

UPDATE

The Complete Remote Pilot

This document revises the first edition (ASA-RPT), published in 2018.



Page v:

- *In the first paragraph, the second sentence is revised to read:*

Drones, officially referred to as uncrewed or unmanned aircraft systems (UAS), provide tremendous opportunities for commercial and personal use.

- *In the third paragraph, the last sentence is revised to read:*

It is also recommended that you read FAA Advisory Circular (AC) 107-2A, *Small Unmanned Aircraft System (small UAS)*, which expands upon the various requirements for sUAS operations in the United States.

- *In the fourth paragraph, the second sentence is revised to read:*

Additionally, you will want to get a copy of FAA Advisory Circular 91-57B, *Exception for Limited Recreational Operations of Unmanned Aircraft*.

- *A new sixth paragraph is added, directly above the heading **Remote Pilot Certificate**, to read:*

Note: The FAA and aviation community are in the process of transitioning from use of the terms *manned* and *unmanned* to *crewed* and *uncrewed*. Many FAA regulations and documents still use the former, and these terms are used interchangeably throughout this book, but you can expect to see increasing use of *crewed* and *uncrewed* over time.

Page 1-1:

- *The title for Lesson 1 is changed to read:*

Uncrewed Aircraft Systems: Learning the Language of Drones

Page 1-2:

- *Under the heading **Terms and Abbreviations**, four new terms are added to read:*

BVLOS	Beyond visual line of sight—anytime a drone is operated out of view of the remote PIC and visual observer. Special authorization is required for BVLOS operations.
FRIA	FAA-Recognized Identification Area—the only locations uncrewed aircraft (drones and radio-controlled airplanes) may operate without broadcasting remote ID message elements. Usually sponsored by community-based organizations or schools.
RID	Remote Identification—the ability of a drone in flight to provide identification and location information that can be received by other parties.
LAANC	Low Altitude Authorization and Notification Capability—a collaboration between the FAA and private sector to provide UAS operators a means of requesting authorization to operate in airspace that otherwise would exclude such operations.

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- *Under the heading **Terms and Abbreviations**, the following terms are revised to read:*

RWY	Runway—pavement used by crewed aircraft for takeoff and landing.
sUAS	Small uncrewed aircraft system—a UAS that weighs less than 55 pounds (25 kg).
TWY	Taxiway—pavement used by crewed aircraft to taxi to and from runways.
UA	Uncrewed aircraft—term used to describe the actual aircraft that is part of a UAS (i.e., excludes the ground station/controller).
UAS	Uncrewed aircraft system—the total system associated with an uncrewed aircraft, including the ground station/controller, sensors, processors, and other components. UAS is also used generically to refer to a drone or remote-controlled aircraft. Previously referred to as unmanned aerial vehicles (UAV).

Page 1-11:

- *At the end of the list in the section **Common Uses of sUAS**, two bullets are added to read:*
 - Firefighters use sUAS to monitor fires, track fight suppression processes, and even extinguish fires.
 - Delivery of time-sensitive and consumer goods is increasingly being conducted with sUAS.

Page 2-3:

- *Under the subheading **Federal Aviation Regulations**, the first two paragraphs are revised to read:*

The FAA expects you to be familiar with all of the Federal Aviation Regulations that apply to your flight operations, but as you read through the regulations, you should be able to distinguish between those that are nice to know but do not affect your day-to-day flying, and those which you *must* know (e.g., basic weather requirements or right-of-way rules). This lesson will discuss those regulations that require explanation or illustration for complete understanding, but all of Part 107 of the regulations apply to you when acting as a certificated remote pilot of sUAS. Before you say, “I can’t find it in the regs,” be sure that you have checked all sources. Note also that the regulations list things you cannot do—if a regulation does not prohibit something, it is permitted. A searchable version of all of the regulations can be found on the FAA’s website.¹

Prior to flying, you must determine the purpose of your planned activity. Simply, are you going to be using the sUAS as a certificated remote pilot (i.e., commercial or other non-recreational use), or are you going to fly as a hobbyist (i.e., for recreational use)? Under statutory exception for limited recreational operations of unmanned aircraft, the recreational use of an unmanned aircraft is recreational use, Title 49 of the United States Code §44809. FAA Advisory Circular 91-57B restates the statutory conditions to operate under the exception and provides additional guidance on adhering to those conditions. If the operation does not meet the conditions for an exception for limited recreational use, then you must adhere to the regulations governed by Part 107.

What is Recreational Flight?

Many people assume that a recreational flight is not operated for a business or any form of compensation. However, that is not always the case. Financial compensation, or the lack of it, is not what determines if the flight is recreational or commercial. The following information can be used to help you determine what rules you should be operating under. Remember, the default regulation for drones weighing under 55 pounds is Part 107. The exception for recreational flyers only applies to flights that are purely for fun or personal enjoyment. When in doubt, fly under Part 107.²

1 “Regulations & Policies,” Federal Aviation Administration, United States Department of Transportation, https://www.faa.gov/regulations_policies/.

2 “Recreational Flyers & Modeler Community-Based Organization,” Federal Aviation Administration, United States Department of Transportation, last modified January 5, 2022, https://www.faa.gov/uas/recreational_fliers/.

Pages 2-3 and 2-4:

- The subheading and the entire section under the subheading **Model Aircraft—Recreational Flying** is deleted.

Page 2-4:

- The subheading **Non-Recreational Flying—Operation of sUAS Requiring Remote Pilot Certificate** is revised to read:

14 CFR Part 107—Small Unmanned Aircraft Systems

- Under the new subheading **14 CFR Part 107—Small Unmanned Aircraft Systems** (previously titled **Non-Recreational Flying—Operations of sUAS Requiring Remote Pilot Certificate**), the first sentence is deleted. The paragraph now begins:

To use sUAS for commercial or other non-recreational missions and serve as the remote pilot-in-command (remote PIC), you must...

Page 2-5:

- The second paragraph on the page (directly above the first subheading) is revised to read:

Regulations covering non-recreational sUAS flying can be found in 14 CFR Part 107. Part 107 is divided into five subparts: (A) General, (B) Operating Rules, (C) Remote Pilot Certification, (D) Operations Over Human Beings, and (E) Waivers.

- Under the heading **Part 107, Subpart A—General**, the first paragraph is revised, and a second paragraph is added, to read:

14 CFR 107.1 Applicability. This part of the regulations sets the stage as to what is covered by Part 107. Exceptions to this applicability include air carrier operations, any aircraft subject to the provisions of 49 U.S.C. §44809 (recreational use), those with an exemption under Section 333 of Public Law 112-95 or 49 U.S.C. §44807, and any operation that a person elects to conduct under Part 91 where an airworthiness certificate has been issued. If you don't know what Section 333 exemptions are, then they most likely don't apply to your operations.

