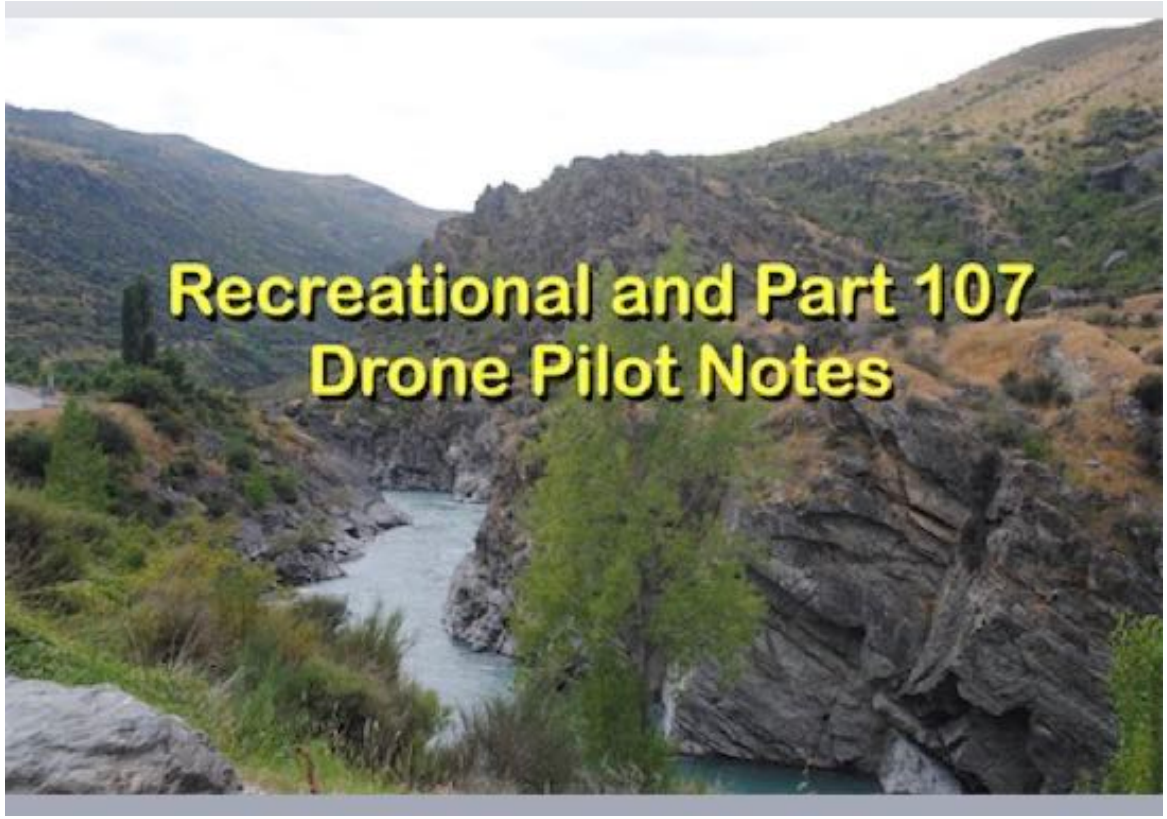


Recreational and Part 107 Notes

Aug 25, 2023

57 flashcards made with the Flashcard Hero app (Mac/iPhone/iPad).

Q: 1 **Recreational and Part 107 Drone Pilot Notes** **Introduction — Part 1 - Topics Covered Here**	Q: 2 **Introduction — Part 2**
Q: 3 **Introduction — Part 3 — Special Request**	Q: 4 **Recreational and Part 107 Drone Pilot Notes** **Apps for Smartphone or Tablet**

A: 2

Please note ... if you wish to share this deck of flashcards, refer other people to this web page at:

https://www.windowview.org/zfaa/rfly.html

That page will have the introductory video and any updates.

If you want to learn more details related to airspace classifications, weather conditions, flight performance, and other topics that Part 107 students study in preparation for the FAA certification test, then go to:

https://www.windowview.org/zfaa/

And if you make an optional (small) donation for any one set of flashcards, you are welcome to download any and all other flashcard files!

The main goal is to freely share helpful information.

Further down are cards specifically referring to FAA guidance with web links for reference to FAA details.

A: 1

*Aside from learning detailed info in FAA Part 107 documents, **recreation flyers** (of drones and UAs) and even 107 students might like some added helpful information presented together here!*

These note cards are intended as a starting point because there is more information out on the Internet … but what is here comes from recreational flight experience and in some ways how that relates to Part 107 guidance.

***Topics**: Drone apps, FAA guidance, Pre-flight, weather, checklist, during flight, post-flight record keeping, night flight, flight over people, batteries, and more. Some notes are just items you may find rare, others more commonplace.*

Hope this helps new and experienced drone pilots!

