



# 2023 FAR/AIM

FEDERAL AVIATION REGULATIONS **AERONAUTICAL INFORMATION MANUAL**



Rules and Procedures for Aviators

U.S. Department of Transportation

From Titles 14 and 49 of the Code of Federal Regulations

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**faa.gov/regulations\_policies/faa\_regulations/**

Visit **asa2fly.com/farupdate** for regulation and *AIM* changes released after this printing date. ASA provides a free Update service with email notification when rules and procedures change.

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# 2023 FAR/AIM

FEDERAL AVIATION REGULATIONS AERONAUTICAL INFORMATION MANUAL

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# Introduction

## ASA 2023 FAR/AIM Series

### FAR/AIM • FAR for Flight Crew • FAR for AMT

ASA has been supplying the standard reference of the industry, the FAR/AIM series, for more than 75 years. The 2023 series continues to provide the Federal Aviation Regulations and the *Aeronautical Information Manual* along with these important features:

- All changes since the last edition are clearly identified
- Includes suggested study list of *AIM* paragraphs and regulations pertinent to specific pilot certificates and ratings
- Index includes both FAR and *AIM* terms to provide an alphabetized listing of subject matter for quick look-up
- *AIM* produced with full-color graphics

Each regulation Part is preceded by a table of contents. Changes since last year's printing are identified on page vii and in the table of contents for each regulation Part (in bold and marked with an asterisk), as well as within the text for quick reference (changed text is indicated with a bold line in the margin). In the *AIM*, changes are explained in a list at the beginning and with bold lines in the margins. It is recommended you familiarize yourself with all the changes to identify those that affect your aviation activities.

Changes affecting the regulations can take place daily; the *AIM* changes every 6 months. ASA tracks all changes and offers you two options for free **Updates**:

- You can download Updates from the ASA website anytime—go to **asa2fly.com/farupdate**.
- You may sign up on our website for ASA's free service to have Update notices automatically emailed to you.

Visit the Federal Aviation Administration (FAA) website at **faa.gov** to review Advisory Circulars (AC), Notices of Proposed Rulemaking (NPRM), current regulations, FSDO contact details, and FAA Orders and publications. Pilots operating internationally should be familiar with Customs and Border Patrol regulations, which can be found at **cbp.gov**.

Although ASA is not a government agency, and we do not write the regulations or the *AIM*, we do work closely with the FAA. Questions or concerns can be forwarded to our attention, and we will in turn pass the comments on to the responsible office within the agency. It is interested in user feedback and your comments could foster improvements in the regulations that affect the entire industry.

#### FAR/AIM Comments

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# Identifying Regulation Changes Since Last Year

Changes since last year's printing of the book are noted in the table of contents of each Part with an asterisk and bold title:

Example:

**\*61.5 Certificates and ratings issued under this part.**

The updated text within the context of the regulation is indicated by a bold line in the margin:

(a) The following certificates are issued under this part to an applicant who satisfactorily accomplishes the training and certification requirements for the certificate sought:

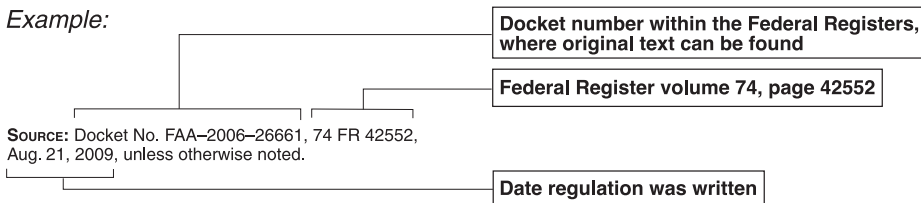
- (1) Pilot certificates—
  - (i) Student pilot.
  - (ii) Sport pilot.
  - (iii) Recreational pilot.
  - (iv) Private pilot.
  - (v) Commercial pilot.
  - (vi) Airline transport pilot.
- (2) Flight instructor certificates.
- (3) Ground instructor certificates.

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## How to Identify the Currency of the Regulations

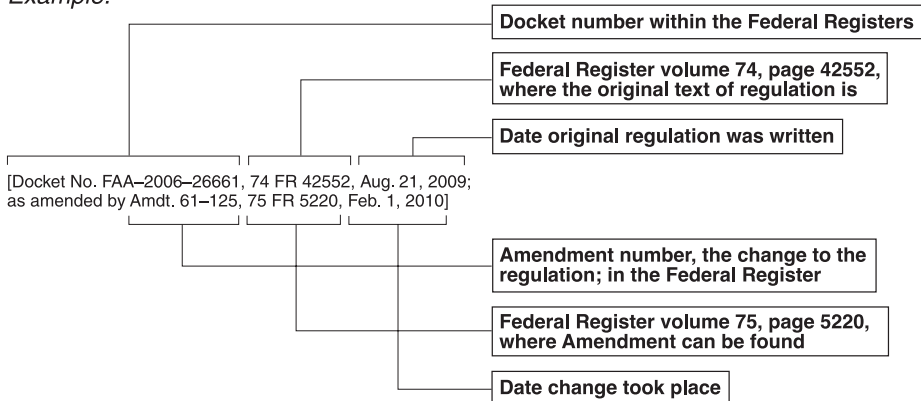
In each Part following the Table of Contents is a Source, with the date of origin for that regulation.

Example:



If a change has taken place since the original Regulation was written, it is noted at the end of the regulation.

Example:



# Summary of Major FAR Changes Since 2022 Book Was Published

All changes are identified in the table of contents of each Part with an asterisk and bold title.

ASA production changes and regulation changes from the *Federal Register* affect this book as follows:

## 14 CFR

### Part 43

- Amends preventive maintenance tasks allowed to be performed by registered owners of aircraft.

### Part 61

- Removes a multiengine training requirement for pilots seeking to obtain an initial airline transport pilot (ATP) certificate concurrently with a single-engine airplane type rating.

### Part 71

- Amends airspace designations to reflect incorporation by reference of FAA Order JO 7400.11F, Airspace Designations and Reporting Points.

### Part 91

- Amends and extends SFAR No. 113—Prohibition Against Certain Flights in Specified Areas of the Dnipro Flight Information Region (FIR) (UKDV).
- Extends SFAR No. 115—Prohibition Against Certain Flights in Specified Areas of the Sanaa Flight Information Region (FIR) (OYSC).

### Part 107

- Makes technical amendments to the “Operation of Small Unmanned Aircraft Systems over People” final rule, which was published January 15, 2021.

### Part 117

- Removed; included in ASA's *FAR for Flight Crew* (FAR-FC).

### Part 135

- Removed; included in ASA's *FAR for Flight Crew* (FAR-FC).

The ***Aeronautical Information Manual*** printed in this book is current through May 19, 2022. The major changes are summarized in the *AIM* introductory text.

**Note:** Changes affecting the regulations can take place daily. ASA tracks all changes and posts them on the ASA website so you always have the most current information. To view the rules currently in effect and to have Update notices automatically emailed to you, visit [asa2fly.com/farupdate](http://asa2fly.com/farupdate)

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**Authority:** 49 U.S.C. 106(f), 106(g), 40113, 44701–44703, 44707, 44709–44711, 44729, 44903, 45102–45103, 45301–45302, Sec. 2307 Pub. L. 114–190, 130 Stat. 615 (49 U.S.C. 44703 note).

**Source:** Docket No. 25910, 62 FR 16298, April 4, 1997, unless otherwise noted.

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#### SPECIAL FEDERAL AVIATION REGULATIONS

### SFAR No. 73

#### ROBINSON R-22 / R-44 SPECIAL TRAINING AND EXPERIENCE REQUIREMENTS

#### Sections

1. *Applicability.*
2. *Required training, aeronautical experience, endorsements, and flight review.*
3. *Expiration date.*

**1. Applicability.** Under the procedures prescribed herein, this SFAR applies to all persons who seek to manipulate the controls or act as pilot in command of a Robinson model R-22 or R-44 helicopter. The requirements stated in this SFAR are in addition to the current requirements of part 61.

**2. Required training, aeronautical experience, endorsements, and flight review.**

(a) Awareness Training:

(1) Except as provided in paragraph (a)(2) of this section, no person may manipulate the controls of a Robinson model R-22 or R-44 helicopter after March 27, 1995, for the purpose of flight unless the awareness training specified in

paragraph (a)(3) of this section is completed and the person's logbook has been endorsed by a certified flight instructor authorized under paragraph (b)(5) of this section.

(2) A person who holds a rotorcraft category and helicopter class rating on that person's pilot certificate and meets the experience requirements of paragraph (b)(1) or paragraph (b)(2) of this section may not manipulate the controls of a Robinson model R-22 or R-44 helicopter for the purpose of flight after April 26, 1995, unless the awareness training specified in paragraph (a)(3) of this section is completed and the person's logbook has been endorsed by a certified flight instructor authorized under paragraph (b)(5) of this section.

(3) Awareness training must be conducted by a certified flight instructor who has been endorsed under paragraph (b)(5) of this section and consists of instruction in the following general subject areas:

- (i) Energy management;
- (ii) Mast bumping;
- (iii) Low rotor RPM (blade stall);
- (iv) Low G hazards; and
- (v) Rotor RPM decay.