14 CFR 107.2 Applicability of certification procedures for products and articles. This simply states that Part 21 of Title 14 does not apply to small unmanned aircraft systems operated under Part 107 unless the sUAS will be operating over human beings in accordance with 14 CFR §107.140.

- In the section **14 CFR 107.3 Definitions**, a third bullet is added to read:

- *Declaration of compliance* means a record submitted to the FAA that certifies the small unmanned aircraft conforms to the Category 2 or Category 3 requirements under subpart D of this part.

Page 2-7:

- In the **14 CFR 107.13 Registration** paragraph, the last sentence is revised to read:

You can register online at: faadronezone.faa.gov.

Page 2-8:

- The **14 CFR 107.29 Daylight operation** title and paragraph are revised to read:

14 CFR 107.29 Operation at night. In short, you cannot operate your sUAS at night or during the period of civil twilight unless the unmanned aircraft is operating with lighted anti-collision lights. These lights must be visible for 3 statute miles and have a flash rate sufficient to avoid a collision. In the interest of operational safety, you may, as the remote PIC, reduce the intensity of the anti-collision lights, but at no time may you extinguish the lights. In the contiguous United States, evening civil twilight is the period from sunset until 30 minutes after sunset, and morning civil twilight is the period beginning 30 minutes prior to sunrise until sunrise. The definition of “civil twilight” can get tricky for Alaska; you will need to check *The Air Almanac*.³

³ “Almanacs and Other Publications,” U.S. Naval Observatory, <https://www.usno.navy.mil/USNO/astronomical-applications/publications>.

(Note: To operate at night, the remote PIC must have completed an initial knowledge test or recurrency training following April 6, 2021, as applicable under §107.65. This is to ensure the remote PIC is familiar with the changes to regulations surrounding operations at night that took effect in April 2021.)

Page 2-9:

- **The 14 CFR 107.39 Operation over human beings paragraph is revised to read:**

14 CFR 107.39 Operation over human beings. The operation of a small unmanned aircraft over human beings is not permitted unless certain conditions are met. The individual or individuals must be directly participating in the operation (e.g., visual observer). The individual or individuals not part of the operation must be under a covered structure or enclosed in a stationary vehicle, providing them protection from a falling small unmanned aircraft. In addition, the small unmanned aircraft may be operated over human beings if the operation being conducted meets one of the requirements for operational categories listed in Subpart D of Part 107. There are four of these categories, and we will discuss each of them in depth later in this section under *Part 107, Subpart D—Operations Over Human Beings*.

Page 2-10:

- **The 14 CFR 107.53 paragraph is revised, and 14 CFR 107.52 and 14 CFR 107.56 paragraphs added, to read:**

14 CFR 107.52 ATC transponder equipment prohibition. This section just states that unless you have permission from the FAA, your sUAS should not have an operating transponder.

14 CFR 107.53 Automatic Dependent Surveillance–Broadcast (ADS-B) out prohibition. This section states that unless you have permission from the FAA, your sUAS should not have an operating ADS-B Out (transmitting) device.

14 CFR 107.56 Applicability. This subpart of the rule applies to the requirements to be issued a remote pilot certificate with an sUAS rating.

Page 2-11:

- **The 14 CFR 107.65 Aeronautical knowledge recency paragraph is revised to read:**

14 CFR 107.65 Aeronautical knowledge recency. To exercise the privileges of remote PIC, you must have received initial or recurrency training within the previous 24 calendar months. This is accomplished through either an initial remote pilot aeronautical knowledge (UAG) test or by completing an FAA-approved sUAS recurrent training course if you already hold a remote pilot certificate. If you hold a crewed aircraft pilot certification under Part 61, you can use a flight review, initial or recurrent training course, or other means acceptable to the Administrator in lieu of the tests mentioned earlier.

- **The 14 CFR 107.73 Initial and recurrent knowledge tests title and two paragraphs that follow it are revised to read:**

14 CFR 107.73 Knowledge and training. Your initial knowledge test (UAG) and recurrent training will require you to know the ins and outs of the following subjects: regulations, airspace classification and operating requirements, aviation weather sources and effects of weather, loading, emergency procedures, crew resource management (CRM), radio communication procedures, aircraft performance, physiological effects of drugs and alcohol, aeronautical decision making (ADM) and judgment, airport operations, maintenance, preflight inspection procedures, and operation at night.

While some of these topics are intuitive even to the non-aviator, if you are not already a pilot, many of these details can be rather foreign concepts, and thus some study is required. Do not underestimate the complexity of the knowledge and training required to hold a remote pilot certificate. Moreover, to stay out of trouble with the FAA and local law enforcement, it is best to be well-versed in the knowledge relating to sUAS operations.

- **The 14 CFR 107.74 Initial and recurrent training courses title and paragraph are revised to read:**

14 CFR 107.74 Small unmanned aircraft system training. Crewed aircraft pilots who hold a certificate issued under 14 CFR Part 61 (other than a student pilot certificate) are still required to have training on specific subjects specifically relating to unmanned aircraft systems to include: regulations, weather, loading, emergency procedures, crew resource management (CRM), performance, maintenance, preflight inspection, and operation at night. This list is shorter than that of §107.73 mainly because a certificated pilot has already been trained on many of the subjects listed for initial sUAS training.

- At the end of section **Part 107 Subpart C—Remote Pilot Certification**, a new subheading and section is added to read:

Part 107, Subpart D—Operations Over Human Beings

The operation of a civil small unmanned aircraft (sUA) is allowed over people if the sUA is in accordance with one of the 4 categories of operations listed in subpart D. Each category will outline specific operational restrictions and eligibility requirements for any operation over a person, which the remote pilot-in-command must adhere to, except as noted in 14 CFR §107.39 and §107.145. These categories were created based on significant research into the risk associated with sUA of various sizes and the potential they have to cause damage or bodily harm. It is critical to adhere to these guidelines to avoid unnecessary risks to individuals on the ground. For example, a DJI Phantom quadcopter that weighs 1.2 kilograms (just over 2.5 pounds) that falls from 200 feet can impart over 7,000 newtons of force. To put this in perspective, it is estimated that a force of 2,300 newtons is enough to crush a human skull even when protected by a helmet.

The most straightforward operation is Category 1, which is outlined in §107.110. For the operation of an sUA over human beings, the remote pilot-in-command must adhere to the following requirements:

- The sUA must weigh less than 0.55 pounds on takeoff and throughout the duration of the flight; this includes everything that is on board or attached to the aircraft.
- The sUA cannot contain any exposed rotating parts that could lacerate skin upon impact.
- The operation must meet the requirements of either 14 CFR §89.110 or §89.115(a) pertaining to standard and alternative remote identification of unmanned aircraft.