A: 4

First let's first look at some apps that can be loaded onto a smartphone or tablet. Some pilots use these devices when controlling flight.

Drones with dedicated remote controls are great, but the apps presented here provide functions that are essential to promoting safe and good flight experience!

NOTE: If you are just thinking about buying your first drone or Unmanned Aircraft, one added help is to first visit the FAA DroneZone and read about regulations and registering your device (see web address below)

A: 3

Special Request: please don't just send the files to someone else.

First, because the option to give a donation is helpful and in recognition of the effort to make these resources available.

Second, files may be updated since you obtained these files.

Encouragements and Input Opportunity:

If you wish to provide a comment, suggest additional and helpful information, you can send an email to:

(remove the spaces when typing the address in your email client 'email to')

Flashcard Version (this set of cards): June 2023 - v1.0

Hyperlinks Listing: Obtain the PDF document with links from the flashcard download page—these links correspond to the blue text web addresses on the following cards.

Q: 5 **Pre-Flight Apps**	Q: 6 **Pre-flight suggestion # 1**
Q: 7 **B4UFLY**	Q: 8 **B4UFLY - Clear To Takeoff**

A: 6

To know the status of a place you are thinking of flying your drone … put **B4UFLY** on your device, open the app and point to the map where you want to fly.

The FAA's web page, **FAADroneZone**, encourages you to register your drone, download this app, and take the T.R.U.S.T. test: https://faadronezone-access.faa.gov/#/

[By the way you can also look at a location online on your computer by accessing B4UFLY info at: https://www.aloft.ai/b4ufly/

and then click on the button "USE ON THE WEB"]

The Apple app store and Google Play have the app to download.

The following note cards are examples of available apps and a bit on what they do ...

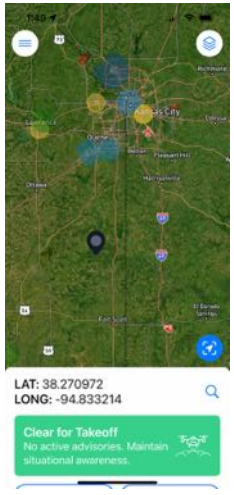
A: 5

First, a listing of some of the apps for smartphone or tablet include the following:

- **B4UFLY**
- **UAV Forecast**
- **Aloft / Air Control**
- **AIRMAP**
- **METAR**
- **Drone Manufacturer** specific Control Station apps

The following note cards go over some basic information on the listed apps, but there may be many others now and in the future—again these are a good starting point!

A: 8



This smartphone screenshot places the location marker in a place where a drone will have no apparent restrictions on flying up to the 400 feet above ground level that is typical of the "**Clear for Takeoff**." *However, be aware that if you are in a school yard, public park or other type of municipal area the local government may have a policy in place for not flying a drone.*

In some cases, it might be worth sending an email or making a phone call to get added assurance that a particular location is truly ok!

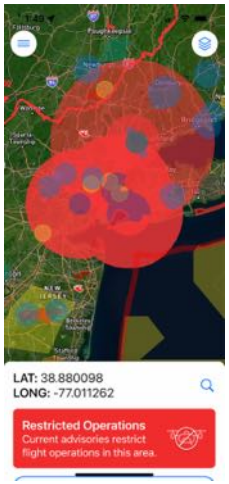
A: 7

When you open the app on your device it will pin point where you are and give you the **flight status** in that location. You can move the map around to find another location and point (touch the screen) where you would like flight status at another location.

The following cards show a number of different types of status, from **'Clear for Takeoff**,' to '**Caution**' because some restrictions or requirements apply, to **'Restricted Operations'** (no fly zone), to **'Controlled Airspace'** which leads you to using the '**LAANC**' to get pre-approval before flying (i.e., if allowed within the area of the controlled space where you are thinking of flying).

Q: 9 **B4UFLY - Caution Before Takeoff**	Q: 10 **B4UFLY - Flight Restricted - NO Takeoff**
Q: 11 **B4UFLY - Controlled Airspace - Need Clearance To Takeoff**	Q: 12 **Click On the LAANC link and ...**

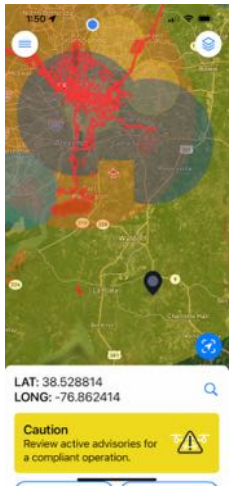
A: 10



Clearly, the areas designated as being restricted are clearly labeled and permission for a recreational flyer to obtain approval to fly in the designated area is <u>not</u> going to be provided.