(4) A person who can show satisfactory completion of the manufacturer's safety course after January 1, 1994, may obtain an endorsement from an FAA aviation safety inspector in lieu of completing the awareness training required in paragraphs (a)(1) and (a)(2) of this section.

(b) Aeronautical Experience:

(1) No person may act as pilot in command of a Robinson model R-22 unless that person:

(i) Has had at least 200 flight hours in helicopters, at least 50 flight hours of which were in the Robinson R-22; or

(ii) Has had at least 10 hours dual instruction in the Robinson R-22 and has received an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that the individual has been given the training required by this paragraph and is proficient to act as pilot in command of an R-22. Beginning 12 calendar months after the date of the endorsement, the individual may not act as pilot in command unless the individual has completed a flight review in an R-22 within the preceding 12 calendar months and obtained an endorsement for that flight review. The dual instruction must include at least the following abnormal and emergency procedures flight training:

(A) Enhanced training in autorotation procedures,

(B) Engine rotor RPM control without the use of the governor,

(C) Low rotor RPM recognition and recovery, and

(D) Effects of low G maneuvers and proper recovery procedures.

(2) No person may act as pilot in command of a Robinson R-44 unless that person—

(i) Has had at least 200 flight hours in helicopters, at least 50 flight hours of which were in the Robinson R-44. The pilot in command may credit up to 25 flight hours in the Robinson R-22 toward the 50 hour requirement in the Robinson R-44; or

(ii) Has had at least 10 hours dual instruction in a Robinson helicopter, at least 5 hours of which must have been accomplished in the Robinson R-44 helicopter and has received an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that the individual has been given the training required by this paragraph and is proficient to act as pilot in command of an R-44. Beginning 12 calendar months after the date of the endorsement, the individual may not act as pilot in command unless the individual has completed a flight review in a Robinson R-44 within the preceding 12 calendar months and obtained an endorsement for that flight review. The dual instruction must include at least the following abnormal and emergency procedures flight training—

(A) Enhanced training in autorotation procedures;

(B) Engine rotor RPM control without the use of the governor;

(C) Low rotor RPM recognition and recovery; and

(D) Effects of low G maneuvers and proper recovery procedures.

(3) A person who does not hold a rotorcraft category and helicopter class rating must have had at least 20 hours of dual instruction in a Robinson R-22 helicopter prior to operating it in solo flight. In addition, the person must obtain an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that instruction has been given in those maneuvers and procedures, and the instructor has found the applicant proficient to solo a Robinson R-22. This endorsement is valid for a period of 90 days. The dual instruction must include at least the following abnormal and emergency procedures flight training:

(i) Enhanced training in autorotation procedures,

(ii) Engine rotor RPM control without the use of the governor,

(iii) Low rotor RPM recognition and recovery, and

(iv) Effects of low G maneuvers and proper recovery procedures.

(4) A person who does not hold a rotorcraft category and helicopter class rating must have had at least 20 hours of dual instruction in a Robinson R-44 helicopter prior to operating it in solo

flight. In addition, the person must obtain an endorsement from a certified flight instructor authorized under paragraph (b)(5) of this section that instruction has been given in those maneuvers and procedures, and the instructor has found the applicant proficient to solo a Robinson R-44. This endorsement is valid for a period of 90 days. The dual instruction must include at least the following abnormal and emergency procedures flight training:

- (i) Enhanced training in autorotation procedures,
- (ii) Engine rotor RPM control without the use of the governor,
- (iii) Low rotor RPM recognition and recovery, and
- (iv) Effects of low G maneuvers and proper recovery procedures.

(5) No certificated flight instructor may provide instruction or conduct a flight review in a Robinson R-22 or R-44 unless that instructor—

- (i) Completes the awareness training in paragraph (2)(a) of this SFAR.
- (ii) For the Robinson R-22, has had at least 200 flight hours in helicopters, at least 50 flight hours of which were in the Robinson R-22, or for the Robinson R-44, has had at least 200 flight hours in helicopters, 50 flight hours of which were in Robinson helicopters. Up to 25 flight hours of Robinson R-22 flight time may be credited toward the 50 hour requirement.
- (iii) Has completed flight training in a Robinson R-22, R-44, or both, on the following abnormal and emergency procedures—

- (A) Enhanced training in autorotation procedures;
- (B) Engine rotor RPM control without the use of the governor;
- (C) Low rotor RPM recognition and recovery; and
- (D) Effects of low G maneuvers and proper recovery procedures.

(iv) Has been authorized by endorsement from an FAA aviation safety inspector or authorized designated examiner that the instructor has completed the appropriate training, meets the experience requirements and has satisfactorily demonstrated an ability to provide instruction on the general subject areas of paragraph 2(a)(3) of this SFAR, and the flight training identified in paragraph 2(b)(5)(iii) of this SFAR.

(c) Flight Review:

(1) No flight review completed to satisfy §61.56 by an individual after becoming eligible to function as pilot in command in a Robinson R-22 helicopter shall be valid for the operation of R-22 helicopter unless that flight review was taken in an R-22.

(2) No flight review completed to satisfy §61.56 by an individual after becoming eligible to function

as pilot in command in a Robinson R-44 helicopter shall be valid for the operation of R-44 helicopter unless that flight review was taken in the R-44.

(3) The flight review will include a review of the awareness training subject areas of paragraph 2(a)(3) of this SFAR and the flight training identified in paragraph 2(b) of this SFAR.

(d) Currency Requirements: No person may act as pilot in command of a Robinson model R-22 or R-44 helicopter carrying passengers unless the pilot in command has met the recency of flight experience requirements of §61.57 in an R-22 or R-44, as appropriate.

**3. Expiration date.** This SFAR number 73 shall remain in effect until it is revised or rescinded.

[Docket No. 28095, 63 FR 666, Jan. 7, 1998; as amended by Docket No. FAA-2002-13744; SFAR No. 73-1, 68 FR 43, Jan. 2, 2003; Amdt. 61-120, 73 FR 17246, April 1, 2008; Amdt. SFAR 73-2, 74 FR 25650, May 29, 2009]

## SFAR No. 100-2

### RELIEF FOR U.S. MILITARY AND CIVILIAN PERSONNEL WHO ARE ASSIGNED OUTSIDE THE UNITED STATES IN SUPPORT OF U.S. ARMED FORCES OPERATIONS

**1. Applicability.** Flight Standards offices are authorized to accept from an eligible person, as described in paragraph 2 of this SFAR, the following:

(a) An expired flight instructor certificate to show eligibility for renewal of a flight instructor certificate under §61.197, or an expired written test report to show eligibility under part 61 to take a practical test;

(b) An expired written test report to show eligibility under §§63.33 and 63.57 to take a practical test; and

(c) An expired written test report to show eligibility to take a practical test required under part 65 or an expired inspection authorization to show eligibility for renewal under §65.93.

**2. Eligibility.** A person is eligible for the relief described in paragraph 1 of this SFAR if:

(a) The person served in a U.S. military or civilian capacity outside the United States in support of the U.S. Armed Forces' operation during some period of time from September 11, 2001, to termination of SFAR 100-2;

(b) The person's flight instructor certificate, airman written test report, or inspection authorization expired some time between September 11, 2001, and 6 calendar months after returning to the United States or termination of SFAR 100-2, whichever is earlier; and

(c) The person complies with §61.197 or §65.93 of this chapter, as appropriate, or completes the appropriate practical test within 6 calendar

months after returning to the United States, or upon termination of SFAR 100–2, whichever is earlier.

**3. Required documents.** The person must send the Airman Certificate and/or Rating Application (FAA Form 8710–1) to the appropriate Flight Standards office. The person must include with the application one of the following documents, which must show the date of assignment outside the United States and the date of return to the United States:

(a) An official U.S. Government notification of personnel action, or equivalent document, showing the person was a civilian on official duty for the U.S. Government outside the United States and was assigned to a U.S. Armed Forces' operation some time between September 11, 2001, to termination of SFAR 100–2;

(b) Military orders showing the person was assigned to duty outside the United States and was assigned to a U.S. Armed Forces' operation some time between September 11, 2001, to termination of SFAR 100–2; or

(c) A letter from the person's military commander or civilian supervisor providing the dates during which the person served outside the United States and was assigned to a U.S. Armed Forces' operation some time between September 11, 2001, to termination of SFAR 100–2.

**4. Expiration date.** This Special Federal Aviation Regulation No. 100–2 is effective until further notice.

[Docket No. FAA–2009–0923, SFAR No. 100–2, 75 FR 9766, March 4, 2010; as amended by Docket No. FAA–2018–0119, Amdt. 61–141, 83 FR 9170, March 5, 2018]

## Subpart A—General

### §61.1 Applicability and definitions.

(a) Except as provided in part 107 of this chapter, this part prescribes:

(1) The requirements for issuing pilot, flight instructor, and ground instructor certificates and ratings; the conditions under which those certificates and ratings are necessary; and the privileges and limitations of those certificates and ratings.

(2) The requirements for issuing pilot, flight instructor, and ground instructor authorizations; the conditions under which those authorizations are necessary; and the privileges and limitations of those authorizations.