As we get into Category 2 and 3 operations, the regulations become more complex and are divided into two primary regulatory sections, *Operating Requirements* and *Eligibility of small unmanned aircraft and other applicant requirements*. One of the main factors for operating under Category 2 or 3 is establishing a means of compliance. This is a detailed design standard that, if met, accomplishes the safety intent of the regulation showing compliance with the regulatory requirements. Category 2 operations are prescribed under 14 CFR §107.115 and §107.120. Category 3 operations are prescribed under §107.125 and §107.130.

One of the main differences in Category 4 operations is that the sUA is required to have an airworthiness certificate issued under Part 21. This requirement makes for more stringent regulations concerning maintenance and recordkeeping of maintenance performed on the sUA. The regulations pertaining to Category 4 operations can be found under §107.140.

14 CFR §107.145 provides the regulatory guidance for operations over moving vehicles with a person located inside. This requires the sUA be operating under one of the four categories of operations listed in Subpart D.

For Category 1, Category 2, or Category 3, the operation being conducted must adhere to the following:

1. The sUA must remain within or over a closed- or restricted-access site, and all human beings located inside a moving vehicle within the closed- or restricted-access site must be on notice that a small unmanned aircraft may fly over them;
or
2. The sUA must not maintain sustained flight over moving vehicles.

For a Category 4 operation, the small unmanned aircraft must adhere to the following:

1. Have an airworthiness certificate issued under part 21 of this chapter.
2. Be operated in accordance with the operating limitations specified in the approved flight manual or as otherwise specified by the FAA Administrator. The operating limitations must not prohibit operations over human beings located inside moving vehicles.

The regulations allow for the variable configuration of small unmanned aircraft systems. This means the sUA can be eligible for more than one of the categories of operation over human beings, as long as a remote pilot-in-command cannot inadvertently switch between modes of configurations. For example, you cannot be airborne and be allowed to go from conducting Category 1 operations to Category 3 operations with the flip of a switch.

The above section briefly discussed the requirement for establishing a means of compliance for Category 2 and 3 operations. 14 CFR §107.155, Means of Compliance, outlines the process and steps involved in establishing compliance as summarized below.

- **Establishment of compliance**—the means of compliance must consist of test, analysis, or inspection.
- **Required information**—an applicant must submit a detailed description of the means of compliance and an explanation of how they will be applied to demonstrate how the small unmanned aircraft meets the requirements for Category 2 or Category 3 operations.
- **FAA acceptance**—the FAA will review the application and notify the applicant that it has accepted the means of compliance.
- **Rescission**—a means of compliance is subject to ongoing review by the Administrator and may be rescinded if it does not meet the requirements; if rescinded, the Administrator will publish a notice of rescission in the *Federal Register*.
- **Inapplicability**—14 CFR Part 13, subpart D, does not apply to the procedures of establishment of compliance in 14 CFR §107.155(a).

Once a means of compliance is accepted by the FAA, the applicant per 14 CFR §107.160 must then submit a declaration of compliance back to the FAA. It is not until the FAA has accepted the declaration of compliance that the applicant has met the requirements of §107.120(a) for Category 2 and §107.130(a) for Category 3 operations. The declaration of compliance must be retained for a period of time and made available to the Administrator upon request.

Page 2-12:

- *The previous titled section **Part 107, Subpart D—Waivers** is retitled and revised to read:*

Part 107, Subpart E—Waivers

The FAA will issue a certificate of waiver to any regulation specified under 14 CFR Part 205 on a case-by-case basis. Waivers are official documents issued by the FAA that approve certain operations of an aircraft outside the limitations of a regulation. Prior to operating outside of the rules of Part 107, you must first apply for a waiver at faadronezone.faa.gov. The FAA uses performance-based standards for determining if it will grant a waiver, so you are well-advised to thoroughly read the instructions for completing such a request. If the FAA requires additional information about your application for waiver/authorization, you will need to promptly respond.

Below is a list of regulations subject to waiver under Part 107.

- 107.25—Operation from a moving vehicle or aircraft. However, no waiver of this provision will be issued to allow the carriage of property of another by aircraft for compensation or hire.
- 107.29(a)(2) and (b)—Anti-collision light required for operations at night and during periods of civil twilight.
- 107.31—Visual line of sight aircraft operation. However, no waiver of this provision will be issued to allow the carriage of property of another by aircraft for compensation or hire.
- 107.33—Visual observer.
- 107.35—Operation of multiple small unmanned aircraft.
- 107.37(a)—Yielding the right of way.
- 107.39—Operation over human beings.
- 107.41—Operation in certain airspace.
- 107.51—Operating limitations for small unmanned aircraft.
- 107.145—Operations over moving vehicles.

First responders and organizations responding to natural disasters may be eligible for an expedited waiver through the Special Government Interest (SGI) process. If you are conducting one of the below operations, you can apply for a waiver through the SGI process. This assumes you are a current Remote Pilot with a certificate or an existing Certificate of Waiver or Authorization (COA).

- Firefighting
- Search and rescue
- Law enforcement
- Utility or other critical infrastructure restoration
- Damage assessments supporting disaster recovery-related insurance claims
- Media coverage providing crucial information to the public

Page 2-12:

- *After Part 107, Subpart E—Waivers (added above), a new section is added to read:*

Part 107 Airspace Authorizations

In order to facilitate timely and flexible UAS operations in controlled airspace (e.g., Class B, C, D, E), the FAA started the Low Altitude Authorization and Notification Capability (LAANC) program. LAANC is a collaboration between the FAA and the private sector to provide UAS operators a means of requesting authorization to operate in airspace that otherwise would exclude such operations. Prior to LAANC, an operator would have to seek permission via means that could take days or weeks to receive. According to the FAA,⁴ LAANC provides:

- Drone pilots with access to controlled airspace at or below 400 feet.
- Awareness of where pilots can and cannot fly.
- Air traffic control professionals with visibility into where and when drones are operating.

LAANC requests are routed through the FAA UAS Data Exchange and are checked using resources such as UAS facility maps, Special Use Airspace data, airports and airspace classes, Temporary Flight Restrictions (TFRs), and Notices to Air Missions (NOTAMs) (see Figure 2-3). If approved, pilots can receive their authorization in near real-time. LAANC authorizations are available to Part 107 and recreational users up to an altitude of 400 feet, while only those operating under Part 107 can apply for authorization at and above 400 feet.

