2019

Remote Pilot

TEST PREP

Study & Prepare

Pass your test and know what is essential to safely operate an unmanned aircraft—from the most trusted source in aviation training
Pass your test and know what is essential to safely operate an unmanned aircraft—from the most trusted source in aviation training

READER TIP
The FAA Knowledge Exam Questions can change throughout the year. Stay current with test changes; sign up for ASA’s free email update service at www.asa2fly.com/testupdate
2019 Remote Pilot Test Prep
Aviation Supplies & Academics, Inc.
7005 132nd Place SE
Newcastle, Washington 98059-3153
425.235.1500
asa2fly.com

© 2018 Aviation Supplies & Academics, Inc.

FAA Questions herein are from United States government sources and contain current information as of: June 2018

None of the material in this publication supersedes any documents, procedures or regulations issued by the Federal Aviation Administration.

ASA assumes no responsibility for any errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein.

Important: This Test Prep should be sold with and used in conjunction with Airman Knowledge Testing Supplement for Sport Pilot, Recreational Pilot, and Private Pilot (FAA-CT-8080-2H). ASA reprints the FAA test figures and legends within this government document, and it is also sold separately and available from aviation retailers nationwide. Order #ASA-CT-8080-2H.

Cover photo: Courtesy Freefly Systems Inc. www.freeflysystems.com

ASA-TP-UAS-19-PD
Print Book ISBN 978-1-61954-666-0

About the Contributors

Jackie Spanitz
General Manager
Aviation Supplies & Academics, Inc.

As General Manager of Aviation Supplies & Academics, Jackie Spanitz oversees maintenance and development of more than 750 titles and pilot supplies in the ASA product line. Ms. Spanitz has worked with airman training and testing for more than 20 years, including participation in the ACS development committees. Jackie holds a Bachelor degree in aviation technology from Western Michigan University, a Masters degree from Embry Riddle Aeronautical University, and Instructor and Commercial Pilot certificates. She is the author of Guide to the Flight Review, and the technical editor for ASA’s Test Prep and FAR/AIM series.

David Ison, Ph.D.
Assistant Professor, College of Aeronautics
Embry-Riddle Aeronautical University-Worldwide

Dr. David Ison is an Assistant Professor of Aeronautics and Research Chair for the College of Aeronautics, ERAU-Worldwide. He holds a Ph.D. in Educational Studies/Higher Education Leadership/Aviation Higher Education from the University of Nebraska Lincoln, a Master’s of Aeronautical Science from ERAU, and a B.S. in Aviation Management from Auburn University. He is a co-author of the comprehensive textbook Small Unmanned Aircraft Systems Guide: Exploring Designs, Operations, Regulations, and Economics.

About ASA: Aviation Supplies & Academics, Inc. (ASA) is an industry leader in the development and sale of aviation supplies and publications for pilots, flight instructors, flight engineers, air traffic controllers, flight attendants, and aviation maintenance technicians. We manufacture and publish more than 700 products, and have been providing trusted and reliable training materials to the aviation industry for more than 75 years. Aviators are invited to visit www.asa2fly.com for a free copy of our catalog.

Stay informed of aviation industry happenings

Website www.asa2fly.com
Updates www.asa2fly.com/testupdate
Twitter www.twitter.com/asa2fly
Facebook www.facebook.com/asa2fly
Blog www.learntoflyblog.com
Contents

Instructions
Preface ................................................................. 2.v
Updates and Practice Tests ........................................ vi
Description of the Test ................................................ vii
Knowledge Test Eligibility Requirements ....................... viii
FAA Knowledge Test Question Coding ............................. viii
Knowledge Test Registration ........................................ ix
Knowledge Test Requirements ....................................... ix
Acceptable Materials ................................................... x
Cheating or Other Unauthorized Conduct ....................... xi
Testing Procedures for Applicants
   Requesting Special Accommodations .......................... xi
Test Report ................................................................ XII
Test Tips ................................................................. XII
Eligibility Requirements for the Remote Pilot Certificate ........ XIII
   English Language Proficiency ....................................... XIII
Knowledge Exam References .................................... xiv
ASA Test Prep Layout ............................................... xv

Chapter 1 Regulations
Introduction ................................................................ 1–3
Remote Pilot Certification ........................................... 1–6
Remote Pilot Privileges .............................................. 1–8
Supporting Crew Roles ............................................... 1–9
Falsification, Reproduction, or Alteration ............... 1–11
Accident Reporting .................................................. 1–11
FAA Inspections ....................................................... 1–13
sUAS Registration .................................................... 1–14
Preflight Action and Inspection ................................... 1–15
Carriage of Hazardous Material ................................. 1–16
Daylight Operations .................................................. 1–17
Visual Line of Sight .................................................... 1–17
Operating Limitations ............................................... 1–18
Right-of-Way Rules ................................................... 1–20
No Operation Over People ......................................... 1–21
Operation from Moving Vehicles or Aircraft .................. 1–22
Privacy and Other Considerations ............................... 1–24
Alcohol and Drugs ...................................................... 1–25
Change of Address ..................................................... 1–27
Waivers ................................................................. 1–28