(3) The requirements for issuing pilot, flight instructor, and ground instructor certificates and ratings for persons who have taken courses approved by the Administrator under other parts of this chapter.

(b) For the purpose of this part:

*Accredited* has the same meaning as defined by the Department of Education in 34 CFR 600.2.

*Aeronautical experience* means pilot time obtained in an aircraft, flight simulator, or flight training device for meeting the appropriate training and flight time requirements for an airman certificate, rating, flight review, or recency of flight experience requirements of this part.

*Authorized instructor* means—

(i) A person who holds a ground instructor certificate issued under part 61 of this chapter and is in compliance with §61.217, when conducting ground training in accordance with the privileges and limitations of his or her ground instructor certificate;

(ii) A person who holds a flight instructor certificate issued under part 61 of this chapter and is in compliance with §61.197, when conducting ground training or flight training in accordance with the privileges and limitations of his or her flight instructor certificate; or

(iii) A person authorized by the Administrator to provide ground training or flight training under part 61, 121, 135, or 142 of this chapter when conducting ground training or flight training in accordance with that authority.

*Aviation training device* means a training device, other than a full flight simulator or flight training device, that has been evaluated, qualified, and approved by the Administrator.

*Complex airplane* means an airplane that has a retractable landing gear, flaps, and a controllable pitch propeller, including airplanes equipped with an engine control system consisting of a digital computer and associated accessories for controlling the engine and propeller, such as a full authority digital engine control; or, in the case of a seaplane, flaps and a controllable pitch propeller, including seaplanes equipped with an engine control system consisting of a digital computer and associated accessories for controlling the engine and propeller, such as a full authority digital engine control.

*Cross-country time* means—

(i) Except as provided in paragraphs (ii) through (vi) of this definition, time acquired during flight—

(A) Conducted by a person who holds a pilot certificate;

(B) Conducted in an aircraft;

(C) That includes a landing at a point other than the point of departure; and

(D) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems to navigate to the landing point.

(ii) For the purpose of meeting the aeronautical experience requirements (except for a rotorcraft category rating), for a private pilot certificate (except for a powered parachute category rating), a commercial pilot certificate, or an instrument rating, or for the purpose of exercising recreational

pilot privileges (except in a rotorcraft) under §61.101(c), time acquired during a flight—

- (A) Conducted in an appropriate aircraft;
- (B) That includes a point of landing that was at least a straight-line distance of more than 50 nautical miles from the original point of departure; and
- (C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems to navigate to the landing point.

(iii) For the purpose of meeting the aeronautical experience requirements for a sport pilot certificate (except for powered parachute privileges), time acquired during a flight conducted in an appropriate aircraft that—

- (A) Includes a point of landing at least a straight line distance of more than 25 nautical miles from the original point of departure; and
- (B) Involves, as applicable, the use of dead reckoning; pilotage; electronic navigation aids; radio aids; or other navigation systems to navigate to the landing point.

(iv) For the purpose of meeting the aeronautical experience requirements for a sport pilot certificate with powered parachute privileges or a private pilot certificate with a powered parachute category rating, time acquired during a flight conducted in an appropriate aircraft that—

- (A) Includes a point of landing at least a straight line distance of more than 15 nautical miles from the original point of departure; and
- (B) Involves, as applicable, the use of dead reckoning; pilotage; electronic navigation aids; radio aids; or other navigation systems to navigate to the landing point.

(v) For the purpose of meeting the aeronautical experience requirements for any pilot certificate with a rotorcraft category rating or an instrument-helicopter rating, or for the purpose of exercising recreational pilot privileges, in a rotorcraft, under §61.101(c), time acquired during a flight—

- (A) Conducted in an appropriate aircraft;
- (B) That includes a point of landing that was at least a straight-line distance of more than 25 nautical miles from the original point of departure; and
- (C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems to navigate to the landing point.

(vi) For the purpose of meeting the aeronautical experience requirements for an airline transport pilot certificate (except with a rotorcraft category rating), time acquired during a flight—

- (A) Conducted in an appropriate aircraft;
- (B) That is at least a straight-line distance of more than 50 nautical miles from the original point of departure; and
- (C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems.

(vii) For a military pilot who qualifies for a commercial pilot certificate (except with a rotorcraft category rating) under §61.73 of this part, time acquired during a flight—

- (A) Conducted in an appropriate aircraft;
- (B) That is at least a straight-line distance of more than 50 nautical miles from the original point of departure; and
- (C) That involves the use of dead reckoning, pilotage, electronic navigation aids, radio aids, or other navigation systems.

*Examiner* means any person who is authorized by the Administrator to conduct a pilot proficiency test or a practical test for an airman certificate or rating issued under this part, or a person who is authorized to conduct a knowledge test under this part.

*Flight training* means that training, other than ground training, received from an authorized instructor in flight in an aircraft.

*Ground training* means that training, other than flight training, received from an authorized instructor.

*Institution of higher education* has the same meaning as defined by the Department of Education in 34 CFR 600.4.

*Instrument approach* means an approach procedure defined in part 97 of this chapter.

*Instrument training* means that time in which instrument training is received from an authorized instructor under actual or simulated instrument conditions.

*Knowledge test* means a test on the aeronautical knowledge areas required for an airman certificate or rating that can be administered in written form or by a computer.

*Nationally recognized accrediting agency* has the same meaning as defined by the Department of Education in 34 CFR 600.2.

*Night vision goggles* means an appliance worn by a pilot that enhances the pilot's ability to maintain visual surface reference at night.

*Night vision goggle operation* means the portion of a flight that occurs during the time period from 1 hour after sunset to 1 hour before sunrise where the pilot maintains visual surface reference using night vision goggles in an aircraft that is approved for such an operation.

*Pilot time* means that time in which a person—

- (i) Serves as a required pilot flight crewmember;
- (ii) Receives training from an authorized instructor in an aircraft, full flight simulator, flight training device, or aviation training device;
- (iii) Gives training as an authorized instructor in an aircraft, full flight simulator, flight training device, or aviation training device; or
- (iv) Serves as second in command in operations conducted in accordance with §135.99(c) of this chapter when a second pilot is not required

under the type certification of the aircraft or the regulations under which the flight is being conducted, provided the requirements in §61.159(c) are satisfied.

*Practical test* means a test on the areas of operations for an airman certificate, rating, or authorization that is conducted by having the applicant respond to questions and demonstrate maneuvers in flight, in a flight simulator, or in a flight training device.

*Set of aircraft* means aircraft that share similar performance characteristics, such as similar airspeed and altitude operating envelopes, similar handling characteristics, and the same number and type of propulsion systems.

*Student pilot seeking a sport pilot certificate* means a person who has received an endorsement—

(i) To exercise student pilot privileges from a certificated flight instructor with a sport pilot rating; or

(ii) That includes a limitation for the operation of a light-sport aircraft specified in §61.89(c) issued by a certificated flight instructor with other than a sport pilot rating.

*Technically advanced airplane (TAA)* means an airplane equipped with an electronically advanced avionics system.

*Training time* means training received—

(i) In flight from an authorized instructor;

(ii) On the ground from an authorized instructor; or

(iii) In a flight simulator or flight training device from an authorized instructor.

[Docket No. 25910, 62 FR 16298, April 4, 1997; as amended by Amdt. 61–103, 62 FR 40893, July 30, 1997; Amdt. 61–110, 69 FR 44864, July 27, 2004; Amdt. 61–124, 74 FR 42546, Aug. 21, 2009; Amdt. 61–128, 76 FR 54105, Aug. 31, 2011; Amdt. 61–130, 78 FR 42372, July 15, 2013; Amdt. 61–137, 81 FR 42208, June 28, 2016; Amdt. 61–142, 83 FR 30276, June 27, 2018]

## §61.2 Exercise of Privilege.

(a) **Validity.** No person may:

(1) Exercise privileges of a certificate, rating, endorsement, or authorization issued under this part if the certificate, rating or authorization is surrendered, suspended, revoked or expired.

(2) Exercise privileges of a flight instructor certificate if that flight instructor certificate is surrendered, suspended, revoked or expired.

(3) Exercise privileges of a foreign pilot certificate to operate an aircraft of foreign registry under §61.3(b) if the certificate is surrendered, suspended, revoked or expired.

(4) Exercise privileges of a pilot certificate issued under §61.75, or an authorization issued under §61.77, if the foreign pilot certificate relied upon for the issuance of the U.S. pilot certificate

or authorization is surrendered, suspended, revoked or expired.

(5) Exercise privileges of a medical certificate issued under part 67 to meet any requirements of part 61 if the medical certificate is surrendered, suspended, revoked or expired according to the duration standards set forth in §61.23(d).

(6) Use an official government issued driver's license to meet any requirements of part 61 related to holding that driver's license, if the driver's license is surrendered, suspended, revoked or expired.

(b) **Currency.** No person may:

(1) Exercise privileges of an airman certificate, rating, endorsement, or authorization issued under this part unless that person meets the appropriate airman and medical recency requirements of this part, specific to the operation or activity.

(2) Exercise privileges of a foreign pilot license within the United States to conduct an operation described in §61.3(b), unless that person meets the appropriate airman and medical recency requirements of the country that issued the license, specific to the operation.

