heading to Manual Termination, i.e., Vector (VM). Narrative: "climb heading 350 to 1500", "heading 265, at 9 DME west of PXR VORTAC, right turn heading 360", "fly heading 090, expect radar vectors to DRYHT INT."

(c) Navigation Issues. Pilots should be aware of their navigation system inputs, alerts, and annunciations in order to make better-informed decisions. In addition, the availability and suitability of particular sensors/systems should be considered.

(1) GPS/WAAS. Operators using TSO-C129(), TSO-C196(), TSO-C145() or TSO-C146() systems should ensure departure and arrival airports are entered to ensure proper RAIM availability and CDI sensitivity.

(2) DME/DME. Operators should be aware that DME/DME position updating is dependent on navigation system logic and DME facility proximity, availability, geometry, and signal masking.

(3) VOR/DME. Unique VOR characteristics may result in less accurate values from VOR/DME position updating than from GPS or DME/DME position updating.

(4) Inertial Navigation. Inertial reference units and inertial navigation systems are often coupled with other types of navigation inputs, e.g., DME/DME or GPS, to improve overall navigation system performance.

NOTE—Specific inertial position updating requirements may apply.

(d) Flight Management System (FMS). An FMS is an integrated suite of sensors, receivers, and computers, coupled with a navigation database. These systems generally provide performance and RNAV guidance to displays and automatic flight control systems.

Inputs can be accepted from multiple sources such as GPS, DME, VOR, LOC and IRU. These inputs may be applied to a navigation solution one at a time or in combination. Some FMSs provide for the detection and isolation of faulty navigation information.

When appropriate navigation signals are available, FMSs will normally rely on GPS and/or DME/DME (that is, the use of distance information from two or more DME stations) for position updates. Other inputs may also be incorporated based on FMS system architecture and navigation source geometry.

NOTE—DME/DME inputs coupled with one or more IRU(s) are often abbreviated as DME/DME/IRU or D/D/I.

(e) RNAV Navigation Specifications (Nav Specs)

Nav Specs are a set of aircraft and aircrew requirements needed to support a navigation application within a defined airspace concept. For both RNP and RNAV designations, the numerical designation refers to the lateral navigation accuracy in nautical miles which is expected to be achieved at least 95 percent of the flight time by the population of aircraft operating within the airspace, route, or procedure. (See FIG 1-2-1.)
1-2-2. REQUIRED NAVIGATION PERFORMANCE (RNP) – continued

### U.S. Standard RNP Levels

<table>
<thead>
<tr>
<th>RNP Level</th>
<th>Typical Application</th>
<th>Primary Route Width (NM) - Centerline to Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 to 1.0</td>
<td>RNP AR Approach Segments</td>
<td>0.1 to 1.0</td>
</tr>
<tr>
<td>0.3 to 1.0</td>
<td>RNP Approach Segments</td>
<td>0.3 to 1.0</td>
</tr>
<tr>
<td>1</td>
<td>Terminal and En Route</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td>En Route</td>
<td>2.0</td>
</tr>
<tr>
<td>4</td>
<td>Projected for oceanic/remote areas where 30 NM horizontal separation is applied.</td>
<td>4.0</td>
</tr>
<tr>
<td>10</td>
<td>Oceanic/remote areas where 50 NM lateral separation is applied.</td>
<td>10.0</td>
</tr>
</tbody>
</table>

(2) **RNP AR APCH.** RNP AR APCH procedures are titled RNAV (RNP), RNP AR APCH vertical navigation performance is based upon barometric VNAV or WAAS. RNP AR is intended to provide specific benefits at specific locations. It is not intended for every operator or aircraft. RNP AR capability requires specific aircraft performance, design, operational processes, training, and specific procedure design criteria to achieve the required target level of safety. RNP AR APCH has lateral accuracy values that can range below 1 in the terminal and missed approach segments and essentially scale to RNP 0.3 or lower in the final approach. Operators conducting these approaches should refer to AC 90-101A, Approval Guidance for RNP Procedures with AR. (See paragraph 5-4-18.)

(3) **Advanced RNP (A-RNP).** Advanced RNP includes a lateral accuracy value of 2 for oceanic and remote operations but not planned for U.S. implementation and may have a 2 or 1 lateral accuracy value for domestic enroute segments. Except for the final approach, A-RNP allows for scalable RNP lateral navigation accuracies. Its applications in the U.S. are still in progress.

(4) **RNP 1.** RNP 1 requires a lateral accuracy value of 1 for arrival and departure in the terminal area and the initial and intermediate approach phase.

(5) **RNP 2.** RNP 2 will apply to both domestic and oceanic/remote operations with a lateral accuracy value of 2.

(6) **RNP 4.** RNP 4 will apply to oceanic and remote operations only with a lateral accuracy value of 4.

(7) **RNP 0.3.** RNP 0.3 will apply to rotorcraft only. This Nav Spec requires a lateral accuracy value of 0.3 for all phases of flight except for oceanic and remote and the final approach segment.

**Application of Standard Lateral Accuracy Values.** U.S. standard lateral accuracy values typically used for:

**Depiction of Lateral Accuracy Values.** The applicable lateral accuracy values will be depicted on affected charts and procedures.

c. **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 paragraph 4-7-1.)

d. **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 lateral accuracy values.

**1-2-3. USE OF SUITABLE AREA NAVIGATION (RNAV) SYSTEMS ON CONVENTIONAL PROCEDURES AND ROUTES:** On page 482, revise subparagraph d. as follows:

**d. Alternate Airport Considerations.** For the purposes of flight planning, any required alternate airport must have an available instrument approach procedure that does not require the use of GPS. This restriction includes conducting a conventional approach at the alternate airport using a substitute means of navigation that is based upon the use of GPS. For example, these restrictions would apply when planning to use GPS equipment as a substitute means of navigation for an out-of-service VOR that supports an ILS missed approach procedure at an alternate airport. In this case, some other approach not reliant upon the use of GPS must be available. This restriction does not apply to RNAV systems using TSO-C145/-C146 WAAS equipment. For further WAAS guidance, see paragraph 1-1-19.