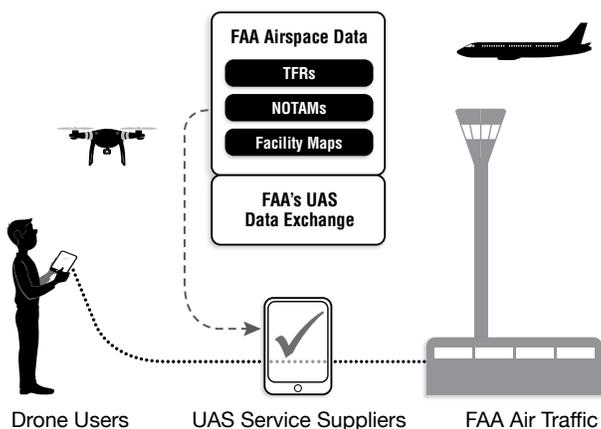


Figure 2-3. FAA's UAS Data Exchange and the Low Altitude Authorization and Notification Capability (LAANC). (FAA UAS Data Exchange [LAANC], [faa.gov/uas/programs_partnerships/data_exchange/](https://www.faa.gov/uas/programs_partnerships/data_exchange/))

Unless deemed necessary within the authorization, remote pilots are not required to contact the control tower prior to flight.

It is important to note that participation in LAANC does not eliminate the need for pilots to check NOTAMs, check weather conditions, and abide by all airspace restrictions. LAANC provides authorizations only to a specific airspace location.

LAANC is currently available at just over 700 airport locations. If LAANC is not available at a specific location, pilots must request authorization manually through the FAA's Drone Zone website.⁵

Page 2-14:

- *Under the heading **Chart Supplements**, a new first paragraph is added, and the first sentence of the next paragraph is revised, to read:*

The *Chart Supplements U.S.* is published in seven volumes depending on geographic location and is revised every 56 days. The Airport/Facility Directory (A/FD) is now part of the *Chart Supplements* (CS, or the online version referred to as the Digital Chart Supplement, d-CS).

⁴ "UAS Data Exchange (LAANC)," Federal Aviation Administration, U.S. Department of Transportation, last modified January 19, 2022, https://www.faa.gov/uas/programs_partnerships/data_exchange/.

⁵ "FAADroneZone," Federal Aviation Administration, U.S. Department of Transportation, <https://faadronezone.faa.gov>.

Before setting off on an sUAS mission, you are required to become familiar with all available information regarding the flight, and the Chart Supplements are your source of information on nearby airports.

- Under **Chart Supplements**, the first paragraph after the bulleted list is deleted.
- Under **Chart Supplements**, in the third paragraph below the bulleted list, the first sentence is revised to read: Appendix B reprints the Airport/Facility Directory Legend from the *Chart Supplements*.
- Under **Chart Supplements**, the last paragraph is revised to read:
Much of the information contained in the *Chart Supplement* (but not the Aeronautical Chart Bulletin) can be found at skyvector.com, airnav.com, or 1800wxbrief.com.
- Under **Advisory Circulars**, in the second paragraph, the second sentence is revised to read:
To give three examples: 14 CFR Part 61 deals with airman and flight instructor certification, while Advisory Circular 61-65 explains flight instructor duties and responsibilities; 14 CFR Part 91 is General Operating Rules, and Advisory Circular 91-74 deals with flight in icing conditions; the 70 series deals with airspace.

Page 2-15:

- The **Notices to Airmen (NOTAMS)** heading and three paragraphs that follow it are revised to read:

NOTICES TO AIR MISSIONS (NOTAMS)

Information that might affect the safety of a flight—such as an airport closure, Temporary Flight Restriction (TFR), communication frequency change, etc.—is available from your Flight Service Station (FSS) briefer.

Your briefer has access to NOTAMS. If you use one of the computer flight planning products such as the AOPA flight planner or 1800wxbrief.com, you will also receive current NOTAMS—but be aware that TFRs can pop up without warning. Always check for them with flight service before takeoff to avoid being greeted by law enforcement or even the military.

To make it easier for pilots to scan through a list of NOTAMS for information specific to their flight, the FAA uses “key words” in the first line of text. See Figure 2-4.

Page 2-16:

- Figure 2-3 is renumbered to Figure 2-4.

Page 2-17:

- The question and answer stems for question 2 are revised to read:

2. The governing the recreational use of drones can be found in

A—14 CFR Part 91

B—49 USC §44809

C—14 CFR Part 101

Page 2-20:

- A new question #31 is added to read:

31. Authorization to operate in airspace via LAANC precludes the requirement to contact the local air traffic control tower.

A—True

B—False

- In answer key, answer is added to end of list to read:

31-A

Page 3-2:

- *The first complete sentence is changed to read:*

Among unofficial sources are skyvector.com, vfrmap.com, and 1800wxbrief.com.

- *In the sixth paragraph under the heading **Geographical Coordinates**, the last sentence is changed to read:*

The geographic position of all airports is found in the Airport/Facility Directory.

Page 3-5:

- *Under the heading **Chart Reading**, at the end of the third paragraph, a sentence is added to read:*

Wind farms are also depicted on sectional charts with an unmistakable symbol.

Page 3-9:

- *Under the subheading **Class D Airspace**, the fifth paragraph is revised to read:*

You have to look at the *Chart Supplement* to be absolutely sure which classification of airspace is left behind when the controller at a part-time tower goes home. Look at the towered airports on the sectional excerpt for the Tacoma Narrows tower (J). It is a part-time tower, and if you look just below the “E” you will find “See NOTAMS/Supplement for Class D/E (sfc hrs.)” Olympia and Paine Field are also part-time with similar notations. What “Supplement” are they referring to? The *Chart Supplement*, of course. When these airports shut down, their surface areas become Class E down to 700 feet above the surface. There are part-time tower-controlled airports that go from Class D to Class G (non-tower) when the tower closes, but there are none on this chart. There is no substitute for the *Chart Supplement* in making this determination.

Page 3-12:

- *The two paragraphs about **Temporary Flight Restrictions** are revised to read:*

Temporary Flight Restrictions. Because of the increased emphasis on security at places where large groups of people (or government bigwigs) are congregated, the FAA is issuing NOTAMs implementing Temporary Flight Restrictions (TFRs) over sporting events, political gatherings, etc. Their dimensions and locations are included in the NOTAM. It is incumbent on every pilot to make a last-minute check for such restrictions before taking off. Regulations specifically state that remote PICs are just as responsible as crewed aircraft pilots to check for—and abide by—NOTAMs and TFRs.

Check for TFRs during flight planning by going to 1800wxbrief.com and selecting “FAA TFRs” under the Links tab; logging in is not required. Check again with FSS on the phone to be sure that nothing new has come up.

Page 4-3:

- *The third paragraph is revised to read:*

Not illustrated but frequently used is the downwind departure. In Figure 4-6, airplanes #4 and #6 are departing in the direction of takeoff. Airplane #5, if not staying in the pattern, should be climbing and departing downwind (if at a tower-controlled airport, the pilot tells the controller that they are making a downwind departure).