[Docket No. FAA–2006–26661, 74 FR 42546, Aug. 21, 2009]

## §61.3 Requirement for certificates, ratings, and authorizations.

(a) **Required pilot certificate for operating a civil aircraft of the United States.** No person may serve as a required pilot flight crewmember of a civil aircraft of the United States, unless that person:

(1) Has in the person's physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate or authorization—

(i) A pilot certificate issued under this part and in accordance with §61.19;

(ii) A special purpose pilot authorization issued under §61.77;

(iii) A temporary certificate issued under §61.17;

(iv) A document conveying temporary authority to exercise certificate privileges issued by the Airmen Certification Branch under §61.29(e);

(v) When engaged in a flight operation within the United States for a part 119 certificate holder authorized to conduct operations under part 121 or 135 of this chapter, a temporary document provided by that certificate holder under an approved certificate verification plan;

(vi) When engaged in a flight operation within the United States for a fractional ownership program manager authorized to conduct operations under part 91, subpart K, of this chapter, a temporary document provided by that program manager under an approved certificate verification plan; or



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Aeronautical Information Manual

Official Guide to Basic Flight Information and ATC Procedures

U.S. Department of Transportation • Federal Aviation Administration

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P/C

## Federal Aviation Administration (FAA)

The Federal Aviation Administration is responsible for ensuring the safe, efficient, and secure use of the Nation's airspace, by military as well as civil aviation, for promoting safety in air commerce, for encouraging and developing civil aeronautics, including new aviation technology, and for supporting the requirements of national defense.

The activities required to carry out these responsibilities include: safety regulations; airspace management and the establishment, operation, and maintenance of a civil-military common system of air traffic control (ATC) and navigation facilities; research and development in support of the fostering of a national system of airports, promulgation of standards and specifications for civil airports, and administration of Federal grants-in-aid for developing public airports; various joint and cooperative activities with the Department of Defense; and technical assistance (under State Department auspices) to other countries.

### Aeronautical Information Manual (AIM)

#### Basic Flight Information and ATC Procedures

This manual is designed to provide the aviation community with basic flight information and ATC procedures for use in the National Airspace System (NAS) of the United States. An international version called the Aeronautical Information Publication contains parallel information, as well as specific information on the international airports for use by the international community.

This manual contains the fundamentals required in order to fly in the United States NAS. It also contains items of interest to pilots concerning health and medical facts, factors affecting flight safety, a pilot/controller glossary of terms used in the ATC System, and information on safety, accident, and hazard reporting.

This manual is complemented by other operational publications which are available via separate subscriptions. These publications are:

The Chart Supplement U.S., the Chart Supplement Alaska, and the Chart Supplement Pacific—These publications contain information on airports, communications, navigation aids, instrument landing systems, VOR receiver check points, preferred routes, Flight Service Station/Weather Service telephone numbers, Air Route Traffic Control Center (ARTCC) frequencies, part-time surface areas, and various other pertinent special notices essential to air navigation. These publications are available through a network of FAA approved print providers. A listing of products, dates of latest editions, and print providers

is available on the Aeronautical Information Services (AIS) website at: [http://www.faa.gov/air\\_traffic/flight\\_info/aeronav/print\\_providers/](http://www.faa.gov/air_traffic/flight_info/aeronav/print_providers/).

Publication Schedule		
Basic or Change	Cutoff Date for Completion	Effective Date of Publication
Basic Manual	12/31/20	6/17/21
Change 1	6/17/21	12/2/21
Change 2	12/2/21	5/19/22
Change 3	5/19/22	11/3/22
Basic Manual	11/3/22	4/20/23
Change 1	4/20/23	10/5/23
Change 2	10/5/23	3/21/24
Change 3	3/21/24	9/5/24

### Flight Information Publication Policy

The following is in essence, the statement issued by the FAA Administrator and published in the December 10, 1964, issue of the Federal Register, concerning the FAA policy as pertaining to the type of information that will be published as NOTAMs and in the *Aeronautical Information Manual*.

a. It is a pilot's inherent responsibility to be alert at all times for and in anticipation of all circumstances, situations, and conditions affecting the safe operation of the aircraft. For example, a pilot should expect to find air traffic at any time or place. At or near both civil and military airports and in the vicinity of known training areas, a pilot should expect concentrated air traffic and realize concentrations of air traffic are not limited to these places.

b. It is the general practice of the agency to advertise by NOTAM or other flight information publications such information it may deem appropriate; information which the agency may from time to time make available to pilots is solely for the purpose of assisting them in executing their regulatory responsibilities. Such information serves the aviation community as a whole and not pilots individually.

c. The fact that the agency under one particular situation or another may or may not furnish information does not serve as a precedent of the agency's responsibility to the aviation community; neither does it give assurance that other information of the same or similar nature will be advertised, nor, does it guarantee that any and all information known to the agency will be advertised.

d. This publication, while not regulatory, provides information which reflects examples of operating techniques and procedures which may be requirements in other federal publications or regulations. It is made available solely to assist pilots in executing their responsibilities required by other publications.

Consistent with the foregoing, it is the policy of the Federal Aviation Administration to furnish information only when, in the opinion of the agency, a unique situation should be advertised and not to furnish routine information such as concentrations of air traffic, either civil or military. The *Aeronautical Information Manual* will not contain informative items concerning everyday circumstances that pilots should, either by good practices or regulation, expect to encounter or avoid.

## **Aeronautical Information Manual (AIM)**

### **Code of Federal Regulations and Advisory Circulars**

Code of Federal Regulations—The FAA publishes the Code of Federal Regulations (CFRs) to make readily available to the aviation community the regulatory requirements placed upon them. These regulations are sold as individual parts by the Superintendent of Documents.

The more frequently amended parts are sold on subscription service with subscribers receiving changes automatically as issued. Less active parts are sold on a single-sale basis. Changes to single-sale parts will be sold separately as issued. Information concerning these changes will be furnished by the FAA through its Status of Federal Aviation Regulations, AC 00-44.

Advisory Circulars—The FAA issues Advisory Circulars (ACs) to inform the aviation public in a systematic way of nonregulatory material. Unless incorporated into a regulation by reference, the contents of an advisory circular are not binding on the public. Advisory Circulars are issued in a

numbered subject system corresponding to the subject areas of the Code of Federal Regulations (CFRs) (Title 14, Chapter 1, FAA).

AC 00-2, Advisory Circular Checklist and Status of Other FAA Publications, contains advisory circulars that are for sale as well as those distributed free-of-charge by the FAA.

#### **Note**

*The above information relating to CFRs and ACs is extracted from AC 00-2. Many of the CFRs and ACs listed in AC 00-2 are cross-referenced in the AIM. These regulatory and nonregulatory references cover a wide range of subjects and are a source of detailed information of value to the aviation community. AC 00-2 is issued annually and can be obtained free-of-charge from:*

U.S. Department of Transportation  
Subsequent Distribution Office  
Ardmore East Business Center  
3341 Q 75th Avenue  
Landover, MD 20785  
Telephone: 301-322-4961

AC 00-2 may also be found at:  
**<http://www.faa.gov>** under Advisory Circulars.

External References—All references to Advisory Circulars and other FAA publications in the *Aeronautical Information Manual* include the FAA Advisory Circular or Order identification numbers (when available). However, due to varied publication dates, the basic publication letter is not included.

#### **Example**

*FAA Order JO 7110.65X, Air Traffic Control, is referenced as FAA Order JO 7110.65.*

## Comments/Corrections

The office of primary responsibility (OPR) for this manual is:

FAA Headquarters, Mission Support Services  
 Policy Directorate (AJV-P)  
 600 Independence Avenue SW  
 Washington, DC 20597

Proposed changes must be submitted electronically, using the following format, to the Policy Directorate  
 ■ Correspondence Mailbox at 9-AJV-P–HQ-Correspondence@faa.gov.

### Notice to Editor

The following comments/corrections are submitted concerning the information contained in:

Paragraph number \_\_\_\_\_

Title \_\_\_\_\_

Page \_\_\_\_\_

Dated \_\_\_\_\_

Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

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<p><i>*For those desiring printed copies, current pricing is available on the GPO website at <a href="http://bookstore.gpo.gov">http://bookstore.gpo.gov</a>.</i></p>	

## Explanation of Major Changes

*Change 1 (effective December 2, 2021) and Change 2 (effective May 19, 2022) to Basic Manual (effective June 17, 2021)*

### 1–1–8. NAVAID Service Volumes

### 1–1–17. Global Positioning System (GPS)

### 1–1–18. Wide Area Augmentation System (WAAS)

### 1–2–3. Use of Suitable Area Navigation (RNAV) Systems on Conventional Procedures and Routes

### 2–1–2. Visual Glideslope Indicators

### 3–5–8. Weather Reconnaissance Area (WRA)

### 4–1–3. Flight Service Stations

### 4–1–14. Automatic Flight Information Service (AFIS)—Alaska FSS Only

### 4–5–9. Flight Information Service—Broadcast (FIS-B)

### 5–1–1. Preflight Preparation

### 5–1–3. Notice To Airmen (NOTAM) System

### 5–5–1. General

### 7–1–5. Preflight Briefing

### 7–1–9. Flight Information Services (FIS)

### 7–6–3. Obstructions To Flight

### 7–6–12. Light Amplification by Stimulated Emission of Radiation (Laser) Operations and Reporting Illumination of Aircraft

### 10–2–1. Offshore Helicopter Operations

This editorial change complies with the Federal Women's Program (FWP) suggestions. The acronym NOTAM is updated from Notice to Airmen to the more applicable term Notice to Air Missions, which is inclusive of all aviators and missions.