**3. This restriction does not apply to TSO-C145() and TSO-C146() equipped users (WAAS users). For further WAAS guidance, see paragraph 1-1-19.**
**Chapter 4. AIR TRAFFIC CONTROL**

**4-1-9. TRAFFIC ADVISORY PRACTICES AT AIRPORTS WITHOUT OPERATING CONTROL TOWERS:** On page 516, revise table 4-1-1 and subparagraphs b. and c. as follows:

*b. Communicating on a Common Frequency:*

<table>
<thead>
<tr>
<th>Facility at Airport</th>
<th>Frequency Use</th>
<th>Communication/Broadcast Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UNICOM (No Tower or FSS)</td>
<td>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.</td>
<td>Before taxiing and before taxiing on the runway for departure. 10 miles out. Entering downwind, base, and final. Leaving the runway.</td>
</tr>
<tr>
<td>2. No Tower, FSS, or UNICOM</td>
<td>Self-announce on MULTICOM frequency 122.9.</td>
<td>Before taxiing and before taxiing on 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.</td>
</tr>
<tr>
<td>4. FSS Closed (No Tower)</td>
<td>Self-announce on CTAF.</td>
<td>Before taxiing and before taxiing on the runway for departure. 10 miles out. Entering downwind, base, and final. Leaving the runway.</td>
</tr>
<tr>
<td>5. Tower or FSS not in operation</td>
<td>Self-announce on CTAF.</td>
<td>Before taxiing and before taxiing on the runway for departure. 10 miles out. Entering downwind, base, and final. Leaving the runway.</td>
</tr>
<tr>
<td>6. Designated CTA F Area (Alaska Only)</td>
<td>Self-announce on CTA F designated on chart or Alaska Supplement (A/FD).</td>
<td>Before taxiing and before taxiing on the runway for departure until leaving designated area. When entering designated CTA F area.</td>
</tr>
</tbody>
</table>

---

2. **CTAF (Alaska Only).** In Alaska, a CTAF may also be designated for the purpose of carrying out advisory practices while operating in designated areas with a high volume of VFR traffic.

3. The CTAF frequency for a particular airport or area is contained in the A/FD, Alaska Supplement, Alaska Terminal Publication, Instrument Approach * * *

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4-5-7. **AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST (ADS-B) SERVICES:** On page 567, revise subparagraph c. as follows:

*c. ADS-B Capabilities and Procedures*

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3. In Alaska, pilots of aircraft conducting other than arriving or departing operations in designated CTAF areas should monitor/communicate on the appropriate frequency while within the designated area, unless required to do otherwise by CFRs or local procedures. Such operations include parachute jumping/dropping, en route, practicing maneuvers, etc.
4-5-7. AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST (ADS-B) SERVICES – continued

2. An aircraft’s Flight Identification (FLT ID), also known as registration number or airline flight number, is transmitted by the ADS-B Out avionics. The FLT ID is comprised of a maximum of seven alphanumeric characters and also corresponds to the aircraft identification annotated on the ATC flight plan. The FLT ID for airline and commuter aircraft is associated with the company name and flight number (for example, AAL3342). The FLT ID is typically entered by the flightcrew during preflight through either a Flight Management System (FMS) interface (Control Display Unit/CDU) or transponder control panel. The FLT ID for General Aviation (GA) aircraft is associated with the aircraft’s registration number. The aircraft owner can preset the FLT ID to the aircraft’s registration number (for example, N235RA), since it is a fixed value, or the pilot can enter it into the ADS-B Out system prior to flight.

ATC systems use transmitted FLT IDs to uniquely identify each aircraft within a given airspace and correlate them to a filed flight plan for the provision of surveillance and separation services. If the FLT ID is not entered correctly, ATC automation systems may not associate surveillance tracks for the aircraft to its filed flight plan. Therefore, Air Traffic Services may be delayed or unavailable until this is corrected. Consequently, it is imperative that flightcrews and GA pilots ensure the FLT ID entry correctly matches the aircraft identification annotated in the filed ATC flight plan.

3. ADS-B systems integrated with the transponder will automatically set the applicable emergency status when 7500, 7600, or 7700 are entered into the transponder. ADS-B systems not integrated with the transponder, or systems with optional emergency codes, will require that the appropriate emergency code is entered through a pilot interface. ADS-B is intended for in-flight and airport surface use. ADS-B systems should be turned “on” -- and remain “on” -- whenever operating in the air and moving on the airport surface. Civil and military Mode A/C transponders and ADS-B systems should be adjusted to the “on” or normal operating position as soon as practical, unless the change to “standby” has been accomplished previously at the request of ATC.

4-6-6. GUIDANCE ON SEVERE TURBULENCE AND MOUNTAIN WAVE ACTIVITY (MWA): On page 573, revise subparagraph b. as follows:

b. Pre-flight tools. Sources of observed and forecast information that can help the pilot ascertain the possibility of MWA or severe turbulence are: Forecast Winds and Temperatures Aloft (FD), Area Forecast (FA), Graphical Turbulence Guidance (GTG), SIGMETs and PIREPs.

4-7-5. PROVISIONS FOR ACCOMMODATION OF NONRNP10 AIRCRAFT (AIRCRAFT NOT AUTHORIZED RNP 10 OR RNP 4): On page 578, revise subparagraph c. as follows:

c. Operators of NonRNP10 aircraft must not annotate ICAO flight plan Item 18 (Other Information) with “PBN/A1” or “PBN/L1” if they have not obtained RNP 10 or RNP 4 authorization.