Part 107 studies address Restricted Areas that show up on sectional charts (maps like Skyvector) and if interested, take a look at the “Part 107 Study Guide Notes” flashcards.

A: 9



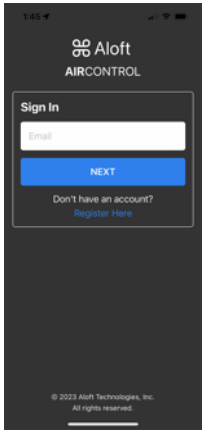
The yellow caution banner typically will pop up and lists added information. In some cases a NOTAM (Notice to Airman) number may be listed and you should look that up for specific information. A note on how to look up NOTAMs is on another card below.

Other information includes locations and distance to specific facilities like hospital, school, heliport, etc.

By the way, if you have never looked at a US map with all the airports illustrated … take a look at Skyvector

(https://skyvector.com/) it’s rather amazing to see all the details when you zoom in on any area especially where you want to fly!

A: 12

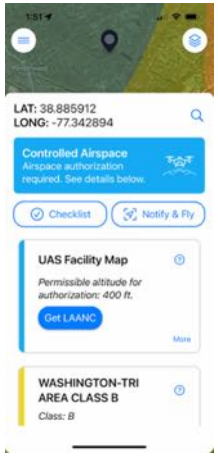


The next app to come up on your smartphone or tablet should be the **Aloft / Air Control** app.

If you need to, download this app, then register yourself as a user.

Sign in and then once you are inside the app and select a site to obtain flight approval you will see the next two types of screen views on the next card …

A: 11



The FAADroneZone web page has the following link to LAANC:

https://www.faa.gov/uas/programs_partnerships/data_exchange

But within B4UFLY you can click on the “Get LAANC” link and … (see next card)

Q: 13 **Next Steps to LAANC and Flight Approval**	Q: 14 **NOTAM - Notices to Airmen**
Q: 15 **Check the Weather Before You Head Out to Fly!**	Q: 16 **UAV Forecast App**

A: 14

In the past and maybe today under certain time oriented circumstances, the listing under the B4UFLY Caution banner may list a NOTAM number. Other means to find if a NOTAM is to go to the web: https://tfr.faa.gov/

If airport related: https://notams.aim.faa.gov/notamSearch/

SUGGESTION: Temporary Flight Restrictions (TFR) are described in a NOTAM, but if you see one listed for where you are:

1) find the NOTAM, **2)** print a copy to have with you, **3)** read carefully (these are kind of complex) and use a yellow highlighter to identify the requirements and restrictions.

If you can comply with requirements and fly, then you have done your homework and can show anyone the printout if necessary!

A: 13

Screen shots from within the AIRCONTROL app.

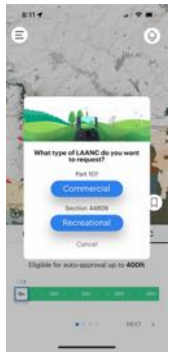
On the left is a view of a site with a pin point indicating where flight approval is desired. The blue area is "Controlled Airspace."

This is just introductory info, so do follow the prompts that appear to obtain approval.

One web page worth a look is the FAA page

at: https://www.faa.gov/uas/getting_started/laanc

Note: Information on the web suggests (depending on location) a day, days, up to a couple weeks may be needed to obtain approval.



A: 16

There are numerous weather apps available for smartphones and tablets, but one weather app that is quite nice for drone (and UA) pilots is the **UAV Forecast**.

One major difference here is the app reports weather, GPS, and geomagnetic storm conditions in a format not found in any one other app (at least not found during a recent online search).

The free version of the app is limited to a 3 hour forecast window, but that is helpful right on the spot if you are thinking of flying in the very near term. But subscriptions give you a 24 hour window, a 7 day window, and a professional option with 15 day forecast.

A: 15

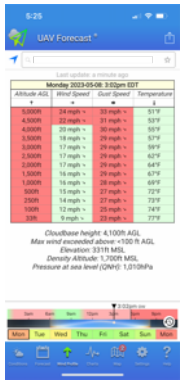
The FAA instructs airplane pilots to plan their trips in advance and to note the weather that they will encounter during flight and weather systems at airports.

A Drone or UA model airplane pilot can actually get a sophisticated report for the location where they want to fly and even get that a day or forecast in advance using a weather app or online service.

The following note cards provide an example of a very informative app that displays what you need to know as a drone of UA pilot. Take a look ...

Q: 17 **UAV Forecast Main Screen Display**	Q: 18 **UAV Forecast - Wind Profile**
Q: 19 **UAV Forecast - Good To Fly?**	Q: 20 Aloft >> now >> Air Channel

A: 18



As a drone or UA pilot you won't need to fly higher than 400 feet above ground level. A Part 107 pilot may need to elevate a drone to view an object that has some height so in some cases wind speed at higher elevations just above 400 feet may be helpful.