### 1–1–9. Instrument Landing System (ILS)

Discussion within the PARC Pilot-Controller Procedures and Systems Integration (PCPSI) work group resulted in a recommendation to further clarify the ILS Expanded Service Volume (ESV) and include a new figure that better explains how pilots can identify an ILS ESV when consulting a charted instrument procedure.

### 1–1–13. User Reports Requested on NAVAID Outages

The current publication of the AIM contains a duplication of content in paragraph 1-1-13. This change deletes the duplicated section found in paragraph 1-1-13, subparagraph a.

### 1–1–17. Global Positioning System

The NOTAM subparagraph (g) was deleted so as not to duplicate. There is a specific NOTAM paragraph (5-1-3) that explains NOTAMs in detail. A few paragraphs were moved to supplement the RAIM paragraph. Lastly, in an effort to clarify guidance and to ensure it supports what is currently being charted in regards to the missed approach waypoint (MAWP) and the missed approach holding waypoint (MAHWP), a clearer de-

scription and a minor correction on how Fly-by (FB) and Fly-over (FO) waypoints are used and depicted on approach charts.

### 1–1–19. Ground Based Augmentation System (GBAS) Landing System (GLS)

This change is a complete rewrite of paragraph 1-1-19 to eliminate much of the technical descriptions and to focus on the operational functions and descriptions of the GLS system. Emphasis was concentrated on GLS similarity to ILS, operational description and additional attention to familiarity with standard service volumes of GLS procedures.

### 2–2–4. LED Lighting Systems

This change adds a new paragraph providing information and clarity in order to emphasize the importance of incorporating procedures—for the avoidance of obstacles marked with light-emitting diode (LED) obstruction lights during night vision goggles (NVG) operations—into manuals and/or standard operating procedures (SOP).

### 4–4–9. VFR/IFR Flights

### 5–1–16. RNAV and RNP Operations

### 5–4–5. Minimum Vectoring Altitude (MVA)

This change rewrites the notes in off route obstruction clearance altitude (OROCA) related paragraphs, to incorporate updated terminology and enable a better understanding of how OROCA is utilized.

### 4–6–4. Flight Planning into RVSM Airspace

### 5–1–1. Preflight Preparation

### 5–1–4. Flight Plan—VFR Flights

### 5–1–6. Flight Plan—Defense VFR (DVFR) Flights

### 5–1–7. Composite Flight Plan (VFR/ IFR Flights)

### 5–1–8. Flight Plan (FAA Form 7233-1)—Domestic IFR Flights

### 5–1–9. International Flight Plan (FAA Form 7233-4)—IFR Flights (For Domestic or International Flights)

### Appendix 4. FAA Form 7233-4—International Flight Plan

### Appendix 5. FAA Form 7233-1—Flight Plan

The following changes are required to align the order with current operational procedures. These changes also support the standardized use of FAA Form 7233-4, International Flight Plan, and inform stakeholders that legacy procedures may be used by parties that do not have the necessary equipment to adhere to the new ICAO forms and or procedures.

*(continued)*

### **5-1-3. Notice To Airmen (NOTAM) System**

GPS NOTAM and receiver autonomous integrity monitoring (RAIM) information is currently located in the overview section of the AIM/AIP. This change consolidates all of the NOTAM information into one procedures section and updates current NOTAM language. This update references how to report GPS anomalies, as well as edits two tables with example NOTAMS on GPS testing and pseudo-random satellite numbers.

### **5-1-17. Cold Temperature Operations**

This change replaces paragraph 5-1-17 Cold Temperature Operations guidance and preflight planning information being updated to reflect the two temperature limitations that may be found on an FAA produced instrument approach procedure (IAP). The new paragraph also directs operators to Chapter 7 to review the information on cold temperature altimetry errors and current procedures for CTA and baro-VNAV temperature limitations.

### **5-2-7. Departure Restrictions, Clearance Void Times, Hold for Release, and Release Times**

A recent change to FAA Order JO 7110.65 requires that ATC give a pilot departing from an airport without an operating control tower a departure release, a hold for release, or a release time when issuing the departure clearance. This AIM change reflects the change made to FAA Order JO 7110.65 and clarifies pilot and controller responsibilities.

### **5-2-8. Departure Control**

### **5-2-9. Instrument Departure Procedures (DP)—Obstacle Departure Procedures (ODP), Standard Instrument Departures (SID), and Diverse Vector Areas (DVA)**

### **5-5-6. Radar Vectors**

### **5-5-14. Instrument Departures**

This change adds a statement that diverse vector areas (DVAs) cannot be used concurrently with a standard instrument departure (SID) when the SID is included as part of the instrument flight rules (IFR) clearance, and addresses a new requirement imposed on ATC that pilots will receive an amended clearance if departure procedures are changed from SIDs to DVAs and vice versa.

### **5-2-9. Instrument Departure Procedures (DP)—Obstacle Departure Procedures (ODP), Standard Instrument Departures (SID), and Diverse Vector Areas (DVA)**

Instructions and clarity were added for pilots to remain within the visual climb over airport (VCOA) specified visibility when departing an airport instrument flight rules (IFR) using VCOA.

### **5-4-5. Instrument Approach Procedure (IAP) Charts**

FAA Order 8260.46 is updated to reflect adding minimum safe altitudes (MSAs) to graphic departures. This AIM change reflects the new terminal instrument procedures (TERPS) guidance.

### **5-4-5. Instrument Approach Procedure (IAP) Charts**

### **5-5-4. Instrument Approach**

### **5-5-5. Missed Approach**

This change renames paragraph 5-4-5m7(f) from Hot and Cold Temperature Limitations to Published Temperature Limitations, and also adds information on the two published temperature limitations. Paragraph 5-5-4 will give a brief description of the two temperature limitations found on the Instrument Approach Procedures (IAPs). Paragraph 5-5-5 will mention the Cold Temperature Airports (CTA) ICON and discuss briefly when to correct and who to contact.

### **5-4-18. RNP AR (Authorization Required) Instrument Approach Procedures**

This change deletes most of this paragraph. All that is necessary in this publication is a brief overview of Required Navigation Performance Authorization Required (RNP AR) and reference to a complete AC dedicated to RNP AR.

### **5-4-20. Approach and Landing Minimums**

Removes outdated and incorrect verbiage and realigns AIM/AIP verbiage with FAA Order 8260.58.

### **5-6-8. Foreign State Aircraft Operations**

Guidance for Foreign State Aircraft operating with a Department of State issued Diplomatic Clearance is being added to the Aeronautical Information Manual regarding authorizations to deviate from Automatic Dependent Surveillance-Broadcast (ADS-B) requirements.

### **7-1-2. FAA Weather Services**

This change adds a new table for SPECI issuance including snow-related intensity changes so flight crews can accurately assess holdover time limitations. Table 7-1-1 in Chapter 7, Section 1, was inserted and other tables in the chapter renumbered along with a new sentence to reference the table.

### **7-1-8. Inflight Weather Advisory Broadcasts**

This change removes Severe Weather Forecast Alerts (AWW) from paragraph 7-1-8, Inflight Weather Advisory Broadcasts, which are not broadcast by Terminal or ARTCC controllers. The change also harmonizes paragraph 7-1-8a Note with FAA Order JO 7110.65, subparagraph 2-6-6b, and adds a Reference to that paragraph.

## **7-1-12. ATC Inflight Weather Avoidance Assistance**

This change adds the word “lateral” to this paragraph to align with FAA Order JO 7110.65 and the Aeronautical Information Publication (AIP).

## **7-1-24. Microbursts**

These changes update the information in this chapter regarding Low Level Wind Shear Alert System (LLWAS), Terminal Doppler Weather Radar (TDWR), and Weather System Processor (WSP).

## **7-6-2. Reporting Radio/Radar Altimeter Anomalies**

This change adds a new paragraph to address the issue of radio frequency interference (RFI) in the C-band that could cause erroneous radio altimeter values and impact dependent system functions due to the deployment of 5G antennas.

## **7-6-16. Space Launch and Reentry Area**

This change relocates the space launch activity area information that was previously in Chart Supplement publications into the AIM and AIP. The term “space launch activity area” was also updated to the more inclusive “space launch and reentry area.”

## **9-1-4. General Description of Each Chart Series**

This change updates frequency of chart production. In cases where annually or biannual updates were made, 56 day chart updates replace those longer update periods, and reduce the NOTAM burden and bring NAS changes to aviators in a timely manner.

## **10-1-2. Helicopter Instrument Approaches**

### **10-1-3. Helicopter Approach Procedures to VFR Heliports**

Changes were made throughout the section to improve the clarity and provide updated information wherever necessary. Emphasis was concentrated on clarification of language and operational description associated with helicopter instrument approach procedures.