Chapter 2 National Airspace System
Introduction ................................................................ 2–3
   NOTAMs .............................................................. 2–3
Other Airspace Resources ........................................... 2–4
Airspace Classification ................................................ 2–6
Topography ............................................................... 2–15
Airport Operations .................................................... 2–18
Airport Markings and Signs ........................................... 2–21
Collision Avoidance .................................................. 2–26
Inflight Hazards ....................................................... 2–26

Chapter 3 Weather
Introduction ............................................................... 3–3
Wind ......................................................................... 3–4
Air Masses and Fronts ................................................... 3–5
Atmospheric Stability ................................................... 3–7
Visibility and Clouds .................................................... 3–8
Thunderstorms .......................................................... 3–10
Icing ................................................................. 3–13
Fog ........................................................................... 3–14
Density Altitude .......................................................... 3–16
Weather Briefing .......................................................... 3–17
Weather Reports, Forecasts and Charts .................... 3–18
   Surface Aviation Weather Observations ...................... 3–19
Aviation Weather Reports ........................................... 3–19
   Aviation Routine Weather Report (METAR) .................. 3–19
   Aviation Forecasts .................................................. 3–21
   Terminal Aerodrome Forecasts (TAF) ....................... 3–21
   Convective Significant Meteorological Information (WST) .......................................................... 3–23

Chapter 4 Loading and Performance
Introduction ............................................................... 4–3
Determining Speed and Altitude .................................. 4–4
Loading .................................................................... 4–6
   Computing Weight and Balance ................................ 4–7
Load Factor ............................................................... 4–8
Stalls ................................................................. 4–10
Performance ............................................................ 4–12
Chapter 5  Operations

Introduction ........................................................... 5–3
Communication Procedures .................................... 5–5
  sUAS Frequencies ................................................... 5–9
Emergency Procedures .......................................... 5–13
  Lost Link .............................................................. 5–13
  Flight Termination .................................................. 5–14
  Flyaways .............................................................. 5–14
  Loss of GPS .......................................................... 5–14
  Battery Fires .......................................................... 5–15
Aeronautical Decision Making ............................ 5–17
Physiology ............................................................ 5–22
Maintenance and Inspection Procedures .......... 5–26

Appendix A: Question Number and Page Number ................................................. A–1

Appendix B: Learning Statement
  Code and Question Number .................................. B–1
Preface

Welcome to ASA's Test Prep Series. ASA's test books have been helping pilots prepare for the FAA Knowledge Tests for more than 60 years with great success. We are confident that with proper use of this book, you will score very well on the Remote Pilot certificate test for the small unmanned aircraft system (sUAS) rating.

Begin your studies with a classroom or home-study ground school course, which will involve reading a textbook to gain the aeronautical knowledge required to earn your Remote Pilot certificate. Visit the dedicated Reader Resource webpage for this Test Prep (www.asa2fly.com/reader/TPUAS) and become familiar with the FAA guidance materials available for this certification exam. Conclude your studies by reviewing the Chapter Text in this book which precedes each question section. Read the question, select your choice for the correct answer, then read the explanation. Use the references that conclude each explanation to identify additional resources if you need further study of a subject. Upon completion of your studies, take practice tests at www.prepware.com (see inside front cover for your free account).

The FAA Unmanned Aircraft Systems questions have been arranged into chapters based on subject matter. Topical study, in which similar material is covered under a common subject heading, promotes better understanding, aids recall, and thus provides a more efficient study guide.

It is important to answer every question assigned on your FAA Knowledge Test. If in their ongoing review, the FAA authors decide a question has no correct answer, is no longer applicable, or is otherwise defective, your answer will be marked correct no matter which one you chose. However, you will not be given the automatic credit unless you have marked an answer. Unlike some other exams you may have taken, there is no penalty for “guessing” in this instance.

The FAA exams are “closed tests” which means the exact database of questions is not available to the public. The question and answer choices in this book are based on our extensive history and experience with the FAA testing process. You might see similar although not exactly the same questions on your official FAA exam. Answer stems may be rearranged from the A, B, C order you see in this book. Therefore, be careful to fully understand the intent of each question and corresponding answer while studying, rather than memorize the A, B, C answer. You may be asked a question that has unfamiliar wording; studying and understanding the information in this book and the associated references will give you the tools to answer question variations with confidence.

