Unmanned Aircraft Systems (Drones)

Terms – Use – Rules

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Plan

1. Terms
2. Drone Types
3. How are drones flown?
4. How are drones powered?
5. Main parts of a drone
6. Payload types
7. How drones are used?
8. Key FAA rules

Terms

DJI M350

- The term drone refers to an unmanned vehicle
- Aerial drone & Underwater drone
- Aerial drones receive commands remotely – they can carry out a range of tasks from taking aerial photos/videos to military operations.
- Unmanned Aerial Vehicles (UAV) – globally known term
- Unmanned Aircraft Systems (UAS) – FAA term
- Small Unmanned Aircraft Systems (sUAS) – FAA term for small drones

Drone Types

Different types of drones are used for various purposes:

1. Fixed-wing drones: longer endurance and high flight speed benefiting from their aerodynamics and design – they are best for mapping large areas.

2. Single-rotor helicopter drones: powerful and durable – They are suited to carry large payloads and fly more efficiently. Usually they use gas engines.

3. Multi-rotor drones: widely used – excellent control & maneuverability – vertical take off – best for aerial photography and aerial inspection. Low flight time if powered by batteries. They can be Tricopter, Quadcopter, Hexacopter, Octocopter.

4. Fixed-wing hybrid VTOL drones: fixed wing drones modified to take off and land vertically. They are designed for mapping, power line inspection, surveillance, agriculture, and rescue operations.


HAWK1


www.jouav.com

How are drones flown?

- Flying drones manually: drone pilots have full control of the aircrafts and are responsible of every drone movement – Pilots must be skilled. Continuous training is recommended.
- Flying drones autonomously: drones execute predefined plans and perform specific maneuvers to complete tasks with minimal to no human intervention. This requires advanced flight control systems, sensors and software algorithms.

Typical Plan for HAWK1

HT 184
5
HT 400
4
HT 400
ERP
HT 400
LAND
3
HT 400
2
HT 400
1
HT 400
7
HT 400
6
HT 400

HAWK1

ted grid path length: 4329 m
ength: 7302 m

How are drones powered?

Batteries: lightweight but expensive, short lifespan and can be hazardous (lithium-ion or lithium polymer)

Gasoline: Long flight time, higher flight speed but potentially dangerous and drones can be noisy

Hydrogen fuel: long flight time, environmentally friendly, works at low temperatures but produce a lot of heat and still not efficient

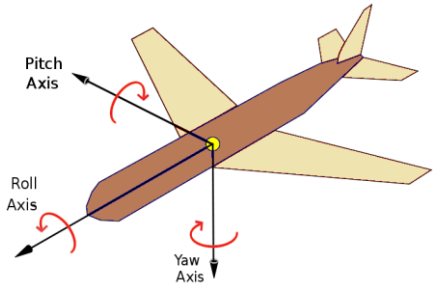
Solar: long flight time while the sun is available, low operating cost

Main parts of a drone

- Drone Motors
- Propellers
- Flight Controller
- GPS Module & antenna
- Inertial Measurement Unit: it tracks drone orientation

(i.e. Yaw, Pitch, Roll)

- Electronic Speed Controller
- Power Port Module
- Obstacle Avoidance Sensors
- Gimbal
- Camera
- Battery
- Remote controller



Payload types

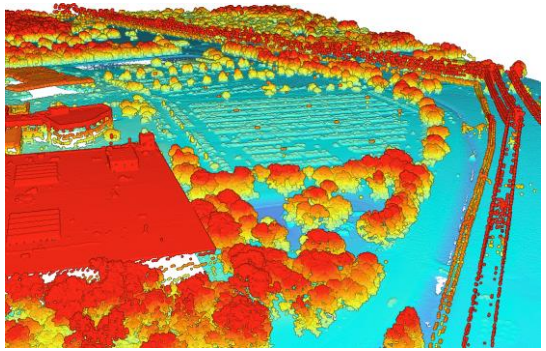
Optical cameras: they produce photos & videos