## **10-1-5. Departure Procedures**

This addition was made to improve the clarity and provide departure information wherever necessary. Emphasis was concentrated on clarification of language and operational description associated with helicopter instrument departure procedures.

## **Pilot/Controller Glossary**

Terns have been added, deleted, and modified within this glossary. Please refer to the first page of the Glossary for more details.

## **Editorial Changes**

Editorial changes include updates to an out-of-date reference in paragraph 3-4-1; a formatting fix in paragraph 7-1-13; a math error correction in paragraph 7-3-6; correcting Las Vegas McCarran International to Harry Reid International in paragraph 4-5-5 (Table 4-5-1); removing an incorrect reference in paragraph 7-4-1; the replacement of filing code M2 for M3 in paragraph 5-1-6 and various tables in Appendix 4; correcting the spelling of Harrisburg International Airport in the title of Figure 5-4-12; updating a hyperlink in subparagraph 4-7-1e; and adding a missing “traffic advisories.”

## **Entire Publication**

Additional editorial/format changes were made where necessary. Revision bars were not used because of the insignificant nature of these changes.

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# Chapter 2 Aeronautical Lighting and Other Airport Visual Aids

## Section 1 Airport Lighting Aids

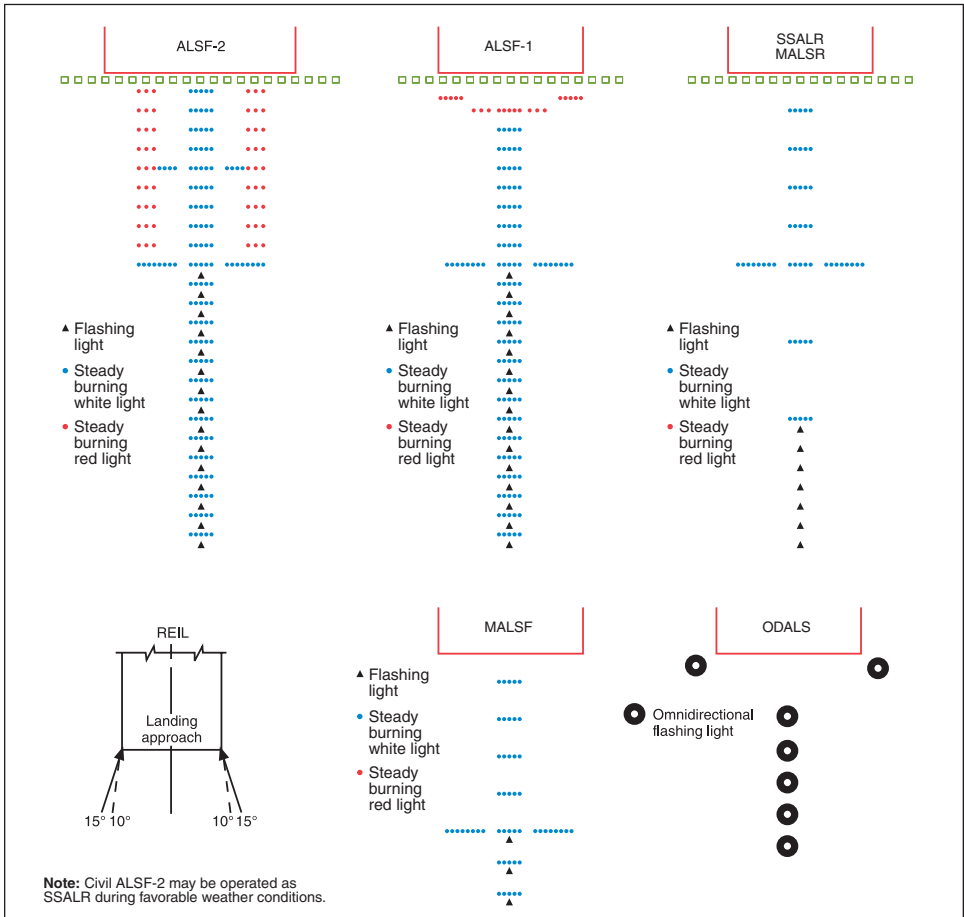
### 2-1-1 Approach Light Systems (ALS)

a. ALS provide the basic means to transition from instrument flight to visual flight for landing. Operational requirements dictate the sophistication and configuration of the approach light system for a particular runway.

b. ALS are a configuration of signal lights starting at the landing threshold and extending into the approach area a distance of 2,400–3,000 feet for precision instrument runways and 1,400–1,500 feet for nonprecision instrument runways. Some systems include sequenced flashing lights which appear to the pilot as a ball of light traveling towards the runway at high speed (twice a second). (See Figure 2-1-1.)

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FIGURE 2-1-1  
Precision and Nonprecision Configurations



## 2-1-2 Visual Glideslope Indicators

### a. Visual Approach Slope Indicator (VASI)

1. VASI installations may consist of either 2, 4, 6, 12, or 16 light units arranged in bars referred to as near, middle, and far bars. Most VASI installations consist of 2 bars, near and far, and may consist of 2, 4, or 12 light units. Some VASIs consist of three bars, near, middle, and far, which provide an additional visual glide path to accommodate high cockpit aircraft. This installation may consist of either 6 or 16 light units. VASI installations consisting of 2, 4, or 6 light units are located on one side of the runway, usually the left. Where the installation consists of 12 or 16 light units, the units are located on both sides of the runway.

2. Two-bar VASI installations provide one visual glide path which is normally set at 3 degrees. Three-bar VASI installations provide two visual glide paths. The lower glide path is provided by the near and middle bars and is normally set at 3 degrees while the upper glide path, provided by the middle and far bars, is normally 1/4 degree higher. This higher glide path is intended for use only by high cockpit aircraft to provide a sufficient threshold crossing height. Although normal glide path angles are three degrees, angles at some locations may be as high as 4.5 degrees to give proper obstacle clearance. Pilots of high performance aircraft are cautioned that use of VASI angles in excess of 3.5 degrees may cause an increase in runway length required for landing and rollout.

3. The basic principle of the VASI is that of color differentiation between red and white. Each light unit projects a beam of light having a white segment in the upper part of the beam and red segment in the lower part of the beam. The light units are arranged so that the pilot using the VASIs during an approach will see the combination of lights shown below.

4. The VASI is a system of lights so arranged to provide visual descent guidance information during the approach to a runway. These lights are visible from 3–5 miles during the day and up to 20 miles or more at night. The visual glide path of the VASI provides safe obstruction clearance within plus or minus 10 degrees of the extended runway centerline and to 4 NM from the runway threshold. Descent, using the VASI, should not be initiated until the aircraft is visually aligned with the runway. Lateral course guidance is provided by the runway or runway lights. In certain circumstances, the safe obstruction clearance area may be reduced by narrowing the beam width or shortening the usable distance due to local limitations, or the VASI may be offset from the extended runway centerline. This will be noted in the Chart Supplement U.S. and/or applicable Notices to Air Missions (NOTAM).

5. For 2-bar VASI (4 light units) see Figure 2-1-2.

6. For 3-bar VASI (6 light units) see Figure 2-1-3.

7. For other VASI configurations see Figure 2-1-4.

### b. Precision Approach Path Indicator (PAPI).

The precision approach path indicator (PAPI) uses light units similar to the VASI but are installed in a single row of either two or four light units. These lights are visible from about 5 miles during the day and up to 20 miles at night. The visual glide path of the PAPI typically provides safe obstruction clearance within plus or minus 10 degrees of the extended runway centerline and to 3.4 NM from the runway threshold. Descent, using the PAPI, should not be initiated until the aircraft is visually aligned with the runway. The row of light units is normally installed on the left side of the runway and the glide path indications are as depicted. Lateral course guidance is provided by the runway or runway lights. In certain circumstances, the safe obstruction clearance area may be reduced by narrowing the beam width or shortening the usable distance due to local limitations, or the PAPI may be offset from the extended runway centerline. This will be noted in the Chart Supplement U.S. and/or applicable NOTAMs. (See Figure 2-1-5.)

c. **Tri-color Systems.** Tri-color visual approach slope indicators normally consist of a single light unit projecting a three-color visual approach path into the final approach area of the runway upon which the indicator is installed. The below glide path indication is red, the above glide path indication is amber, and the on glide path indication is green. These types of indicators have a useful range of approximately one-half to one mile during the day and up to five miles at night depending upon the visibility conditions. (See Figure 2-1-6.)

d. **Pulsating Systems.** Pulsating visual approach slope indicators normally consist of a single light unit projecting a two-color visual approach path into the final approach area of the runway upon which the indicator is installed. The on glide path indication may be a steady white light or alternating *red* and *white* light. The slightly below glide path indication is a steady red light. If the aircraft descends further below the glide path, the red light starts to pulsate. The above glide path indication is a pulsating white light. The pulsating rate increases as the aircraft gets further above or below the desired glide slope. The useful range of the system is about four miles during the day and up to ten miles at night. (See Figure 2-1-7.)

e. **Alignment of Elements Systems.** Alignment of elements systems are installed on some small general aviation airports and are a low-cost system consisting of painted plywood panels, normally black and white or fluorescent orange. Some

of these systems are lighted for night use. The useful range of these systems is approximately three-quarter miles. To use the system the pilot positions the aircraft so the elements are in alignment. The glide path indications are shown in Figure 2-1-8.