- *Figure 4-6 is replaced with the following:*

Single Runway

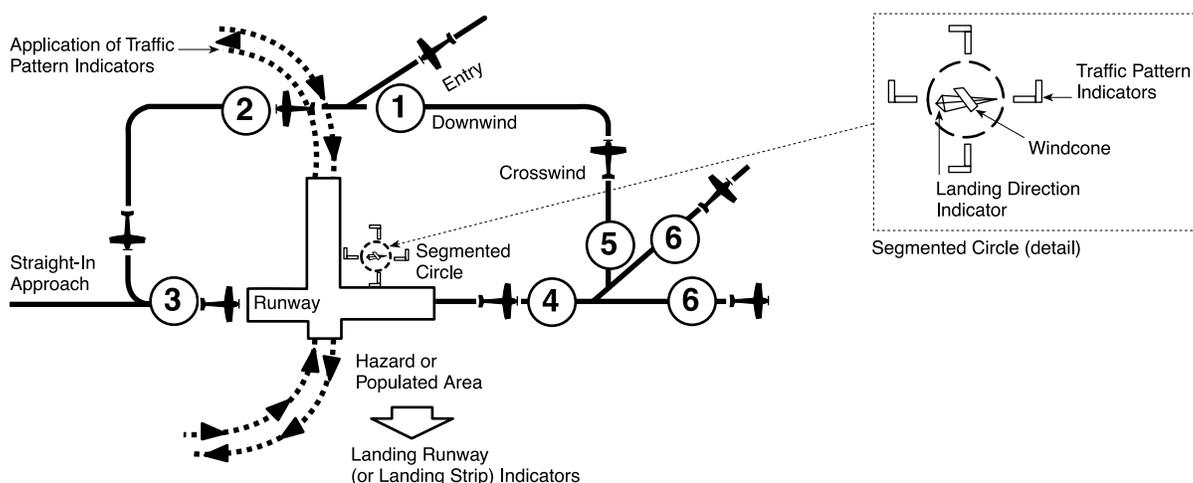


Figure 4-6. FAA recommended standard left-hand traffic pattern with arrival and departure procedures. (FAA AC 90-66B)

Page 4-6:

- *Under the heading **Operations at Non-Tower Airports**, the first sentence is revised to read:*

There are close to 20,000 public and private use airports in the United States of which only a small handful have operating control towers (roughly 600–700 at any given time).

Page 4-13:

- *Under the heading **Flying at Night**, the paragraph is revised to read:*

For Part 107, operations at night, as well as operations during times of civil twilight, require the same regulatory compliance. Civil twilight is defined as the 30-minute period occurring immediately after sunset and the 30-minute period immediately before sunrise, with night defined as the time between the end of evening civil twilight and the beginning of morning civil twilight.

During times of civil twilight and at night, operations of small unmanned aircraft (sUA) are permitted as long as you are in compliance with 14 CFR §107.29. Your sUA will be required to have installed anti-collision lighting that must be visible for 3 statute miles, and that has a sufficient flash rate to avoid a collision. A sufficient flash rate is a minimum of 40 and no more than 100 flashes per minute that must be visible 360 degrees around the vertical axis of the aircraft.⁶ The intensity of the anti-collision lighting may be reduced in the interest of safety but should never be extinguished.

Page 5-2:

- *Under the subheading **Voice Communication Frequencies**, the line for 122.7 MHz is revised to read:*

122.7 MHz—Unicom, non-tower airports

Page 5-4:

- *In the first paragraph under the heading **Radio Use at Non-Tower Airports**, the fourth sentence is revised to read:*

When operating in the vicinity of a non-radio airport, use the Common Traffic Advisory Frequency (CTAF, shown as **C** on sectional charts) listed in the *Chart Supplement*.

⁶ 14 CFR §27.1401 (2021).

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- Under the heading **Radio Use at Non-Tower Airports**, the fifth paragraph is revised to read:

The FAA contracted Flight Service Station (FSS) duties to Leidos, a private contractor (referred to as FSS in this text). These duties have been consolidated and you will no longer find an FSS on the airport. Go to 1800wxbrief.com for more details. The radio frequencies in the *Chart Supplements* and on sectional charts are remote communication outlets, and the controller you talk to might be hundreds of miles from your location. These individuals may or may not be familiar with the uniqueness of your location in terms of weather and terrain. Be sure to read the Communications section of the Aircraft/Facility Directory legend pages in Appendix B; it makes clear how frequencies are to be used.

Page 5-6:

- Under the heading **ADS-B**, the sixth sentence is revised to read:

Your GPS continuously transmits your position, track, altitude, ground speed, and a unique identification number to a ground-based transceiver (GBT), where it is relayed to an air traffic control facility, making it possible for controllers to know all about you without using radar (this is called ADS-B Out).

- Under the heading **ADS-B**, all references to “airplane” or “airplanes” are changed to “aircraft.”
- Under the heading **ADS-B**, the third paragraph is revised and fourth paragraph added to read:

The FAA is installing GBTs across the continent and has mandated that crewed aircraft flying in airspace where a Mode C transponder is now required have ADS-B Out equipment installed by January 2020. Portable ADS-B does not comply with the mandate.

It should be noted that the FAA has reserved ADS-B Out for only a select few UAS that are conducting advanced operations, usually in a test environment.

Page 5-7:

- After the **ADS-B** section, a new heading and section is added to read:

REMOTE IDENTIFICATION (RID)

The FAA has been working on new technology to track unmanned aircraft within the National Airspace System (NAS) called Remote Identification (RID). It is available now but will be required on all unmanned aircraft operating within the NAS by September 16, 2023. This technology allows for a safer and more secure integration of unmanned aircraft into the NAS.

Effective September 16, 2023, no person may operate an unmanned aircraft within the airspace of the United States unless the operation meets the requirements of 14 CFR §89.110 (standard remote identification) or §89.115 (alternative remote identification) unless otherwise authorized by the FAA.⁷

Remote ID is the ability of a drone in flight to provide identification and location information via radio frequency (e.g., Wi-Fi or Bluetooth) that can be received by other parties. This information includes:

- A unique identifier for the drone;
 - The drone’s latitude, longitude, geometric altitude, and velocity;
 - An indication of the latitude, longitude, and geometric altitude of control station (standard) or take-off location (broadcast module);
 - A time mark; and
 - Emergency status (standard remote ID drone only).
- The above information helps the FAA, law enforcement, and other federal agencies find the control station when a drone appears to be flying in an unsafe manner or where it is not allowed to fly. Remote ID also lays the foundation of the safety and security groundwork needed for more complex drone operations.

⁷ “Remote Identification for Drone Pilots,” Federal Aviation Administration, U.S. Department of Transportation, last modified October 13, 2021, https://www.faa.gov/uas/getting_started/remote_id/drone_pilots/.

- There are two types of Remote ID available, and you must comply with only one.