If your study leads you to question an answer choice, we recommend you seek the assistance of a local instructor. We welcome your questions, recommendations or concerns:

Aviation Supplies & Academics, Inc.
7005 132nd Place SE
Newcastle, WA 98059-3153
Voice: 425.235.1500   Fax: 425.235.0128
Email: cfi@asa2fly.com   Website: www.asa2fly.com

The FAA appreciates testing experience feedback. You can contact the branch responsible for the FAA Knowledge Exams at:

Federal Aviation Administration
AFS-630, Airman Testing Standards Branch
PO Box 25082
Oklahoma City, OK 73125
Email: afs630comments@faa.gov
Free Test Updates for the One-Year Life Cycle of Test Prep Books

The FAA rolls out new tests as needed throughout the year; this typically happens in June, October, and February. The FAA exams are “closed tests” which means the exact database of questions is not available to the public. ASA combines more than 60 years of experience with expertise in airman training and certification tests to prepare the most effective test preparation materials available in the industry.

You can feel confident you will be prepared for your FAA Knowledge Exam by using the ASA Test Preps. ASA keeps abreast of changes to the tests. These changes are then posted on the ASA website as a Test Update.

Visit the ASA website before taking your test to be certain you have the most current information, including the reader resource page: www.asa2fly.com/reader/TPUAS. Additionally, sign up for ASA’s free email Update service. We will then send you an email notification if there is a change to the test you are preparing for so you can review the Update for revised and/or new test information.

www.asa2fly.com/testupdate

We invite your feedback. After you take your official FAA exam, let us know how you did. Were you prepared? Did the ASA products meet your needs and exceed your expectations? We want to continue to improve these products to ensure applicants are prepared, and become safe aviators. Send feedback to: cfi@asa2fly.com

www.prepware.com

Helping you practice for written exams.
As the experts in FAA Knowledge Exam preparation, we want you to have the confidence needed before heading to the testing center, and help eliminate the hassle and expense of retaking exams.

> Realistic Test Simulation
Test questions and time allowed replicate the official FAA exam

> Performance Graphs
Review how you did, track your performance and review explanations for the questions you missed

> Gain Confidence
Go into your exam fully prepared after practicing up to 5 simulated tests

> Succeed
Pass your exam, achieve your goals, and set new ones

Remote Pilot • Sport Pilot • Private Pilot • Instrument Rating • Commercial Pilot • Flight Instructor
Ground Instructor Fundamentals of Instructing • Flight Engineer • Airline Transport Pilot
AMT General • Airframe • Powerplant • Inspection Authorization
Practice tests are also available as an app! www.asa2fly.com/apps
The sample FAA questions have been sorted into chapters according to subject matter. Within each chapter, the questions have been further classified and all similar questions grouped together with a concise discussion of the material covered in each group. This discussion material of “Chapter text” is printed in a larger font and spans the entire width of the page. Immediately following the sample FAA Question is ASA’s Explanation in *italics*. The last line of the Explanation contains the Learning Statement Code and further reference (if applicable). See the EXAMPLE below.

**Figures referenced by the Chapter text only** are numbered with the appropriate chapter number, i.e., “Figure 1-1” is Chapter 1’s first chapter-text figure.

**Some Questions refer to Figures or Legends** immediately following the question number, i.e., “1201. (Refer to Figure 2.).” These are FAA Figures and Legends which can be found in the FAA Airman Knowledge Testing Supplement (CT-8080-2G). This supplement is bundled with the Test Prep and is the exact material you will have access to when you take your computerized test. We provide it separately, so you will become accustomed to referring to the FAA Figures and Legends as you would during the test.

**Answers** to each question are found at the bottom of each page.

### EXAMPLE:

Four aerodynamic forces are considered to be basic because they act upon an aircraft during all flight maneuvers. There is the downward-acting force called **WEIGHT** which must be overcome by the upward-acting force called **LIFT**, and there is the rearward-acting force called **DRAG**, which must be overcome by the forward-acting force called **THRUST**.

**ALL**

1201. (Refer to Figure 2.) The four forces acting on an airplane in flight are

A— lift, weight, thrust, and drag.
B— lift, weight, gravity, and thrust.
C— lift, gravity, power, and friction.

Lift, weight, thrust, and drag are the four basic aerodynamic forces acting on an aircraft in flight. 

(PLT235) — FAA-H-8083-25

Answer (B) is incorrect because the force of gravity is always the same number and reacts with the airplane’s mass to produce a different weight for almost every airplane. Answer (C) is incorrect because weight is the final product of gravity, thrust is the final product of power, and drag is the final product of friction. Power, gravity, and friction are only parts of the aerodynamic forces of flight.