FIGURE 2-1-2  
2-Bar VASI

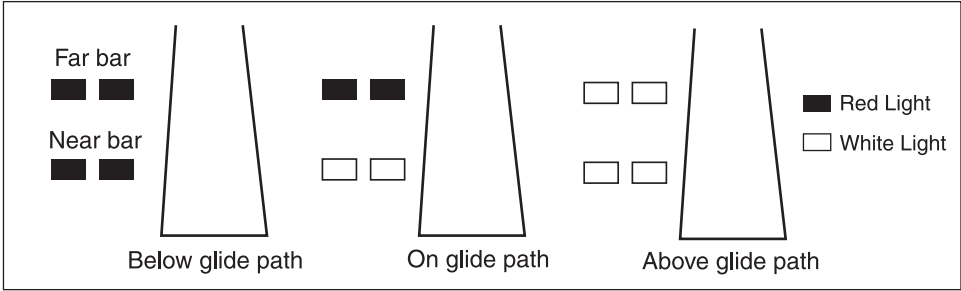


FIGURE 2-1-3  
3-Bar VASI

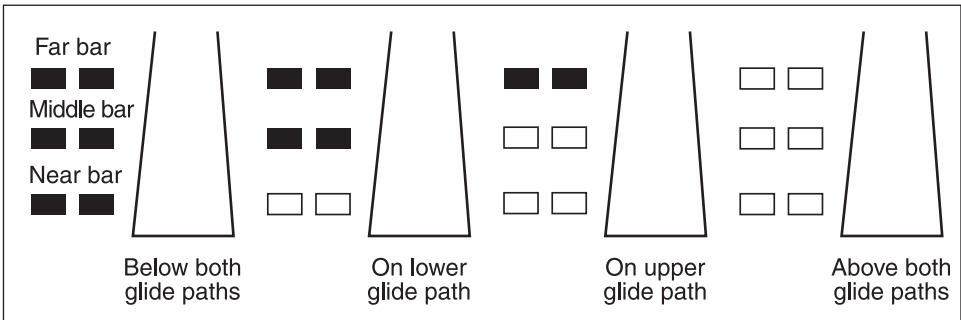
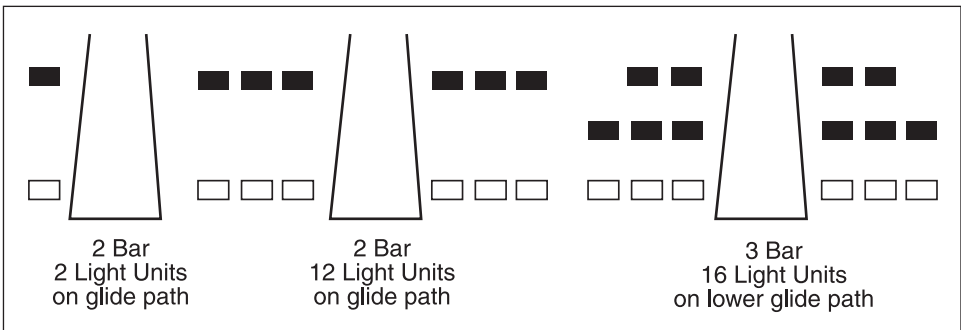
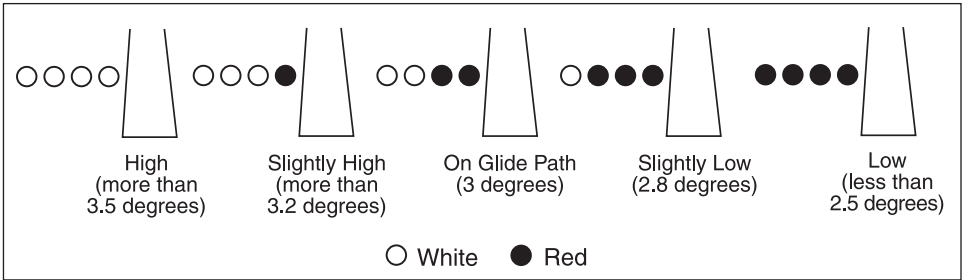


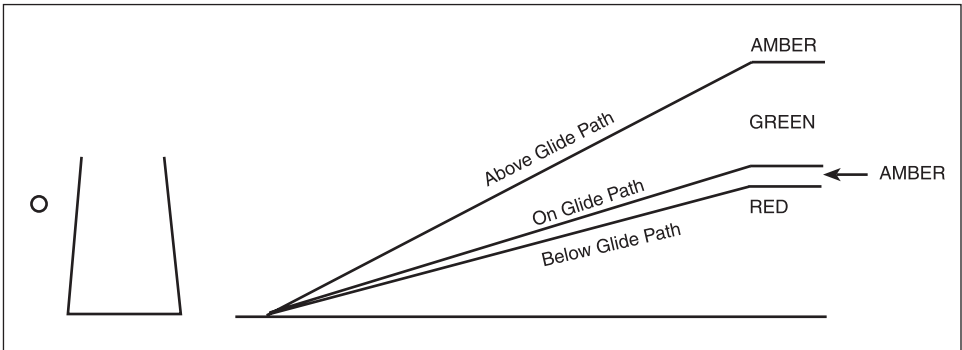
FIGURE 2-1-4  
VASI Variations



**FIGURE 2-1-5**  
**Precision Approach Path Indicator (PAPI)**



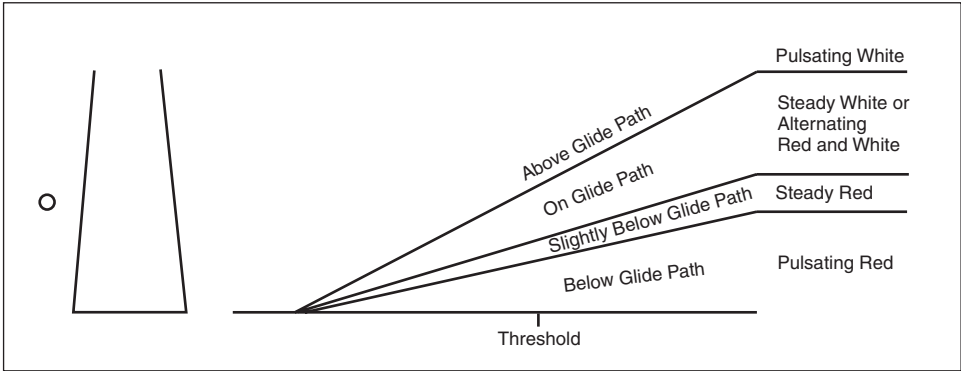
**FIGURE 2-1-6**  
**Tri-Color Visual Approach Slope Indicator**



**Notes:**

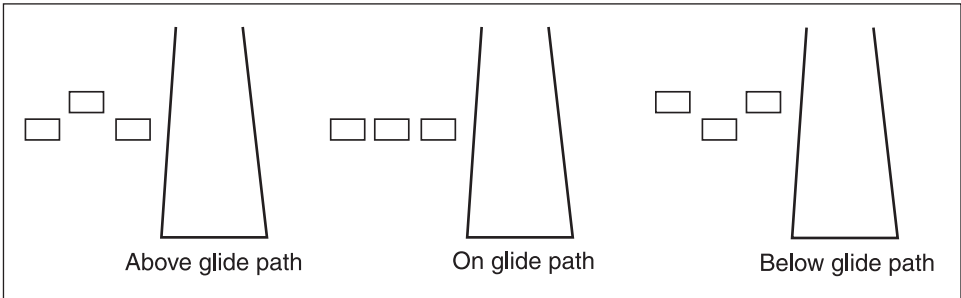
1. Since the tri-color VASI consists of a single light source which could possibly be confused with other light sources, pilots should exercise care to properly locate and identify the light signal.
2. When the aircraft descends from green to red, the pilot may see a dark amber color during the transition from green to red.

**FIGURE 2-1-7**  
Pulsating Visual Approach Slope Indicator



**Note:** Since the PVASI consists of a single light source which could possibly be confused with other light sources, pilots should exercise care to properly locate and identify the light signal.

**FIGURE 2-1-8**  
Alignment of Elements



**2-1-3 Runway End Identifier Lights (REIL)**

REILs are installed at many airfields to provide rapid and positive identification of the approach end of a particular runway. The system consists of a pair of synchronized flashing lights located laterally on each side of the runway threshold. REILs may be either omnidirectional or unidirectional facing the approach area. They are effective for:

- a. Identification of a runway surrounded by a preponderance of other lighting.
- b. Identification of a runway which lacks contrast with surrounding terrain.
- c. Identification of a runway during reduced visibility.

**2-1-4 Runway Edge Light Systems**

a. Runway edge lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity or brightness they are capable of producing: they are the High Intensity Runway Lights (HIRL), Medium Intensity Runway Lights (MIRL), and the Low Intensity Runway Lights (LIRL). The HIRL and MIRL systems have variable intensity controls, whereas the LIRLs normally have one intensity setting.

b. The runway edge lights are white, except on instrument runways yellow replaces white on the last 2,000 feet or half the runway length, whichever is less, to form a caution zone for landings.

c. The lights marking the ends of the runway emit red light toward the runway to indicate the end of runway to a departing aircraft and emit green outward from the runway end to indicate the threshold to landing aircraft.