Standard remote identification broadcasts identification and location information about the drone and its control station (Figure 5-5). A standard remote ID drone is one that is manufactured with built-in remote ID broadcast capability per the remote ID rule's requirements. For operations using standard remote identification, you must comply with the requirements of 14 CFR §89.110.

DRONE REMOTE IDENTIFICATION

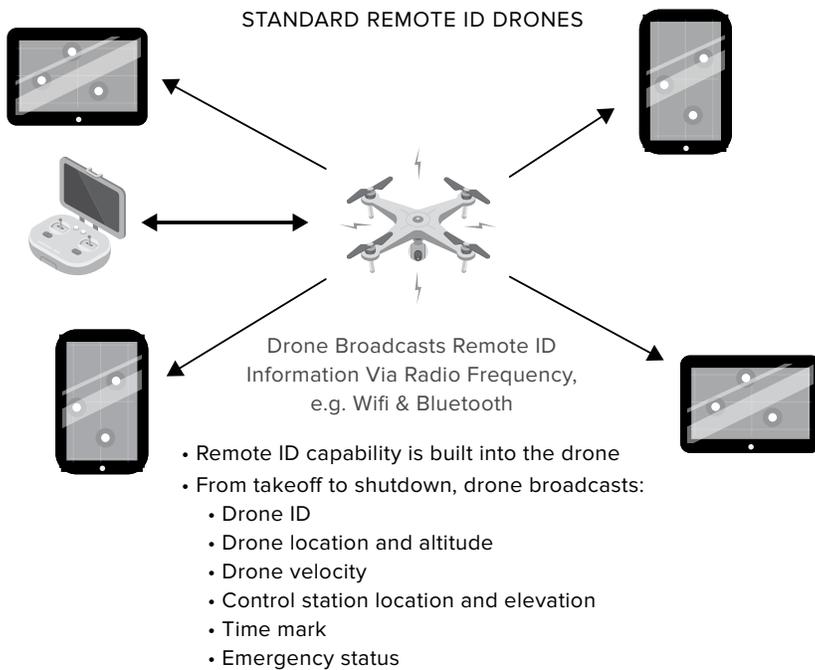


Figure 5-5. Standard remote ID drones. (FAA)

Remote identification broadcast module is an alternative remote identification device that broadcasts identification and location information about the drone and its take-off location in accordance with the remote ID rule's requirements (Figure 5-6). The broadcast module can be added to a drone to retrofit it with remote ID capability. This module is limited to visual line-of-sight operations. For operations using alternative remote identification, you must comply with the requirements of §89.115.

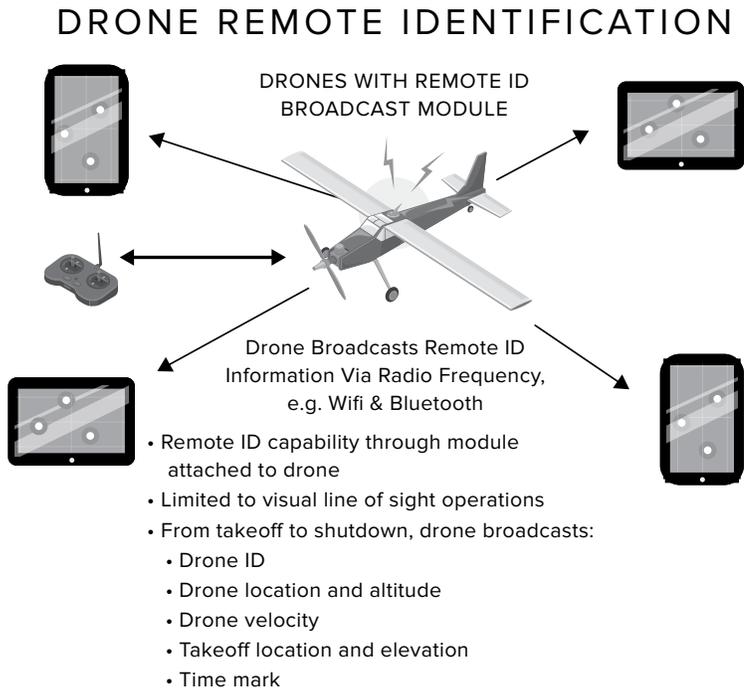


Figure 5-6. Remote ID broadcast module. (FAA)

The certificate of aircraft registration of the unmanned aircraft used in an operation must include the serial number of the remote identification broadcast module. The serial number of the unmanned aircraft must be provided to the FAA in a notice of identification prior to the operation.

Standard and alternative remote ID must be broadcasting from takeoff to shutdown. In the event of a broadcast failure, the person manipulating the flight controls must land the unmanned aircraft as soon as practicable.

If the unmanned aircraft operation is being conducted for aeronautical research or to show compliance with regulations, the Administrator (FAA) may authorize such operations without remote ID capability. Operations without remote ID may also be conducted in **FAA-Recognized Identification Areas (FRIAs)**. FRIAs are often community-based organizations or educational institutions that have received prior FAA permission that allow unmanned aircraft to operate in a specified area without remote ID capability (Figure 5-7).

FAA-RECOGNIZED IDENTIFICATION AREA [FRIA]

DRONES WITHOUT REMOTE ID

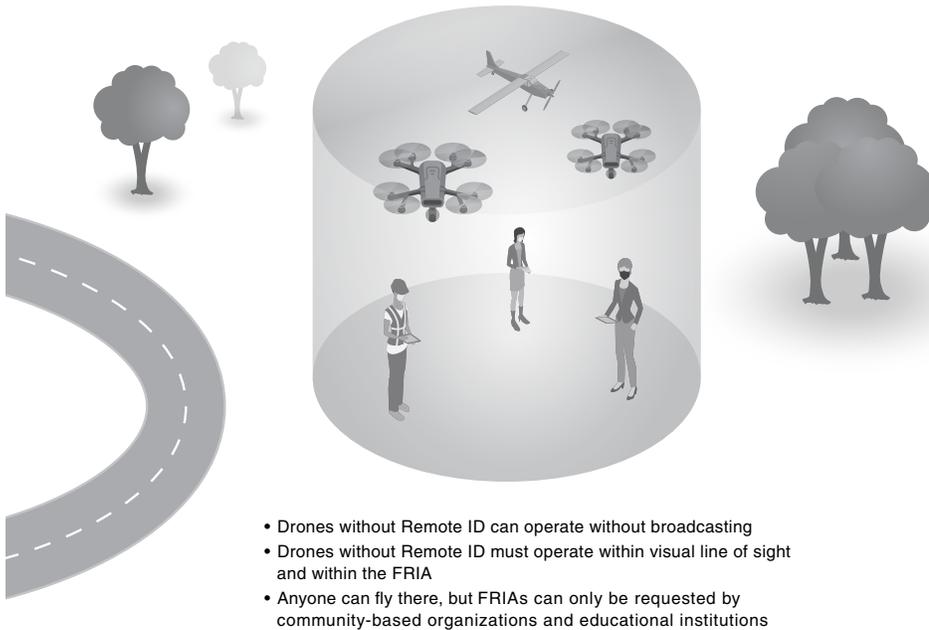


Figure 5-7. FAA-Recognized Identification Area (FRIA). (FAA)

Page 5-8:

- *In the second paragraph, the first sentence is changed to read:*

Many non-tower airports share UNICOM frequencies, and if you do not identify the airport at which you are operating, your transmissions may serve to confuse other pilots monitoring the frequency.