**Incorrect answer explanation. Reasons why answer choices are incorrect explained here.**
Chapter 2
National Airspace System

Introduction 2–3
   NOTAMs 2–3
   Other Airspace Resources 2–4
Airspace Classification 2–6
Topography 2–15
Airport Operations 2–18
Airport Markings and Signs 2–21
Collision Avoidance 2–26
   Inflight Hazards 2–26
Introduction
The remote pilot certificate with an sUAS rating will allow operation of an sUAS in the National Airspace System (NAS). There are two categories of airspace or airspace areas: Regulatory (Class A, B, C, D and E airspace areas, restricted, and prohibited areas) and nonregulatory (Class G airspace, military operations areas, warning areas, alert areas, and controlled firing areas). Class A, B, C, D, and E airspace areas are referred to as controlled airspace and Class G airspace areas are referred to as uncontrolled airspace. You must become familiar with the NAS in order to safely operate with the others sharing this airspace, as well as with the nonparticipants on the ground. The following resources are critical for remote PICs to be able to understand airspace and the NAS, as well as invaluable tools for adequately planning safe operations in compliance with regulations and restrictions.

Refer to the Chart Supplement U.S. (formerly the Airport/Facility Directory or A/FD) to determine what kind of airspace, air traffic control facilities, and traffic you can expect near the airport closest to your operations. The Chart Supplement U.S. is a publication for pilots containing key information about all airports, seaplane bases, and heliports open to the public including communications data, navigational facilities, and certain special notices and procedures. This supplement is reissued in its entirety every 56 days. See CT-8080-2X, Figure 31 for a sample Chart Supplement U.S.

The aeronautical map most commonly used by manned pilots are the Sectional Aeronautical Chart and the Terminal Area Chart (TAC). Both charts include aeronautical information such as airports, airways, special use airspace, and other pertinent data. These charts are of tremendous value to the remote pilot operating an sUAS. The scale of the Sectional Aeronautical Chart is 1:500,000 (1 inch = 6.86 NM). Designed for visual navigation of slow speed aircraft in visual conditions (referred to as VFR), this chart portrays terrain relief and checkpoints such as populated places, roads, railroads, and other distinctive landmarks. These charts are revised every 6 months. See CT-8080-2X, Legend 1 to become familiar with the Sectional Chart Legend, and Figure 20 on page A-4 for a sample Sectional excerpt. Information found on the TAC is similar to that found on the Sectional Chart, but at a scale of 1:250,000 (1 inch = 3.43 NM). These charts display a specific city with Class B airspace. They show more significant detail than the Sectional Chart, but have small area coverage.

NOTAMs
Notices to Airmen (NOTAMs) provide the most current information available and can be found by visiting www.faa.gov, or obtained from the FAA’s Flight Service by referencing www.1800wxbrief.com. Also, Air Traffic Publications generates the Notices to Airmen Publication (NTAP) every 28 days that contains all current NOTAM (D)s and FDC NOTAMs (except FDC NOTAMs for temporary flight restrictions) available for publication. They provide time-critical information on airports and changes that affect the NAS. It is necessary for the sUAS remote PIC to check for NOTAMs before each flight to determine if there are any applicable airspace restrictions.

NOTAM information is classified into five categories: NOTAM (D) or distant, Flight Data Center (FDC) NOTAMs, pointer NOTAMs, Special Activity Airspace (SAA) NOTAMs, and military NOTAMs. In addition to being available from flight service stations (FSS), NOTAM (D)s are transmitted with hourly weather reports. FDC NOTAMs are issued by the National Flight Data Center (NFDC) and contain regulatory information such as temporary flight restrictions or an amendment to instrument approach procedures. Pointer NOTAMs highlight or point out another NOTAM, such as the issuance of an FDC or NOTAM (D). This type of NOTAM will assist pilots in cross-referencing important information that might not be found under an airport or NAVAID identifier. Military NOTAMs pertain to U.S. Air Force, Army, Navy and Marine NAVAIDs/airports that are part of the NAS. SAA NOTAMs are issued when Special Activity Airspace will be active outside the published schedule times and when required by the published schedule. Pilots

Continued
and other users are still responsible to check published schedule times for Special Activity Airspace as well as any NOTAMs for that airspace. NOTAM (D)s and FDC NOTAMs are contained in the Notices to Airmen publication, which is issued every 28 days. Prior to any flight, all types of pilots must check for any NOTAMs that could affect their intended flight.

An FDC NOTAM will be issued to designate a temporary flight restriction (TFR). The NOTAM will begin with the phrase “FLIGHT RESTRICTIONS” followed by the location of the temporary restriction, effective time period, area defined in statute miles, and altitudes affected. The NOTAM will also contain the FAA coordination facility and telephone number, the reason for the restriction, and any other information deemed appropriate. TFRs are inclusive of sUAS operations; therefore it is necessary for the remote PIC to check for NOTAMs before each flight to determine if there are any applicable airspace restrictions. Common TFRs that relate to sUAS operations include, but are not limited to:

- Presidential TFRs and NOTAMs (e.g., when the President, or other important public figures are travelling or at a specific location).
- Emergency response TFRs and NOTAMs (e.g., forest fires and other disasters).
- Standing TFRs that go into and out of effect (e.g., stadiums for sporting events).