4-7-7. RNP 10 OR RNP 4 AUTHORIZATION: POLICY AND PROCEDURES FOR AIRCRAFT AND OPERATORS: On page 579, revise subparagraph e.4. as follows:

e.4. * * * * * * *

(a) FAA Order 8400.12

(e) FAA RNP 10 Job Aid with FAA Order 8400.12 references

4-7-8. FLIGHT PLANNING REQUIREMENTS: On pages 579 and 580, revise subparagraphs b., d., and e. as follows:

b. * * *

1. Annotate ICAO Flight Plan Item 10 (Equipment) with the letters “R” and

2. Annotate Item 18 (Other Information) with, as appropriate, “PBN/A1” (for RNP10) or “PBN/L1” (for RNP4).

NOTE–

[2.] On the ICAO Flight Plan, the letter “R” in Item 10 indicates that the flight is authorized for PBN operations. Item 18 PBN/indicates the types of PBN capabilities that are authorized.

* * * * * * *

d. Operators that have not obtained RNP 10 or RNP 4 authorization must not annotate ICAO flight plan Item 18 (Other information) with “PBN/A1” or “PBN/L1”, but must follow the practices detailed in paragraph 4-7-5.

e. * * *

1. Explanation. The FAA program that allows operators to communicate their domestic U.S. RNAV capabilities to ATC. It is explained in paragraph 5-1-9 b 8 items 18 (c) and 18 (d).

2. Recommendation. It is recommended that operators provide their PBN capability for oceanic operations by filing “PBN/ A1” (for RNP10) or “PBN/L1” (for RNP4). For domestic operations, operators should indicate their PBN capability per paragraph 5-1-9 b 8 items 18 (c) and 18 (d).
Chapter 5. AIR TRAFFIC PROCEDURES

5-1.1. PREFLIGHT PREPARATION: On page 581, revise subparagraphs a. and c. as follows:

a. Every pilot is urged to receive a preflight briefing and to file a flight plan. This briefing should consist of the latest or most current weather, airport, and en route NAV/ information. Briefing service may be obtained from an FSS either by telephone, by radio when airborne, or by a personal visit to the station. Pilots with a current medical certificate in the 48 continental States may access Lockheed Martin Flight Services or the Direct User Access Terminal System (DUATS) via the internet. Lockheed Martin Flight Services and DUATS will provide preflight weather data and allow pilots to file domestic VFR or IFR flight plans.

* * * * *

c. Consult an FSS, Lockheed Martin Flight Services, or DUATS for preflight weather briefing.

* * * * *

5-1.3. NOTICE TO AIRMEN (NOTAM) SYSTEM: On page 582, revise the NOTE in subparagraph a. as follows:

NOTE—

[2.] NOTAM information is transmitted using standard contractions to reduce transmission time. See TBL 5-1-2 for a listing of the most commonly used contractions. For a complete listing, see FAA Order 7340.2, Contractions.

* * * * *

5-1.9. INTERNATIONAL FLIGHT PLAN (FAA FORM 7233-4): On page 593, revise subparagraph a., add a.1.-3., and revise [4] in the NOTE. On page 596, beneath table 5-1-4, revise [4] and [5]. On page 599, revise subparagraph b.8.(d) as follows:

a. General Use of FAA Form 7233-4 is:

1. Mandatory for assignment of RNAV SIDs and STARs or other PBN routing,
2. Mandatory for all IFR flights that will depart U.S. domestic airspace, and
3. Recommended for domestic IFR flights.

NOTE—

[4.] ATC issues clearances based on aircraft capabilities filed in Items 10 and 18 of FAA Form 7233-4. Operators should file all capabilities for which the aircraft and crew is certified, capable, and authorized. PBN/ capability should be filed as per paragraph 5-1-9 b 8 Items 18 (c) and (d).

* * * * *

b. * * *

* * * * *

4. * * *

* * * * *

NOTE—

[4.] If the letter R is used, the performance-based navigation levels that are authorized must be specified in Item 18 following the indicator PBN/. For further details, see Paragraph 5-1-9 b 8, Item 18 (c) and (d).

[5.] If the letter Z is used, specify in Item 18 the other equipment carried, preceded by COM/, DAT/, and/or NAV/, as appropriate.

* * * * *

8. * * *

* * * * *

(d) NAV/ Significant data related to navigation equipment, other than as specified in PBN/.

1. When Performance Based Navigation Capability has been filed in PBN/, if PBN routing is desired for only some segment(s) of the flight then that information can be conveyed by inserting the character “Z” in Item 10 and “NAV/RNV” in field 18 followed by the appropriate RNAV accuracy value(s) per the following:

a. To be assigned an RNAV 1 SID, insert the characters “D1”.

b. To be assigned an RNAV 1 STAR, insert the characters “A1”.

c. To be assigned en route extensions and/or RNAV PTP, insert the characters “E2”.

d. To prevent assignment of an RNAV route or procedure, insert a numeric value of “0” for the segment of the flight. Alternatively, you may simply remove the segment of the flight indicator and numeric value from the character string.

EXAMPLE—

[1.] NAV/RNVD1 or NAV/RNVD1E0A0 (Same meaning)
[2.] NAV/RNVA1 or NAV/RNVD0E0A1 (Same meaning)
[3.] NAV/RNVE2 or NAV/RNVD0E2A0 (Same meaning)
[4.] NAV/RNVD1A1 or NAV/RNVD1E0A1 (Same meaning)
[5.] NAV/RNVD1E2A1

NOTE—

[1.] Route assignments are predicated on NAV/ data over PBN/ data in ERAS.


(2) Operators should file their maximum capabilities in order to qualify for the most advanced procedures.