## 2-1-5 In-Runway Lighting

**a. Runway Centerline Lighting System (RCLS).** Runway centerline lights are installed on some precision approach runways to facilitate landing under adverse visibility conditions. They are located along the runway centerline and are spaced at 50-foot intervals. When viewed from the landing threshold, the runway centerline lights are white until the last 3,000 feet of the runway. The white lights begin to alternate with red for the next 2,000 feet, and for the last 1,000 feet of the runway, all centerline lights are red.

**b. Touchdown Zone Lights (TDZL).** Touchdown zone lights are installed on some precision approach runways to indicate the touchdown zone when landing under adverse visibility conditions. They consist of two rows of transverse light bars disposed symmetrically about the runway centerline. The system consists of steady-burning white lights which start 100 feet beyond the landing threshold and extend to 3,000 feet beyond the landing threshold or to the midpoint of the runway, whichever is less.

**c. Taxiway Centerline Lead-Off Lights.** Taxiway centerline lead-off lights provide visual guidance to persons exiting the runway. They are color-coded to warn pilots and vehicle drivers that they are within the runway environment or instrument landing system (ILS) critical area, whichever is more restrictive. Alternate green and yellow lights are installed, beginning with green, from the runway centerline to one centerline light position beyond the runway holding position or ILS critical area holding position.

**d. Taxiway Centerline Lead-On Lights.** Taxiway centerline lead-on lights provide visual guidance to persons entering the runway. These "lead-on" lights are also color-coded with the same color pattern as lead-off lights to warn pilots and vehicle drivers that they are within the runway environment or instrument landing system (ILS) critical area, whichever is more conservative. The fixtures used for lead-on lights are bidirectional, i.e., one side emits light for the lead-on function while the other side emits light for the lead-off function. Any fixture that emits yellow light for the lead-off function must also emit yellow light for the lead-on function. (See Figure 2-1-12.)

**e. Land and Hold Short Lights.** Land and hold short lights are used to indicate the hold short point on certain runways which are approved for Land and Hold Short Operations (LAHSO). Land and hold short lights consist of a row of pulsing white lights installed across the runway at the hold short point. Where installed, the lights will be on anytime LAHSO is in effect. These lights will be off when LAHSO is not in effect.

**Reference:** AIM, *Pilot Responsibilities When Conducting Land and Hold Short Operations (LAHSO)*, ¶4-3-11.

## 2-1-6 Runway Status Light (RWSL) System

### a. Introduction.

RWSL is a fully automated system that provides runway status information to pilots and surface vehicle operators to clearly indicate when it is unsafe to enter, cross, takeoff from, or land on a runway. The RWSL system processes information from surveillance systems and activates Runway Entrance Lights (REL) and Takeoff Hold Lights (THL), in accordance with the position and velocity of the detected surface traffic and approach traffic. REL and THL are in-pavement light fixtures that are directly visible to pilots and surface vehicle operators. RWSL is an independent safety enhancement that does not substitute for or convey an ATC clearance. Clearance to enter, cross, takeoff from, land on, or operate on a runway must still be received from ATC. Although ATC has limited control over the system, personnel do not directly use and may not be able to view light fixture activations and deactivations during the conduct of daily ATC operations.

**b. Runway Entrance Lights (REL):** The REL system is composed of flush mounted, in-pavement, unidirectional light fixtures that are parallel to and focused along the taxiway centerline and directed toward the pilot at the hold line. An array of REL lights include the first light at the hold line followed by a series of evenly spaced lights to the runway edge; one additional light at the runway centerline is in line with the last two lights before the runway edge (see Figure 2-1-9 and Figure 2-1-10). When activated, the red lights indicate that there is high speed traffic on the runway or there is an aircraft on final approach within the activation area.

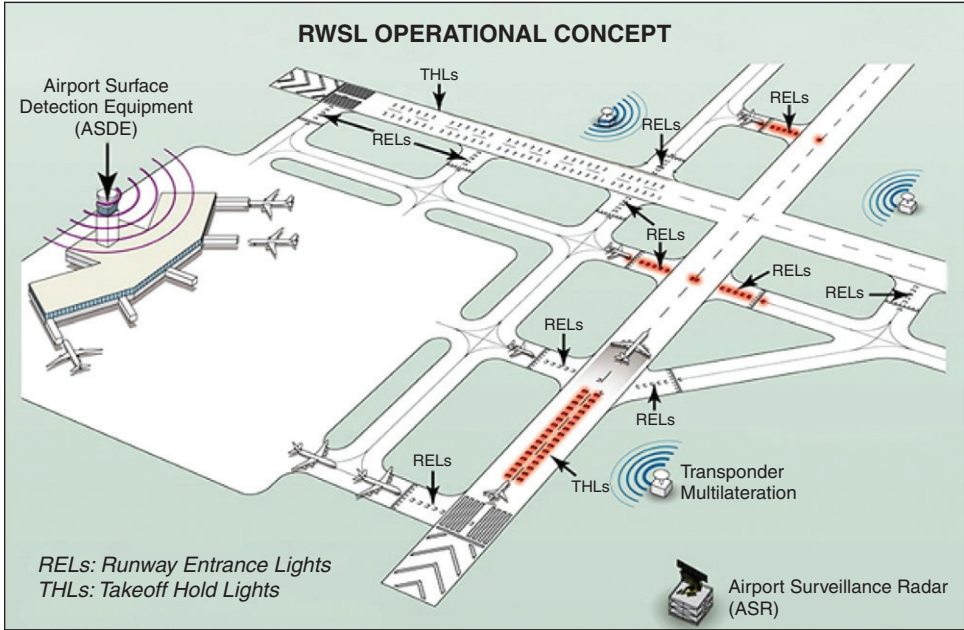
#### 1. REL Operating Characteristics—Departing Aircraft:

When a departing aircraft reaches a site adaptable speed of approximately 30 knots, all taxiway intersections with REL arrays along the runway ahead of the aircraft will illuminate (see Figure 2-1-9). As the aircraft approaches an REL equipped taxiway intersection, the lights at that intersection extinguish approximately 3 to 4 seconds before the aircraft reaches it. This allows controllers to apply "anticipated separation" to permit ATC to move traffic more expeditiously without compromising safety. After the aircraft is declared "airborne" by the system, all REL lights associated with this runway will extinguish.

#### 2. REL Operating Characteristics—Arriving Aircraft:

When an aircraft on final approach is approximately 1 mile from the runway threshold, all sets of taxiway REL light arrays that intersect the runway illuminate. The distance is adjustable and can be configured for specific operations at particular

FIGURE 2-1-9  
Runway Status Light System



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airports. Lights extinguish at each equipped taxiway intersection approximately 3 to 4 seconds before the aircraft reaches it to apply anticipated separation until the aircraft has slowed to approximately 80 knots (site adjustable parameter). Below 80 knots, all arrays that are not within 30 seconds of the aircraft's forward path are extinguished. Once the arriving aircraft slows to approximately 34 knots (site adjustable parameter), it is declared to be in a taxi state, and all lights extinguish.

3. What a pilot would observe: A pilot at or approaching the hold line to a runway will observe RELs illuminate and extinguish in reaction to an aircraft or vehicle operating on the runway, or an arriving aircraft operating less than 1 mile from the runway threshold.

4. When a pilot observes the red lights of the REL, that pilot will stop at the hold line or remain stopped. The pilot will then contact ATC for resolution if the clearance is in conflict with the lights. Should pilots note illuminated lights under circumstances when remaining clear of the runway is impractical for safety reasons (for example, aircraft is already on the runway), the crew should proceed according to their best judgment while understanding the illuminated lights indicate the runway is unsafe to enter or cross. Contact ATC at the earliest possible opportunity.

**c. Takeoff Hold Lights (THL):** The THL system is composed of flush mounted, in-pavement, unidirectional light fixtures in a double longitudinal row aligned either side of the runway centerline lighting. Fixtures are focused toward the arrival end of the runway at the "line up and wait" point. THLs extend for 1,500 feet in front of the holding aircraft starting at a point 375 feet from the departure threshold (see Figure 2-1-11). Illuminated red lights provide a signal, to an aircraft in position for takeoff or rolling, that it is unsafe to takeoff because the runway is occupied or about to be occupied by another aircraft or ground vehicle. Two aircraft, or a surface vehicle and an aircraft, are required for the lights to illuminate. The departing aircraft must be in position for takeoff or beginning takeoff roll. Another aircraft or a surface vehicle must be on or about to cross the runway.

1. THL Operating Characteristics—Departing Aircraft:

THLs will illuminate for an aircraft in position for departure or departing when there is another aircraft or vehicle on the runway or about to enter the runway (see Figure 2-1-9). Once that aircraft or vehicle exits the runway, the THLs extinguish. A pilot may notice lights extinguish prior to the downfield aircraft or vehicle being completely clear of the runway but still moving. Like RELs, THLs have an "anticipated separation" feature.

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