Thermal cameras: they produce photos & videos

Multispectral cameras: they produce multi-band images

Lidar sensors: they produce 3D point cloud data

Sniffer sensors: sense leaks of gases



Point cloud

Thermal photo

Sniffer drone

Orthoimage


Spatial resolution
o.8 cm
Mouth of the
Brazos river

Examples

Bird Survey

Prescribed Burn at UH Coastal Center

3D Oil Tanks

Regulations

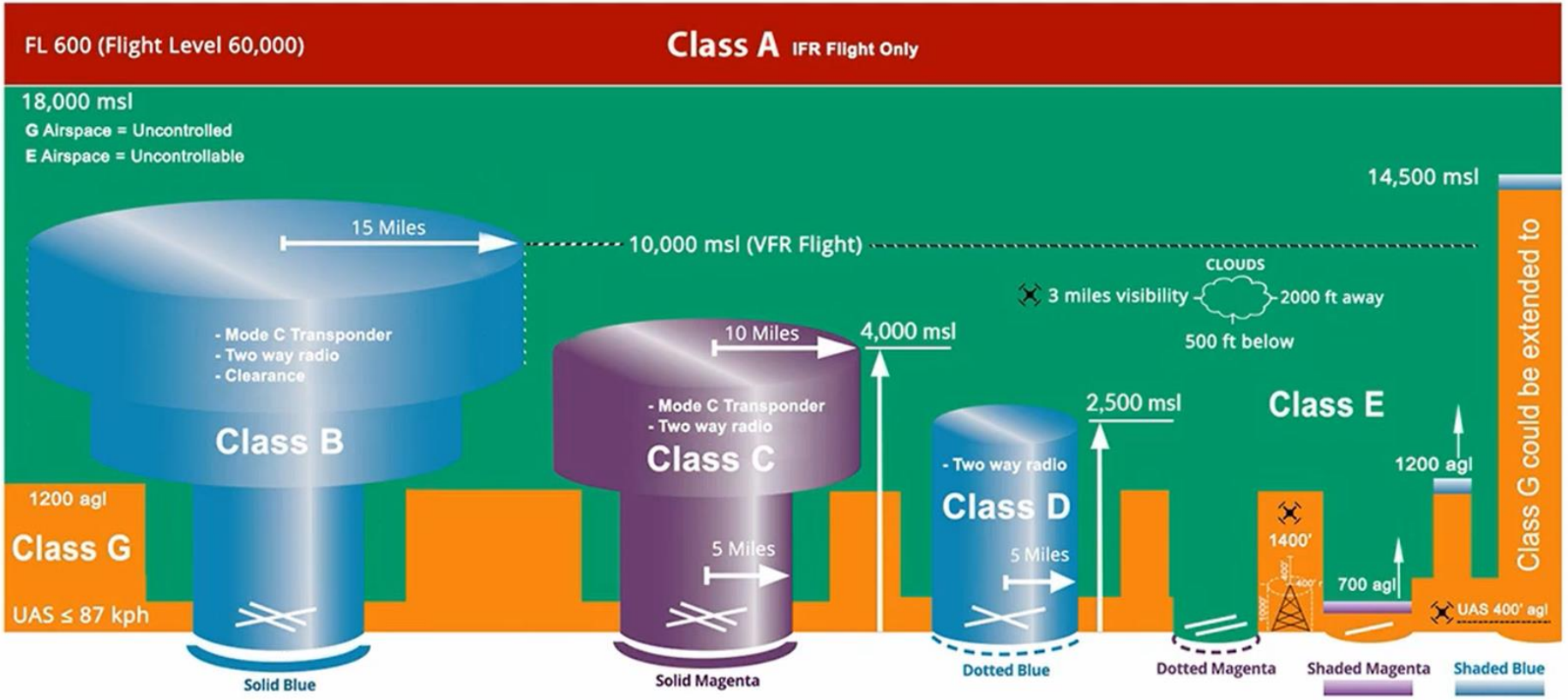
sUAS are subject to the **Federal Aviation Administration (FAA)** oversight and enforcement. FAA timeline for drone integration

Regulations vary depending on purpose:

- Commercial use: Remote pilot with a Part 107 License
- Recreational use: **requirements**
  - Fly only for recreational purposes
  - Follow the safety guidelines of an FAA-recognized Community Based Organization (CBO)
  - Maintain visual line of sight or use a visual observer
  - Give way to and do not interfere with other aircraft
  - Fly at or below FAA-authorized altitudes in controlled airspace (Class B, C, D, and surface Class E designated for an airport) only with prior FAA authorization by using LAANC or DroneZone
  - Fly at or below 400 feet in Class G (uncontrolled) airspace
  - Take The Recreational UAS Safety Test (TRUST) and carry your certificate when flying
  - Have a current FAA registration
  - Do not endanger the safety of the national airspace system

Airspace Classification

National Airspace System (NAS)



How can you become a remote pilot?