* * * * *

5-4.5. INSTRUMENT APPROACH PROCEDURE CHARTS: On page 626, revise subparagraph d.7. as follows:

d. * * *

7. * * *

(a) FIG 5-4-6 depicts a TAA without a left base leg and right base leg. In this generalized example, pilots approaching on a bearing TO the IF/IAF from 271 clockwise to 089 are expected to execute a course reversal because the amount of turn required at the IF/IAF exceeds 90 degrees. The term “NOPT” will be annotated on the boundary of the TAA icon for the other portion of the TAA.
5-4-15. SIMULTANEOUS (PARALLEL) INDEPENDENT ILS/RNAV/GLS APPROACHES: On page 644, revise figure 5-4-20 as follows:

Simultaneous (Parallel) Independent ILS/RNAV/GLS Approaches

RUNWAY CENTERLINES SPACED BETWEEN 9000 FEET* AND AT LEAST 4300' [DUAL RUNWAYS] OR 5000' OR MORE, [TRIPLE OR QUADRUPLE RUNWAYS] - NTZ RADAR MONITORING REQUIRED

(*'9200' for airports above 5000 FEET)

FIG. 5-4-20
5-4-16. SIMULTANEOUS CLOSE PARALLEL ILS PRM/RNAV
PRM/GLS PRM APPROACHES AND SIMULTANEOUS
OFFSET INSTRUMENT APPROACHES (SOIA): On pages 645-
648, replace the word “effected” with “affected” in subparagraph
a.1.(c) and “turn-on” with “turn” in subparagraph c.4.(e), and
Figures 5-4-21 and 5-4-22 as follows:

PRM Approaches Simultaneous Close Parallel

RUNWAY CENTERLINES SPACED LESS THAN 4300 ft BUT AT LEAST 3000 ft APART
NTZ RADAR MONITORING REQUIRED.
PRM TRAINING AND PROCEDURES REQUIRED.
HIGH UPDATE RATE PRM RADAR SENSOR REQUIRED FOR
CERTAIN RUNWAY SPACING.

INTERSECTION OR WAYPOINT ESTABLISHED WHERE 3200’ ALTITUDE
INTERCEPTS GLIDE SLOPE OR VERTICAL PATH. NTZ BEGINS

Radar monitoring provided to .5 NM beyond departure end to ensure separation
during simultaneous missed approaches

Radar monitoring provided to ensure lateral or vertical
separation between aircraft on parallel final approach
courses prior to the beginning of the NTZ

a. * * *
1. * * *

(c) The pilot may request to fly the RNAV PRM or GLS PRM
approach in lieu of either the ILS PRM and LDA PRM
approaches. ATIS may advertise RNAV or GLS PRM approaches to
the affected runway or runways in the event of the loss of ground based NAVAIDS. The Attention All Users Page will address ILS
PRM, LDA PRM, RNAV PRM, or GLS PRM approaches as applicable. In the remainder of this section:

* * *

4. * * *
(e) Aircraft observed to overshoot the turn 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 cancel the approach clearance, and issue missed
approach or other instructions to the deviating aircraft.

* * *

5-4-16 continued on next page
SOIA Approach Geometry

**NOTE**

**SAP**
The stabilized approach point is a design point along the extended centerline of the intended landing runway on the glide slope/glide path at 500 feet above the runway threshold elevation. It is used to verify a sufficient distance is provided for the visual maneuver after the offset course approach DA to permit the pilots to conform to approved, stabilized approach criteria. The SAP is not published on the IAP.

**Offset Course DA**
The point along the LDA, or other offset course, where the course separation with the adjacent ILS, or other straight-in course, reaches the minimum distance permitted to conduct closely spaced approaches. Typically that minimum distance will be 3,000 feet without the use of high update radar; with high update radar, course separation of less than 3,000 ft may be used when validated by a safety study. The altitude of the glide slope/glide path at that point determines the offset course approach decision altitude and is where the NTZ terminates. Maneuvering inside the DA is done in visual conditions.

**Visual Segment Angle**
Angle, as determined by the SOIA design tool, formed by the extension of the straight segment of the calculated flight track (between the offset course MAP/DA and the SAP) and the extended runway centerline. The size of the angle is dependent on the aircraft approach categories (Category D or only selected categories/speeds) that are authorized to use the offset course approach and the spacing between the runways.

**Visibility**
Distance from the offset course approach DA to runway threshold in statute mile.

**Procedure**
The aircraft on the offset course approach must see the runway-landing environment and, if ATC has advised that traffic on the straight-in approach is a factor, the offset course approach aircraft must visually acquire the straight-in approach aircraft and report it in sight to ATC prior to reaching the DA for the offset course approach.

**CC**
The Clear of Clouds point is the position on the offset final approach course where aircraft first operate in visual meteorological conditions below the ceiling, when the actual weather conditions are at, or near, the minimum ceiling for SOIA operations. Ceiling is defined by the Aeronautical Information Manual.
Chapter 7. SAFETY OF FLIGHT

7-1-2. FAA WEATHER SERVICES: On page 684, revise subparagraph c.3. as follows:

3. Pilots can access the Direct User Access Terminal System (DUATS) and Lockheed Martin Flight Services with a current medical certificate via the internet. Pilots can receive preflight weather data and file domestic VFR and IFR flight plans. The following are the contract DUATS vendors:

Computer Sciences Corporation (CSC)
Internet Access: http://www.duats.com
For customer service: (800) 345-3828

Data Transformation Corporation (DTC)
Internet Access: http://www.duat.com
For customer service: (800) 243-3828

Lockheed Martin Flight Services
Internet Access: http://www.lmfsw.com/Website.com
For customer service: (866) 936-6826

7-1-3. USE OF AVIATION WEATHER PRODUCTS: On pages 685 and 686, revise subparagraph b. as follows and delete subparagraph n.

b. Operators not certificated under the provisions of 14 CFR Part 119 are encouraged to use FAA/NWS products through Flight Service Stations, Direct User Access Terminal System (DUATS), Lockheed Martin Flight Services, and/or Flight Information Services-Broadcast (FIS-B).