- *Under the subheading **Online Sources**, the paragraph is changed to read:*

Non-government online sources are not official, and they should be used only for planning and orientation. Aerial views are not current. Information from 1800wxbrief.com is official. An excellent resource for radio communication procedures is “Say It Right,” produced by the Air Safety Foundation. It can be found at asf.org/courses.

Page 6-4:

- *Under the heading **Fronts**, a sentence is added to the end of the first paragraph to read:*

It is safe to say that frontal boundaries are favored areas for clouds, showers, and thunderstorms.

Page 6-8:

- *At the end of the first paragraph, a sentence is added to read:*

A squall line is, by definition, a line of storm clouds; out in front of the squall line, invisible and moving rapidly, is the gust front.

Page 6-12:

- *Under the heading **Learning More About Weather**, the second sentence is revised to read:*

The FAA's tried-and-true Advisory Circular 00-6B, *Aviation Weather*, is the source of all weather questions on the knowledge examinations, but there are dozens of other places for you to look and learn.

- *Under the heading **Learning More About Weather**, the fifth sentence is revised to read:*

Excellent weather videos are available at aopa.org/training-and-safety/online-learning.

Page 6-13:

- *Under the subheading **Weather Briefing Process**, the third paragraph is revised to read:*

Because weather can significantly impact your ability to fly safely and efficiently, you want to get a weather briefing, and you want that briefing on record. The way to do this is to use a government-sponsored site such as the Automated Flight Service Station system. Go to 1800wxbrief.com and register. The Leidos Flight Service website (1800wxbrief.com) has a weather tab with a treasure trove of weather data; you can spend hours exploring its offerings. There is some duplication with the ADDS page, but there are also sites not covered by ADDS. You do not have to be registered to access the weather pages.

- *Table 6-1 is revised to read:*

URL	NAME
aviationweather.gov/adds	Aviation Weather Center, Aviation Digital Data Service (ADDS) Page
digital.weather.gov	National Weather Service (NWS) Graphical Forecasts page
faa.gov/air_traffic/weather/asos/	ASOS Information by state
accuweather.com	AccuWeather Website
1800wxbrief.com	gateway to Flight Service weather pages
wunderground.com	Weather Underground
spc.noaa.gov	NOAA/NWS Storm Prediction Center
youtube.com/avwxworkshops	videos on weather subjects
lightningmaps.org	lightning = thunderstorm

Table 6-1. Weather URLs

- Figure 6-20 is replaced with the following:

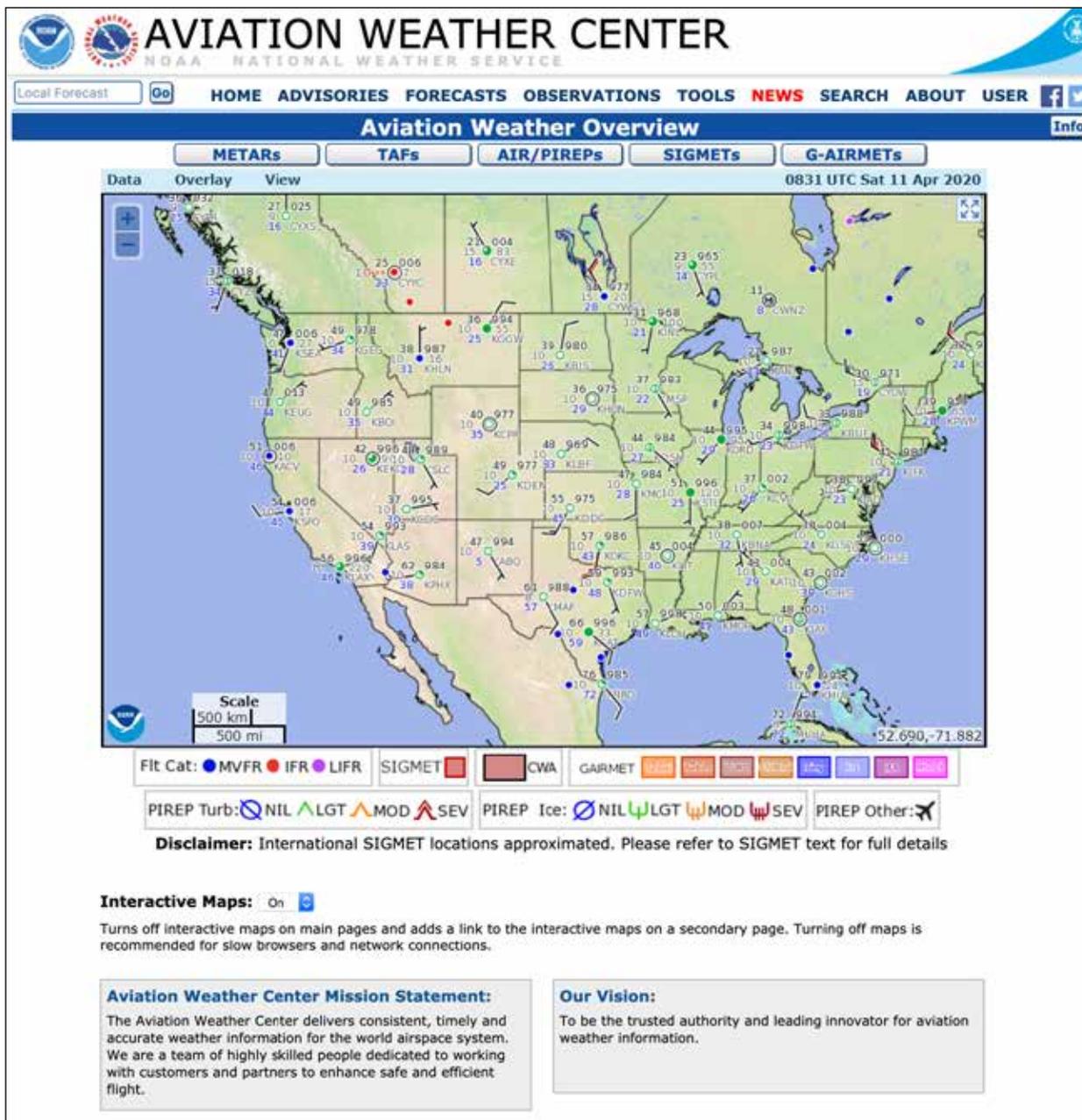


Figure 6-20. AWC home page—an overview with choices for displaying different elements (*aviationweather.gov*)

- The subheading **TAFs and FAs** is revised to read:

Terminal Area Forecasts (TAFs)

- The third sentence under the newly reworded **Terminal Area Forecasts (TAFs)** heading (see above) is revised to read:

Many pilots mistakenly use the TAF as a source of weather information for a larger area around the airport.