- Create an account on IACRA to obtain your FAA Tracking Number (FTN) at: https://iacra.faa.gov/IACRA
- Create an account on PSI to schedule your test at: https://faa.psiexams.com/faa/login
- Find a testing center in your area on PSI and apply for a Remote Pilot Knowledge Test
- Fees: $175.
- Bring your photo ID with signature and address on it.

- Knowledge Test takes up to 2 hours.
- 60 questions (style: three multiple choice answer).
- 1/3 of questions are easy to answer, 1/3 can be challenging, 1/3 designed to test your reading comprehension.
- Passing score: 70%.
- FAA recommends 15-20 hours to prepare for the test.
- You have to wait 14 days to retake the test if you fail.

Federal Aviation Administration

- Home
- What's new in IACRA
- Frequently Asked Questions
- Aircraft Search
- Site Feedback
- Contact Us
- Training and Documentation
- Helpful FAA Links
- Available Certifications and Ratings
- Current Registry Processing Dates

IACRA

Integrated Airman Certification and Rating Application (IACRA)

IACRA is the web-based certification/rating application that guides the user through the FAA's airman application process. IACRA helps ensure applicants meet regulatory and policy requirements through the use of extensive data validation. It also uses electronic signatures to protect the information's integrity, eliminates paper forms, and prints temporary certificates.

New to IACRA? Please read the **New User Guide**.

Trouble Viewing Documents? Please make sure your browser allows popups in IACRA.

Reminder: Password Reset and Recovery

If you need to reset your password you can use the IACRA password recovery page: **Forgot Username or Password?**

What's new in IACRA

IACRA Version 10.7

This release contains the following changes:

- Updated the fields for place of birth so they won't be affected when using browser autofill to autofill addresses on the user profile and Foreign Verification application.
- Updated the help text for the applicant name on the user profile to indicate the importance of matching the knowledge test name if a knowledge test is required.
- The Notice of Disapproval will display the full description for selected ACS codes instead of only the codes.
- The Notice of Disapproval supports overflowing to additional pages when needed.

..read more

Username:

Password:

Forgot Username or Password?

Login or Register

FAA Employee Login Help

Need Help?

Follow the link for the complete IACRA user guide -- or visit our Training and Documentation page for more information.

NOW HIRING
AVIATION SAFETY INSPECTORS

- Hiring in multiple locations
- Spend more time with your family
- Weekends and Holidays off
- Regular work hours
- Possible Telework Opportunities

Notice: Upcoming Maintenance

Testing will be temporarily unavailable during the weekend of February 24th-25th, 2024, while PSI performs system maintenance and upgrades. The estimated time for the outage is from 2:00 PM EST on Saturday, February 24th through 2:00 PM EST on Sunday, February 25th. Scheduling has been blocked accordingly. We apologize for any inconvenience and thank you for your patience during this process.

For news and announcements related to Airman Testing, please check the FAA's Community Advisory publications at https://www.faa.gov/training_testing/testing

FAA Airman Knowledge Testing is now available for online scheduling.