7-1-4. PREFLIGHT BRIEFING: On page 687, revise the NOTE under subparagraph b.8. as follows:

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

[2.] NOTAM (D) information and FDC NOTAMs which have been published in the Notices to Airmen Publication are not included in pilot briefings unless a review of this publication is specifically requested by the pilot. For complete flight information you are urged to review the printed NOTAMs in the Notices to Airmen Publication and the A/FD in addition to obtaining a briefing.
7-1-20. PILOT WEATHER REPORTS (PIREPs): On page 713, revise table 7-1-7 as follows:

<table>
<thead>
<tr>
<th>PIREP ELEMENT</th>
<th>PIREP CODE</th>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 3-letter station identifier</td>
<td>XXX</td>
<td>Nearest weather reporting location to the reported phenomenon</td>
</tr>
<tr>
<td>2. Report type</td>
<td>UA or UUA</td>
<td>Routine or urgent PIREP</td>
</tr>
<tr>
<td>3. Location</td>
<td>/OV</td>
<td>In relation to a VOR</td>
</tr>
<tr>
<td>4. Time</td>
<td>/TM</td>
<td>Coordinated Universal Time</td>
</tr>
<tr>
<td>5. Altitude</td>
<td>/FL</td>
<td>Essential for turbulence and icing reports</td>
</tr>
<tr>
<td>6. Type aircraft</td>
<td>/TP</td>
<td>Essential for turbulence and icing reports</td>
</tr>
<tr>
<td>7. Sky cover</td>
<td>/SK</td>
<td>Cloud height and coverage (sky clear, few, scattered, broken, or overcast)</td>
</tr>
<tr>
<td>8. Weather</td>
<td>/WX</td>
<td>Flight visibility, precipitation, restrictions to visibility, etc.</td>
</tr>
<tr>
<td>9. Temperature</td>
<td>/TA</td>
<td>Degrees Celsius</td>
</tr>
<tr>
<td>10. Wind</td>
<td>/WV</td>
<td>Direction in degrees magnetic north and speed in knots</td>
</tr>
<tr>
<td>11. Turbulence</td>
<td>/TB</td>
<td>See AIM paragraph 7-1-23</td>
</tr>
<tr>
<td>12. Icing</td>
<td>/IC</td>
<td>See AIM paragraph 7-1-21</td>
</tr>
<tr>
<td>13. Remarks</td>
<td>/RM</td>
<td>For reporting elements not included or to clarify previously reported items</td>
</tr>
</tbody>
</table>

* * * * *

7-2-3. ALTIMETER ERRORS: On page 732, revise subparagraphs c.-e. as follows:

a. Temperature also has an effect on the accuracy of altimeters and your altitude. The crucial values to consider are standard temperature versus the ambient (at altitude) temperature and the elevation above the altitude setting reporting source. It is these “differences” that cause the error in indicated altitude. When the column of air is warmer than standard, you are higher than your altimeter indicates. Subsequently, when the column of air is colder than standard, you are lower than indicated. It is the magnitude of these “differences” that determine the magnitude of the error. When flying into a cooler air mass while maintaining a constant indicated altitude, you are losing true altitude. However, flying into a cooler air mass does not necessarily mean you will be lower than indicated if the difference is still on the plus side. For example, while flying at 10,000 feet (where STANDARD temperature is +5 degrees Celsius (C)), the outside air temperature cools from +5 degrees C to 0 degrees C, the temperature error will nevertheless cause the aircraft to be HIGHER than indicated. It is the extreme “cold” difference that normally would be of concern to the pilot. Also, when flying in cold conditions over mountainous terrain, the pilot should exercise caution in flight planning both in regard to route and altitude to ensure adequate en route and terminal area terrain clearance.

NOTE—

Non-standard temperatures can result in a change to effective vertical paths and actual descent rates while using aircraft Baro-VNAV equipment for vertical guidance on final approach segments. A higher than standard temperature will result in a steeper gradient and increased actual descent rate. Indications of these differences are not often directly related to vertical speed indications. Conversely, a lower than standard temperature will result in a shallower descent gradient and reduced actual descent rate. Pilots should consider potential consequences of these effects on approach minimums, power settings, sight picture, visual cues, etc., especially for high-altitude or terrain-challenged locations and during low-visibility conditions.

d. TBL 7-2-3, derived from ICAO formulas, indicates how much error can exist when operating in cold temperatures. To use the table, find the reported temperature in the left column, read across the top row to locate the height above the airport/reporting station (i.e., subtract the airport/reporting elevation from the intended flight altitude). The intersection of the column and row is how much lower the aircraft may actually be as a result of the possible cold temperature induced error.

e. Pilots are responsible to compensate for cold temperature altimetry errors when operating into an airport with any published cold temperature restriction and a reported airport temperature at or below the published temperature restriction. Pilots must ensure compensating aircraft are correcting on the proper segment or segments of the approach. Manually correct if compensating aircraft system is inoperable. Pilots manually correcting, are responsible to calculate and apply a cold temperature altitude correction derived from TBL 7-2-3 to the affected approach segment or segments; Pilots must advise the cold temperature altitude correction to Air Traffic Control (ATC). Pilots are not required to advise ATC of a cold temperature altitude correction inside of the final approach fix.