TFRs may also be found at the FAA website: http://tfr.faa.gov.

**Other Airspace Resources**

Additional resources on the subject of airspace include ACs and the AIM. ACs are issued systematically by the FAA to inform the aviation community of non-regulatory material of interest. In many cases, they are the result of a need to fully explain a particular subject (the pilot’s role in collision avoidance, for example). They are issued in a numbered-subject system corresponding to the subject areas of the Federal Aviation Regulations. ACs are available from www.faa.gov and are also occasionally issued in print for a fee. Some ACs include additional information on airspace. The AIM is the official guide to basic flight information and ATC procedures, which is issued yearly with ongoing revisions. These resources should be reviewed by remote PICs.

**ALL, UGR 1067.** The most comprehensive information on a given airport is provided by

A— the Chart Supplement U.S. (formerly Airport/Facility Directory).
B— Notices to Airmen (NOTAMs).
C— Terminal Area Chart (TAC).

The Chart Supplement U.S. is a publication for pilots containing information about airports, seaplane bases, and heliports open to the public including communications data, navigational facilities, and certain special notices and procedures. (PLT281) — FAA-H-8083-25

Answers (B) and (C) are incorrect because these publications do not have comprehensive and specific airport information.

**ALL, UGR 1068.** (Refer to Figure 20, area 5.) How would a remote PIC “CHECK NOTAMS” as noted in the CAUTION box regarding the unmarked balloon?

A— By utilizing the B4UFly mobile application.
B— By contacting the FAA district office.
C— By obtaining a briefing via an online source such as 1800WXbrief.com.

Notices to Airmen (NOTAMs) provide the most current information available and can be found by visiting www.faa.gov or obtained at a flight service station (FSS). A comprehensive weather briefing can be obtained as part of a standard preflight briefing. (PLT323) — FAA-H-8083-25
ALL, UGR

1313. An FDC NOTAM will typically contain information
A— regarding public gatherings of large groups.
B— regarding military operations.
C— regarding available hard surface runways.

Notices to Airmen (NOTAMs) provide time-critical aeronautical information either temporary in nature or not sufficiently known in advance to permit publication on aeronautical charts or in other operational publications. (PLT323) — FAA-H-8083-25

1069. What information is contained in the Notices to Airmen Publication (NTAP)?
A— Current NOTAM (D) and FDC NOTAMs.
B— All Current NOTAMs.
C— Current FDC NOTAMs.

The Notices to Airmen Publication (NTAP) is published by Air Traffic Publications every 28 days and contains all current NOTAM (D)s and FDC NOTAMs (except FDC NOTAMs for TFRs) available for publication. (PLT323) — FAA-H-8083-25

1070. Flight Data Center (FDC) NOTAMS are issued by the National Flight Data Center and contain regulatory information, such as
A— temporary flight restrictions.
B— markings and signs used at airports.
C— standard communication procedures at uncontrolled airports.

FDC NOTAMS are issued by the National Flight Data Center and contain regulatory information, such as Temporary Flight Restrictions. (PLT323) — FAA-H-8083-25

1071. Time-critical information on airports and changes
that affect the national airspace system are provided by
A— Notices to Airmen (NOTAMS).
C— Advisory Circulars (ACs).

TFRs are imposed in order to:
1. Protect persons and property in the air or on the surface from an existing or imminent flight associated hazard;
2. Provide a safe environment for the operation of disaster relief aircraft;
3. Prevent an unsafe congestion of sightseeing aircraft above an incident;
4. Protect the President, Vice President, or other public figures; and,
5. Provide a safe environment for space agency operations.

Pilots are expected to check appropriate NOTAMs during flight planning when conducting flight in an area where a TFR is in effect. (PLT376) — FAA-H-8083-25

Answer (A) is incorrect because this is done through NOTAMs. Answer (C) is incorrect because these are identified through the sectional and Chart Supplement U.S.

1073. Public figures are protected by
A— special use airspace.
B— prohibited areas.
C— temporary flight restrictions.

TFRs are imposed in order to:
1. Protect persons and property in the air or on the surface from an existing or imminent flight associated hazard;
2. Provide a safe environment for the operation of disaster relief aircraft;
3. Prevent an unsafe congestion of sightseeing aircraft above an incident;

Continued
It is very important that sUAS remote PICs be aware of the type of airspace in which they will be operating their small UA. Referring to the “B4UFly” app, or a current aeronautical chart (http://faacharts.faa.gov) of the intended operating area will aid a remote PIC’s decision-making regarding sUAS operations in the NAS.