- Under the subheading **Observations Tab**, the fourth paragraph is revised to read:

The Helicopter Emergency Medical Services (HEMS) chart, despite its name, is for everyone. Figure 6-27 is for the continental U.S., but you can select portions of the country for more detail. This is only one of many web pages where you can get a quick-and-dirty view of ceiling and visibility along your flight path. The ADDS satellite image (AWC, observations, satellite) combines overall cloud cover with the familiar blue/red symbology denoting VFR and IFR conditions. For even more detail, go to the AWC home page and select METARS for specific airports along your route; it gives you the advantage of looking back in time to see how conditions have changed over the past few hours.

Page 6-23:

- Figure 6-27 image and caption are replaced with the following:

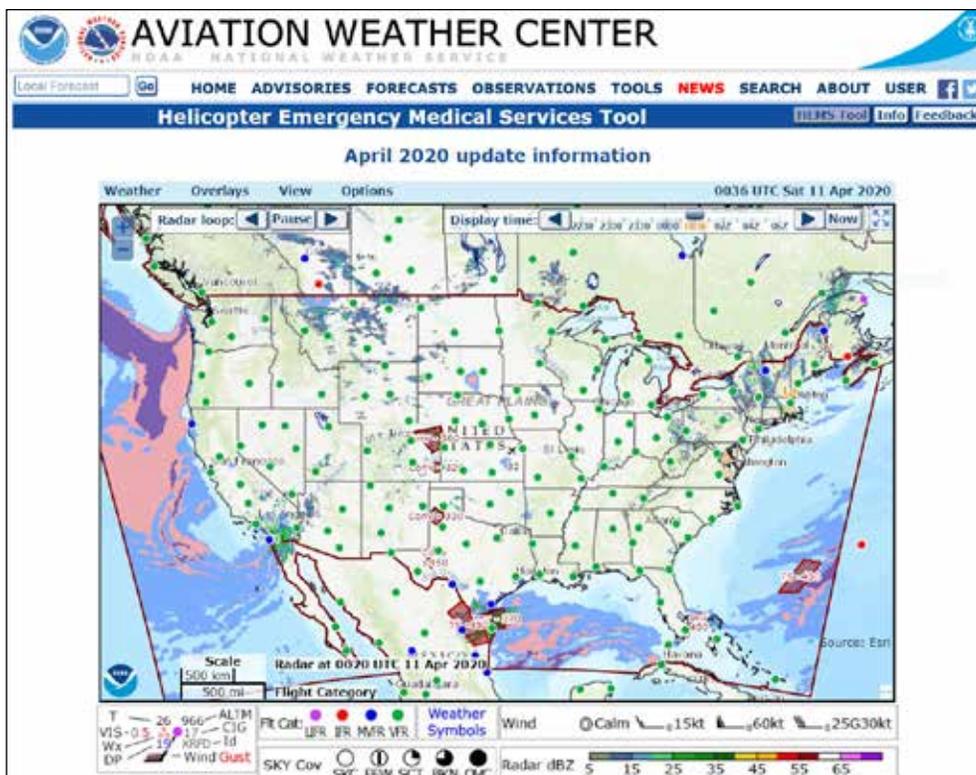


Figure 6-27. Helicopter Emergency Medical Services (HEMS) chart

Page 6-27:

- The subheading **Textual FAs** and the four paragraphs that follow it are deleted.

Page A-2:

- A new term is added to the Glossary (directly following the term **base**) to read:

beyond visual line of sight (BVLOS). Anytime a drone is operated out of view of the remote PIC and visual observer. Special authorization is required for BVLOS operations.

Page A-3:

- A new term is added to the Glossary (directly following the term **endurance**) to read:

FAA-Recognized Identification Area (FRIA). The only locations uncrewed aircraft (drones and radio-controlled airplanes) may operate without broadcasting remote ID message elements. Usually sponsored by community-based organizations or schools.

Page A-5:

- A new term is added to the Glossary (directly following the term **longitude**) to read:

Low Altitude Authorization and Notification Capability (LAANC). A collaboration between the FAA and the private sector to provide UAS operators a means of requesting authorization to operate in airspace that otherwise would exclude such operations. It facilitates timely and flexible UAS operations in controlled airspace (e.g., Class B, C, D, E).

- The wording of the term **Notice to Airman (NOTAM)** is revised to read:

Notice to Air Missions (NOTAM).

Page A-6:

- A new term is added to the Glossary (directly following the term **relative wind**) to read:

remote identification (RID). The ability of a drone in flight to provide identification and location information that can be received by other parties.

- A new term is added to the Glossary (directly following the term **Significant Meteorological Information**) to read:

small uncrewed aircraft system (sUAS). UAS that are below 55 pounds (25 kg). Also referred to as small unmanned aircraft system.

- The term **small unmanned aircraft system (sUAS)** is revised to read:

small unmanned aircraft system (sUAS). See small uncrewed aircraft system.

Page A-7:

- Two new terms are added to the Glossary (directly following the term **Universal Time Coordinated**) to read:

uncrewed aircraft (UA). The actual aircraft that is part of a UAS (i.e., it excludes the ground station/controller). Also referred to as unmanned aircraft.

uncrewed aircraft system (UAS). The total system associated with an uncrewed aircraft to include the ground station/controller, sensors, processors, and other components. Generically, it is used to describe what is also referred to as a drone or remote-controlled aircraft. Previously referred to as unmanned aircraft system or unmanned aerial vehicle (UAV).

- The following Glossary definitions are revised to read:

unmanned aircraft (UA). See uncrewed aircraft.

unmanned aircraft system (UAS). See uncrewed aircraft system.

unmanned aerial vehicles (UAV). See uncrewed aircraft system.

Page B-1 (Appendix B):

- The *Airport/Facility Directory Legend from the Chart Supplements* is updated. The latest version can be referenced online at faa.gov/air_traffic/flight_info/aeronav/Digital_Products/dafd/.

Additional revisions:

- Minor editorial changes are incorporated throughout, including:

- *Manned* and *unmanned* are changed to *crewed* and *uncrewed*, respectively (except in reference to specific FAA regulations and documents in which the former terms are still used).
- “Notice to Airman (NOTAM)” is changed to “Notice to Air Missions (NOTAM).”
- *Chart Supplement* is spelled out instead of abbreviated “CS.”