* * * * *

7-3-4. VORTEX BEHAVIOR: On page 734, revise subparagraph a.1. as follows:

a. * *

1. An aircraft generates vortices from the moment it rotates on takeoff to touchdown, since trailing vortices are a by-product of wing lift. Prior to takeoff or touchdown pilots should note the rotation or touchdown point of the preceding aircraft. (See FIG 7-3-3.)

* * * * *
Chapter 9. AERONAUTICAL CHARTS AND RELATED PUBLICATIONS

9-1-2. OBTAINING AERONAUTICAL CHARTS: On page 753, revise subparagraph b. as follows:

b. Public sales of charts and publications are available through a network of FAA chart agents primarily located at or near major civil airports. A listing of products, dates of latest editions and agents is available on the AeroNav website at: http://www.faa.gov/air_traffic/flight_info/aeronav.


1. **Sectional Aeronautical Charts.** Sectional Charts are designed for visual navigation of slow to medium speed aircraft. The topographic information consists of contour lines, shaded relief, drainage patterns, and an extensive selection of visual checkpoints and landmarks used for flight under VFR. Cultural features include cities and towns, roads, railroads, and other distinctive landmarks. The aeronautical information includes visual and radio aids to navigation, airports, controlled airspace, special-use airspace, obstructions, and related data. Scale 1 inch = 6.86nm/1:500,000. 60 x 20 inches folded to 5 x 10 inches. Revised biannually, except most Alaskan charts are revised annually. (See FIG 9-1-1 and FIG 9-1-13.)

2. **VFR Terminal Area Charts (TAC).** TACs depict the airspace designated as Class B airspace. While similar to sectional charts, TACs have more detail because the scale is larger. The TAC should be used by pilots intending to operate to or from airfields within or near Class B or Class C airspace. Areas with TAC coverage are indicated by a • on the Sectional Chart indexes. Scale 1 inch = 3.43nm/1:250,000. Charts are revised biannually, except Puerto Rico-Virgin Islands which is revised annually. (See FIG 9-1-1 and FIG 9-1-13.)

3. **World Aeronautical Chart (WAC).** WACs cover land areas for navigation by moderate speed aircraft operating at high altitudes. Included are city tints, principal roads, railroads, distinctive landmarks, drainage patterns, and relief. Aeronautical information includes visual and radio aids to navigation, airports, airways, special-use airspace, and obstructions. Because of a smaller scale, WACs do not show as much detail as sectional or TACs, and; therefore, are not recommended for exclusive use by pilots of low speed, low altitude aircraft. Scale 1 inch = 13.7nm/1:1,000,000. 60 x 20 inches folded to 5 x 10 inches. WACs are revised annually, except for a few in Alaska, Mexico, and the Caribbean, which are revised biennially. (See FIG 9-1-14 and FIG 9-1-15.)

Sectional and VFR Terminal Area Charts for the Conterminous U.S., Hawaii, Puerto Rico, and Virgin Islands
6. **Helicopter Route Charts.** A three-color chart series which shows current aeronautical information useful to helicopter pilots navigating in areas with high concentrations of helicopter activity. Information depicted includes helicopter routes, four classes of heliports with associated frequency and lighting capabilities, NAVAIDs, and obstructions. In addition, pictorial symbols, roads, and easily identified geographical features are portrayed. Helicopter charts have a longer life span than other chart products and may be current for several years. Helicopter Route Charts are updated as requested by the FAA. Scale 1 inch = 1.71nm/1:125,000. 34 x 30 inches folded to 5 x 10 inches. (See FIG 9-1-2.)
9-1-4. GENERAL DESCRIPTION OF EACH CHART SERIES – continued

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

Enroute High Altitude Charts for the Conterminous U.S.
9-1-4. GENERAL DESCRIPTION OF EACH CHART SERIES –
continued

Alaska Enroute Low Altitude Chart

Alaskan Enroute High Altitude Chart

9-1-4 continued on next page
9-1-4. GENERAL DESCRIPTION OF EACH CHART SERIES – continued

Planning Charts

3. U.S. VFR Wall Planning Chart. This chart is designed for VFR preflight planning and provides aeronautical and topographic information of the conterminous U.S. The aeronautical information includes airports, radio aids to navigation, Class B airspace and special use airspace. The topographic information includes city tint, populated places, principal roads, drainage patterns, and shaded relief. Scale 1 inch = 43 nm/1:3,100,000. The one-sided chart is 59 x 36 inches and ships unfolded for wall mounting. Chart is revised biennially. (See FIG 9-1-8.)

U.S. VFR Wall Planning Chart


d. Supplementary Charts and Publications.

1. Airport/Facility Directory (A/FD). This 7-volume booklet series contains data on airports, seaplane bases, heliports, NAVAIDs, communications data, weather data sources, airspace, special notices, and operational procedures. Coverage includes the conterminous U.S., Puerto Rico, and the Virgin Islands. The A/FD shows data that cannot be readily depicted in graphic form; e.g., airport hours of operations, types of fuel available, runway widths, lighting codes, etc. The A/FD also provides a means for pilots to update visual charts between edition dates (A/FD is published every 56 days while Sectional Aeronautical and VFR Terminal Area Charts are generally revised every six months). The Aeronautical Chart Bulletins (VFR Chart Update Bulletins) are available for free download from the AeroNav web site. Volumes are side-bound 5-3/8 x 8-1/4 inches. (See FIG 9-1-12.)

North Atlantic Route Charts

North Pacific Oceanic Route Charts

9-1-4 continued on next page
9-1-4. GENERAL DESCRIPTION OF EACH CHART SERIES – continued

3. digital-Visual Charts (d-VC). These digital VFR charts are geo-referenced images of FAA Sectional Aeronautical, TAC, WAC, and Helicopter Route charts. Additional digital data may easily be overlaid on the raster image using commonly available Geographic Information System software. Data such as weather, temporary flight restrictions, obstacles, or other geospatial data can be combined with d-VC data to support a variety of needs. The file resolution is 300 dots per inch and the data is 8-bit color. The data is provided as a GeoTIFF and distributed on DVD-R media and on the AeroNav Products website. The root mean square error of the transformation will not exceed two pixels. D-VC DVDs are updated every 28 days and are available by subscription only.