Pilots are expected to check appropriate NOTAMs during flight planning when conducting flight in an area where a TFR is in effect. (PLT376) — FAA-H-8083-25

Answer (A) is incorrect because special use airspace is the broad category to include alert, controlled firing, military operations, prohibited, restricted, and warning areas; none of these areas are used to protect public figures. Answer (B) is incorrect because prohibited areas are blocks of airspace within which the flight of all aircraft is prohibited.

The Aeronautical Information Manual (AIM) is the official guide to basic flight information and ATC procedures. (PLT116) — AIM

Answer (B) is incorrect because the Chart Supplement U.S. contains information on airports and various other pertinent special notices essential to operating in the NAS. Answer (C) is incorrect because AC 00-2 is the Advisory Circular Checklist for the status of all other FAA publications.

The Chart Supplement U.S. includes airport details, including the airspace the airport lies in. Figure 31 shows Coeur D’Alene airport lies within Class E airspace. (PLT161) — Chart Supplement U.S.

ALL, UGR

1076. (Refer to Figure 52.) What special conditions do remote pilots need to be on the lookout for while operating near Lincoln Airport?

A— Deer near the runway.
B— Birds in the vicinity.
C— Parachute operations.

A NOTAM may be issued for reasons including hazards, such as air shows. The NOTAM will include the location and time for the affected region. UAS operations should stay away from these locations during the timeframe defined by the NOTAM. Once the NOTAM is over, UAS operations may resume with ATC authorization. (PLT323) — FAA-H-8083-25

Airspace Classification

It is very important that sUAS remote PICs be aware of the type of airspace in which they will be operating their small UA. Referring to the “B4UFly” app, or a current aeronautical chart (http://faacharts.faa.gov) of the intended operating area will aid a remote PIC’s decision-making regarding sUAS operations in the NAS.

Though many sUAS operations will occur in uncontrolled airspace, there are some that may need to operate in controlled airspace. Operations in what is called controlled airspace, i.e. Class B, Class C, or Class D airspace, or within the lateral boundaries of the surface area of Class E airspace designated for an airport, are not allowed unless that person has prior authorization from ATC.

Answers

The sUAS remote PIC must understand airspace classifications and requirements. The authorization process can be found at [www.faa.gov/uas](http://www.faa.gov/uas). Although sUAS will not be subject to Part 91, the equipage and communications requirements outlined in Part 91 were designed to provide safety and efficiency in controlled airspace. Accordingly, while sUAS operating under Part 107 are not subject to Part 91, as a practical matter, ATC authorization or clearance may depend on operational parameters similar to those found in Part 91. The FAA has the authority to approve or deny aircraft operations based on traffic density, controller workload, communication issues, or any other type of operations that could potentially impact the safe and expeditious flow of air traffic in that airspace. Those planning sUAS operations in controlled airspace are encouraged to contact the FAA as early as possible.

Many sUAS operations can be conducted in uncontrolled, Class G airspace without further permission or authorization. However, controlled airspace operations require prior authorization from ATC and therefore it is incumbent on the remote PIC to be aware of the type of airspace in which they will be operating their sUAS. As with other flight operations, the remote PIC should refer to current aeronautical charts and other navigation tools to determine position and related airspace.

Controlled airspace, that is, airspace within which some or all aircraft may be subject to air traffic control, consists of those areas designated as Class A, Class B, Class C, Class D, and Class E airspace. Much of the controlled airspace begins at either 700 feet or 1,200 feet above the ground. The lateral limits and floors of Class E airspace of 700 feet are defined by a magenta vignette (shading) on the Sectional Chart; while the lateral limits and floors of 1,200 feet are defined by a blue vignette on the Sectional Chart if it abuts uncontrolled airspace. Floors other than 700 feet or 1,200 feet are indicated by a number indicating the floor. See Figure 2-1.

**Figure 2-1.** National Airspace System: airspace classification

**Class A**—Class A airspace extends from 18,000 feet MSL (mean sea level) up to and including Flight Level (FL) 600 (60,000 feet) and is not depicted on VFR sectional charts. No flight under visual flight rules (VFR) is authorized in Class A airspace.

**Class B**—Class B airspace consists of controlled airspace extending upward from the surface or higher up to specified altitudes. Class B airspace size, altitudes, and layouts vary greatly from one site to another which are centered around one or more primary airports. Each Class B airspace sector, outlined in blue
on the Sectional Chart, is labeled with its delimiting arcs, radials, and altitudes. Within each segment, the floor and ceiling are denoted by one number over a second number or the letters SFC. Class B airspace is also depicted on the Terminal Area Chart; on these each Class B airspace sector is, again, outlined in blue and is labeled with its delimiting arcs, radials, and altitudes. An ATC clearance is required prior to operating within Class B airspace. Some large, very busy airports are designated as Class B Primary airports; these require the pilot hold at least a Private Pilot certificate and may have additional operating requirements or limitations.