View Test Authorization Requirements

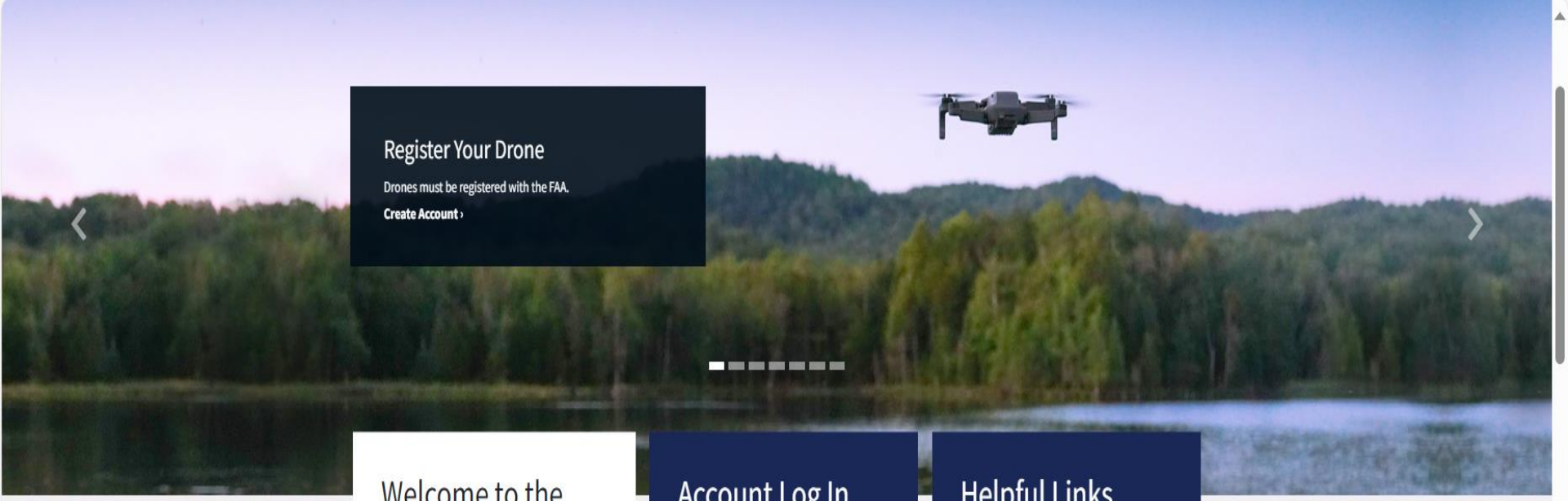
If you are a **new user**, and want to start scheduling your exam, click below to **create an account** (In order to create an account, you will need your **FAA Tracking Number** and an authenticator app for MFA).

Why covering a range of topics?

- To insure safe airspace and air travel
- It prepares you to become a good remote pilot
- It provides you with a better understanding of aviation by providing a glimpse into the FAA history in providing safe air travel

Key rules & numbers

- 0.55 lbs: minimum weight of small Unmanned Aircraft Systems (sUAS) for aircraft registration with FAA. No need for registration if aircraft weight less than 0.55 lbs and used recreationally.
- 55 lbs: maximum weight of sUAS is under 55 lbs.
- Check for details on registration at: https://faadronezone.faa.gov/
- You must be at least 13 year age to register a drone
- You can take the test to become a certified remote pilot at 16 year of age or older
- The test is valid for 2 years
- 400 ft Above Ground Level (AGL) : maximum altitude you can fly a drone



Welcome to the FAADroneZone

FAADroneZone is the official FAA website for managing drone services.

CREATE ACCOUNT

Account Log In

Email

Enter Email Address

Email is required.

Password

Enter Password

Password is required.

LOG IN

System Use Notice

Forgot Password?

Resend Verification Email

Helpful Links

- Register your drone
- Download the B4UFLY Mobile App
- Take T.R.U.S.T.
- UAS en Español
- Check out Hot Topics in U.A.S.
- Get an airspace authorization through LAANC

You must use the paper (N-number) registration process if:

- Your unmanned aircraft is 55 pounds or greater
- You want to qualify a small unmanned aircraft for operation outside the United States
- You hold title to an aircraft in trust
- The small unmanned aircraft owner uses a voting trust to meet U.S. Citizenship requirements

- 400 ft above/around buildings/structures
- 500 ft below clouds
- 2000 ft horizontal from clouds
- 2000 ft horizontal from guy wires
- 100 MPH (86 knots): maximum speed
- 3 Statute Miles (SM) visibility: minimum visibility distance
- Must maintain visual line of sight of the drone unaided by any device other than corrective lenses (medical glasses or contacts).
- At least 8 Hours without alcohol & 0.04 is the maximum blood alcohol level.
- Penalty if you refuse to give a blood alcohol test is: Suspension or Revocation of your certificate

- You cannot fly sUAS for 1 year after a narcotic conviction.
- $500: minimum damage (other than the value of your drone) to report an accident to FAA.
- You must report accidents to FAA within 10 days of an accident.
- You MUST file FAA report if someone seriously injured and needed a hospitalization for 48 hours or more.

Questions?