9-1-4 continued on next three pages
GLEIM FAR/AIM 2015 UPDATES

Airport/Facility Directory Geographic Areas

Sectional and VFR Terminal Area Charts for Alaska

FIG 9-1-12
FIG 9-1-13
GLEIM FAR/AIM 2015 UPDATES

World Aeronautical Charts for Alaska

World Aeronautical Charts for the Conterminous U.S., Mexico, and the Caribbean Areas
PILOT/CONTROLLER GLOSSARY

On pages 783, 789, 794, and 797, revise and add the following:

**d. Terms Added:**

APPROACH WITH VERTICAL GUIDANCE (APV) DESIGNATED COMMON TRAFFIC ADVISORY FREQUENCY (CTAF) AREA

**e. Terms Modified:**

COMMON TRAFFIC ADVISORY FREQUENCY (CTAF)

**APPROACH WITH VERTICAL GUIDANCE (APV) - A term used to describe RNAV approach procedures that provide lateral and vertical guidance but do not meet the requirements to be considered a precision approach.**

**COMMON TRAFFIC ADVISORY FREQUENCY (CTAF) - A frequency designed 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. (See DESIGNATED COMMON TRAFFIC ADVISORY FREQUENCY (CTAF) AREA.) (Refer to AC 90-42, Traffic Advisory Practices at Airports Without Operating Control Towers.)**

**DECISION ALTITUDE/DECISION HEIGHT [ICAO Annex 6] - A specified altitude or height (A/H) in the precision approach at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.**

1. Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.

2. Category II and III minima are expressed as a DH and not a DA. Minima is assessed by reference to a radio altimeter and not a barometric altimeter, which makes the minima a DH.

3. The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path.

Decision altitude (DA) - A specified altitude (mean sea level (MSL)) on an instrument approach procedure (ILS, GLS, vertically guided RNAV) at which the pilot must decide whether to continue the approach or initiate an immediate missed approach if the pilot does not see the required visual references.

DECISION HEIGHT - With respect to the operation of aircraft, means the height at which a decision must be made during an ILS, MLS, or PAR instrument approach to either continue the approach or to execute a missed approach. (See ICAO term DECISION ALTITUDE/DECISION HEIGHT.)

**DESIGNATED COMMON TRAFFIC ADVISORY FREQUENCY (CTAF) AREA - In Alaska, in addition to being designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating airport traffic control tower, a CTAF may also be designated for the purpose of carrying out advisory practices for operations in and through areas with a high volume of VFR traffic.**
January 8, 2015

Effective March 9, 2015

PART 119—CERTIFICATION: AIR CARRIERS AND COMMERCIAL OPERATORS

On page 230, add new Sec. 119.8 as follows:

Sec. 119.8 Safety Management Systems.

(a) Certificate holders authorized to conduct operations under part 121 of this chapter must have a safety management system that meets the requirements of part 5 of this chapter and is acceptable to the Administrator by March 9, 2018.

(b) A person applying to the Administrator for an air carrier certificate or operating certificate to conduct operations under part 121 of this chapter after March 9, 2015, must demonstrate, as part of the application process under Sec. 119.35, that it has an SMS that meets the standards set forth in part 5 of this chapter and is acceptable to the Administrator.
Effective December 30, 2014

PART 91—GENERAL OPERATING AND FLIGHT RULES

On page 198, add new Sec. 91.1609 as follows:

Sec. 91.1609 Special Federal Aviation Regulation No. 114—Prohibition Against Certain Flights in the Damascus (OSTT) Flight Information Region (FIR).

(a) Applicability. This rule applies to the following persons:
   (1) All U.S. air carriers and U.S. commercial operators;
   (2) All persons exercising the privileges of an airman certificate issued by the FAA, except such persons operating U.S.-registered aircraft for a foreign air carrier; and
   (3) All operators of aircraft registered in the United States, except where the operator of such aircraft is a foreign air carrier.

(b) Flight prohibition. No person may conduct flight operations in the Damascus (OSTT) Flight Information Region (FIR), except as provided in paragraphs (c) and (d) of this section.

(c) Permitted operations. This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations in the Damascus (OSTT) FIR, provided that such flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality, and the person described in paragraph (a)), with FAA approval, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: first, for those operations in support of U.S. government-sponsored activities; second, for those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

(d) Emergency situations. In an emergency that requires immediate decision and action for the safety of the flight, the pilot in command of an aircraft may deviate from this section to the extent required by that emergency. Except for U.S. air carriers and commercial operators that are subject to the requirements of parts 119, 121, 125, or 135 of this chapter, each person who deviates from this section must, within ten (10) days of the deviation, excluding Saturdays, Sundays, and Federal holidays, submit to the nearest FAA Flight Standards District Office (FSDO) a complete report of the operations of the aircraft involved in the deviation, including a description of the deviation and the reasons for it.

(e) Expiration. This SFAR will remain in effect until December 30, 2016. The FAA may amend, rescind, or extend this SFAR No. 114, Sec. 91.1609, as necessary.
December 29, 2014

Effective December 29, 2014

PART 91—GENERAL OPERATING AND FLIGHT RULES

On pages 197-198, revise Sec. 91.1607 title and paragraphs (b), (c), and (e) as follows:

Sec. 91.1607 Special Federal Aviation Regulation No. 113—Prohibition Against Certain Flights in the Simferopol (UKFV) and the Dnipropetrovsk (UKDV) Flight Information Regions (FIRs).