**Class C**—All Class C airspace shares the same dimensions with minor site variations. Class C is composed of two circles, both centered on the primary airport. The inner surface area has a radius of 5 nautical miles (NM) and extends from the surface up to 4,000 feet above the airport. The “outer shelf” area has a radius of 10 NM and extends vertically from 1,200 feet AGL (above ground level) up to 4,000 feet above the primary airport. In addition to the Class C airspace proper, there is an outer area with a radius of 20 NM that has vertical coverage from the lower limits of the radio/radar coverage up to the top of the approach control facility’s delegated airspace. Within the outer area, pilots are encouraged to participate but it is not a requirement. Class C airspace service to aircraft proceeding to a satellite airport is terminated at a sufficient distance to allow time to change to the appropriate tower or advisory frequency. On aeronautical charts, Class C airspace is depicted by solid magenta lines. Class C requires two-way radio communications equipment, a transponder, and an encoding altimeter.

**Class D**—Class D airspace extends upward from the surface to approximately 2,500 feet AGL (the actual height is as needed). Class D airspace may include one or more airports and is normally 4 NM in radius centered around a designated airport. The actual size and shape is depicted on sectional charts by a blue dashed line and numbers showing the top or airspace ceiling. When the ceiling of Class D airspace is less than 1,000 feet and/or the visibility is less than 3 statute miles, additional restrictions exist for manned aircraft and may preclude UAS operations; contact ATC for information during these circumstances.

**Class E**—Magenta shading on the Sectional Chart identifies Class E airspace starting at 700 feet AGL, and no shading (or blue if next to Class G airspace) identifies Class E airspace starting at 1,200 feet AGL. It may also start at other altitudes. All airspace from 14,500 feet to 17,999 feet is Class E airspace. It also includes the surface area of some airports with an instrument approach but no control tower. An airway is a corridor of Class E airspace extending from 1,200 feet above the surface (or as designated) up to and including 17,999 feet MSL, and 4 NM either side of the centerline. The airway is indicated by a centerline, shown in blue.

**Class G**—Class G airspace is airspace within which ATC has neither the authority nor responsibility to exercise any control over air traffic. Class G airspace typically extends from the surface to the base of the overlying controlled (Class E) airspace, which is normally 700 or 1,200 feet AGL. In some areas of the western U.S. and Alaska, Class G airspace may extend from the surface to 14,500 feet MSL. An exception to this rule occurs when 14,500 feet MSL is lower than 1,500 feet AGL.

**Prohibited Areas** are blocks of airspace within which the flight of aircraft is prohibited. Examples include the airspace around the White House and the U.S. Capitol building.

**Restricted Areas** denote the presence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization of the using or controlling agency may be extremely hazardous to the aircraft and its occupants. Per 14 CFR Part 107, entry into restricted airspace is not authorized without permission from the controlling agency.

**Warning Areas** contain the same hazardous activities as those found in restricted areas, but are located in international airspace. Prohibited, restricted, or warning areas are depicted as shown in CT-8080-2X, Legend 1.
Military Operations Areas (MOAs) consist of airspace established for the purpose of separating certain military training activities from instrument flight rules (IFR) traffic. Pilots should exercise extreme caution while flying within an active MOA. Prior to entering an active MOA, pilots should contact the controlling agency for traffic advisories.

Alert Areas may contain a high volume of pilot training activities or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas. Pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance.

FAA Advisory Circular AC 91-36, Visual Flight Rules (VFR) Flight Near Noise-Sensitive Areas, defines the surface of a national park area (including parks, forests, primitive areas, wilderness areas, recreational areas, national seashores, national monuments, national lakeshores, and national wildlife refuge and range areas) as: the highest terrain within 2,000 feet laterally of the route of flight, or the upper-most rim of a canyon or valley. These are marked on sectional charts with a solid blue line on the outside of the area border with blue dots on the inside of the border line. Aircraft are requested to remain at least 2,000 feet above the surface of National Parks, National Monuments, Wilderness and Primitive Areas, and National Wildlife Refuges.

Local Airport Advisory (LAA) is an advisory service provided by Flight Service facilities, which are located on the landing airport, using a discrete ground-to-air frequency or the tower frequency when the tower is closed. LAA services include local airport advisories, automated weather reporting with voice broadcasting, and a continuous Automated Surface Observing System (ASOS)/Automated Weather Observing Station (AWOS) data display, other continuous direct reading instruments, or manual observations available to the specialist.