* * * * *

(b) Flight prohibition. Except as provided in paragraphs (c) and (d) of this section, no person described in paragraph (a) of this section may conduct flight operations in the Simferopol (UKFV) FIR or the Dnipropetrovsk (UKDV) FIR.

(c) Permitted operations. This section does not prohibit persons described in paragraph (a) of this section from conducting flight operations in either or both of the Simferopol (UKFV) and the Dnipropetrovsk (UKDV) FIRs, provided that such flight operations are conducted under a contract, grant, or cooperative agreement with a department, agency, or instrumentality of the U.S. government (or under a subcontract between the prime contractor of the department, agency, or instrumentality, and the person subject to paragraph (a)), with the approval of the FAA, or under an exemption issued by the FAA. The FAA will process requests for approval or exemption in a timely manner, with the order of preference being: First, for those operations in support of U.S. government-sponsored activities; second, for those operations in support of government-sponsored activities of a foreign country with the support of a U.S. government department, agency, or instrumentality; and third, for all other operations.

* * * *

(e) Expiration. This SFAR will remain in effect until October 27, 2015. The FAA may amend, rescind, or extend this SFAR as necessary.
December 3, 2014

Effective January 20, 2015

PART 61—CERTIFICATION: PILOTS, FLIGHT INSTRUCTORS, AND GROUND INSTRUCTORS

Sec. 61.65. On page 64, revise paragraph (i) and add new paragraph (j) as follows:

*(i) Use of an aviation training device. A maximum of 20 hours of instrument time received in an aviation training device may be credited for the instrument time requirements of this section if--*

1. The device is approved and authorized by the FAA;
2. An authorized instructor provides the instrument time in the device; and
3. The FAA approved the instrument training and instrument tasks performed in the device.

*(j) A person may not credit more than 20 total hours of instrument time in a flight simulator, flight training device, aviation training device, or combination toward the instrument time requirements of this section.*

PART 141—PILOT SCHOOLS

Sec. 141.41. On page 362, revise the section as follows:

An applicant for a pilot school certificate or a provisional pilot school certificate must show that its flight simulators, flight training devices, training aids, and equipment meet the following requirements:

(a) Flight simulators and flight training devices. Each flight simulator and flight training device used to obtain flight training credit in an approved pilot training course curriculum must be:

1. Qualified under part 60 of the chapter; and
2. Approved by the Administrator for the tasks and maneuvers.

(b) Aviation training devices. Each aviation training device used to obtain flight training credit in an approved pilot training course curriculum must be evaluated, qualified, and approved by the Administrator.

(c) Training aids and equipment. Each training aid, including any audiovisual aid, projector, tape recorder, mockup, chart, or aircraft component listed in the approved training course outline, must be accurate and appropriate to the course for which it is used.
November 12, 2014

Effective November 12, 2014

PART 43—MAINTENANCE, PREVENTIVE MAINTENANCE, REBUILDING, AND ALTERATION

Sec. 43.10. On page 29, revise paragraph (c)(6) to change “produce” to “product” in the second line as follows:

\*(c)\*\*\*\*

(6) Mutilation. The part may be mutilated to deter its installation in a type certificated product. The mutilation must render the part beyond repair and incapable of being reworked to appear to be airworthy.

\*\*\*\*\*
GLEIM FAR/AIM 2015 UPDATES

September 25, 2014

Effective November 13, 2014

PART 91—GENERAL OPERATING AND FLIGHT RULES

Appendix D to Part 91. On page 201, in Section 1, add entries for “Houston, TX” and “San Diego, CA” as follows:

Section 1. Locations at which the requirements of Sec. 91.215(b)(2) and Sec. 91.225(d)(2) apply. The requirements of Secs. 91.215(b)(2) and 91.225(d)(2) apply below 10,000 feet MSL within a 30-nautical-mile radius of each location in the following list:

* Houston, TX (William P. Hobby Airport)
* San Diego, CA (Marine Corps Air Station Miramar)
September 2, 2014

Effective September 15, 2014, through September 15, 2015

PART 71—DESIGNATION OF CLASS A, B, C, D, AND E AIRSPACE AREAS; AIR TRAFFIC SERVICE ROUTES; AND REPORTING POINTS

Sec. 71.1. On page 119, revise date and policy references as follows:

A listing for Class A, B, C, D, and E airspace areas; air traffic service routes; and reporting points can be found in FAA Order 7400.9Y, Airspace Designations and Reporting Points, dated August 6, 2014. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. The approval to incorporate by reference FAA Order 7400.9Y is effective September 15, 2014, through September 15, 2015. During the incorporation by reference period, proposed changes to the listings of Class A, B, C, D, and E airspace areas; air traffic service routes; and reporting points will be published in full text as proposed rule documents in the Federal Register. Amendments to the listings of Class A, B, C, D, and E airspace areas; air traffic service routes; and reporting points will be published in full text as final rules in the Federal Register. Periodically, the final rule amendments will be integrated into a revised edition of the Order and submitted to the Director of the Federal Register for approval for incorporation by reference in this section. Copies of FAA Order 7400.9Y may be obtained from Airspace Policy and Regulations Group, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591, (202) 267-8783. An electronic version of the Order is available on the FAA Web site at http://www.faa.gov/air_traffic/publications. Copies of FAA Order 7400.9Y may be inspected in Docket No. FAA-2014-0450; Amendment No. 71-46 on http://www.regulations.gov. A copy of FAA Order 7400.9Y may be inspected at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal-register/cfr/ibr-locations.html.

Secs. 71.5, 71.15, 71.31, 71.33, 71.41, 71.51, 71.61, 71.71, and 71.901. On pages 119 and 120, replace the words “FAA Order 7400.9X” with “FAA Order 7400.9Y.”