Military Training Routes (MTRs) have been developed for use by the military for the purpose of conducting low-altitude, high-speed training. Generally, MTRs are established below 10,000 feet MSL for operations at speeds in excess of 250 knots. IFR Military Training Route (IR) operations are conducted in accordance with instrument flight rules, regardless of weather conditions. VFR Military Training Routes (VR) operations are conducted in accordance with visual flight rules. IR and VR at and below 1,500 feet AGL will be identified by four digit numbers, e.g. VR1351, IR1007. IR and VR with one or more segments above 1,500 AGL will be identified by three digit numbers, e.g. IR341, VR426. The lateral boundaries of MTRs vary. For more information, pilots should consult the Department of Defense Flight Information Publication (FLIP).

When ATC authorization is required (at or near an airport with a control tower and/or when operating within controlled airspace), it must be requested and granted before any operation in that airspace. There is currently no established timeline for approval after ATC permission has been requested because the time required for approval will vary based on the resources available at the ATC facility and the complexity and safety issues raised by each specific request. For this reason, remote PICs should contact the appropriate ATC facility as soon as possible prior to any operation in Class B, C and D airspace and within the lateral boundaries of the surface area of Class E airspace designated for an airport. ATC has the authority to approve or deny aircraft operations based on traffic density, controller workload, communication issues, or any other type of operations that could potentially impact the safe and expeditious flow of air traffic in that airspace.

When ATC authorization is not required (at or near an airport without a control tower and/or when operating within uncontrolled airspace), remote pilots should monitor the Common Traffic Advisory Frequency (CTAF) of any nearby airport(s) to stay aware of manned aircraft communications and operations. The CTAF can be found in the Chart Supplement U.S. and on Sectional and Terminal Area Charts (noted by a magenta “C” next to the frequency).
1077. (Refer to Figure 25, area 4.) The floor of Class B airspace overlying Hicks Airport (T67) north-northwest of Fort Worth Meacham Field is

A— at the surface.  
B— 3,200 feet MSL.  
C— 4,000 feet MSL.

The thick blue lines on the sectional chart indicate the boundaries of the overlying Class B airspace. Within each segment, the floor and ceiling are denoted by one number over a second number or the letters SFC. The floor of the Class B airspace is 4,000 feet MSL. (PLT040) — AIM ¶3-2-3

1326. (Refer to Figure 25, Area 3.) The floor of Class B airspace at Dallas Executive (RBD) is

A— at the surface.  
B— 3,000 feet MSL.  
C— 3,100 feet MSL.

The thick blue lines on the sectional chart indicate the boundaries of the overlying Class B airspace. Within each segment, the floor and ceiling are denoted by one number over a second number, or the letters “SFC.” The floor of the Dallas Executive (RBD) Class B airspace is 3,000 feet MSL. (PLT040) — AIM ¶3-2-3

1078. (Refer to Figure 23, area 3.) What is the floor of the Savannah Class C airspace at the shelf area (outer circle)?

A— 1,300 feet AGL.  
B— 1,300 feet MSL.  
C— 1,700 feet MSL.

Within the outer magenta circle of Savannah Class C airspace, there is a number 41 directly above the number 13. These numbers depict the floor and ceiling of the Class C airspace; the floor being 1,300 feet MSL and the ceiling being 4,100 feet MSL. (PLT040) — AIM ¶3-2-4

1079. According to 14 CFR Part 107, the remote PIC of a small unmanned aircraft planning to operate within Class C airspace

A— is required to receive ATC authorization.  
B— is required to file a flight plan.  
C— must use a visual observer.

No person may operate a small unmanned aircraft in Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless that person has prior authorization from Air Traffic Control (ATC). (PLT161) — 14 CFR §107.41

1080. According to 14 CFR part 107, how may a Remote Pilot in Command (Remote PIC) operate an unmanned aircraft in Class C airspace?

A— The Remote PIC must have prior authorization from the Air Traffic Control (ATC) facility having jurisdiction over that airspace.  
B— The Remote PIC must contact the Air Traffic Control (ATC) facility after launching the unmanned aircraft.  
C— The Remote PIC must monitor the Air Traffic Control (ATC) frequency from launch to recovery.

No person may operate a small unmanned aircraft in Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless that person has prior authorization from Air Traffic Control (ATC). (PLT161) — 14 CFR §107.41

1081. The lateral dimensions of Class D airspace are based on

A— the number of airports that lie within the Class D airspace.  
B— 5 statute miles from the geographical center of the primary airport.  
C— the instrument procedures for which the controlled airspace is established.

The dimensions of Class D airspace are as needed for each individual circumstance. The airspace may include extensions necessary for IFR arrival and departure paths. (PLT161) — AIM ¶3-2-5

Answers