This example for UAV Forecast is related to the 7-day forecast option and this includes the cloud ceiling height. Part 107 tells us that a drone needs to be flown 500 feet below the cloud ceiling … so if the ceiling is 800 feet, the drone can only be flown up to a maximum of 300 feet!

A: 17

Here is an example. Just below the top blue banner is a window that will display the address / location where you are a the moment you bring up the app.

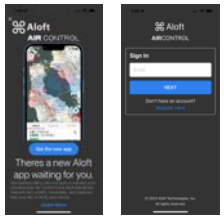
You can click on the 'Map' link below and move around to get a forecast at an alternate location.

If one or more of the display cells turns red, the recommendation of "Good To Fly" will turn to "Not Good To Fly." Ultimately the decision is up to you, but this information is very helpful! Flight safety is of utmost concern!

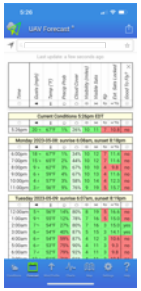
A: 20

>>>

Early on there was an icon for an app to download labeled "Aloft" and that has been updated to AIRCONTROL. In many respects this is helpful like B4UFLY but the app also provides important information in a format that is different from B4UFLY plus this app leads to the means to obtain flight approval via LAANC (as illustrated previously).



A: 19

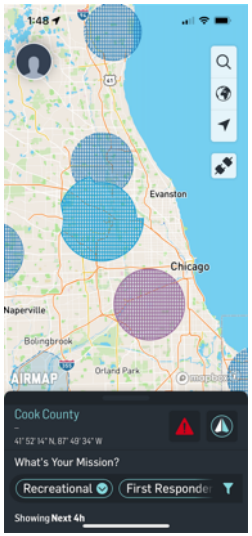


Multiple factors contribute to the assessment as to whether to fly given the weather, GPS, Kp (geomagnetic storm) index, etc. This is the 'Forecast' screen that covers all parameters over the span of time covered by the app.

Note: you can set the target Wind Altitude in the app to your target altitude to see the wind speeds at the specific height you need to fly to!

Q: 21 **AIRMAP**	Q: 22 **AIRMAP**
Q: 23 **METAR**	Q: 24 **METAR Display**

A: 22

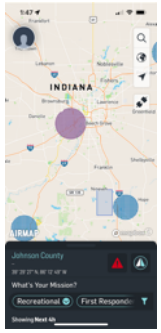


One added AIRMAP note: Part 107 drone flyers will recognize the display indicates the classification color (e.g., B, C, and D) associated with an airport. What is not illustrated here is the area of the airport that extends from the **surface** of the ground. Flight approval would <u>not</u> be granted in that area. In an **adjacent area** not starting at ground level it may be possible to get approval to fly (within limits designated depending on the takeoff and flight range being requested).

A: 21

AIRMAP
AirMap

This is another app that requires registration for planning a flight. If you simply download the app without entering a registration, you will still be able to view listings of information regarding airspace, rules, advisories and more.



A: 24

This app provides information in both a *simpler descriptive format* plus the *METAR listing* that pilots often times have to interpret (to essentially see and recognize what is in the simpler app display)!

The METER listing is a bit like coded and condensed information and this METAR app is helpful for Part 107 students who can practice decoding the METAR section with the help of the rest of the display!

A: 23

METAR

While looking around the web for other interesting apps, the METAR app came up and is related to regular pilots but also can help with Part 107 training.

In simplest terms, the app will use your location and then provide links to a number of airports in your vicinity.

Information relevant to each airport includes weather reports at the present time. While a bit complex to interpret without some training, the basic display (see next note card) is another way of getting a cloud ceiling height the may apply to where you are when pulling up the app.

Q: 25 **Review Available Apps!**	Q: 26 **Helpful Terms, Abbreviations, and Links:**
Q: 27 **FAA DroneZone Orientation and Listings:**	Q: 28 **FAA Flight Basics (Part 1) Consider Before Flight**:

A: 26

CS - Control Station

VO - Visual Observer

PIC - Pilot in Command

LAANC - Low Altitude Authorization Notification Capability

(See info on LAANC and how to use: https://www.faa.gov/uas/programs_partnerships/data_exchange)

ATC - Air Trafic Control

AGL - Above Ground Level

TRUST - The Recreational UAS Safety Test (see info:

https://www.faa.gov/uas/recreational_flyers/knowledge_test_updates)

FAADroneZone (official FAA website for managing drone services: https://faadronezone-access.faa.gov/#/) Start here if you need to create an account and register your drone(s).

A: 25

One suggestion to offer here is that if you are using a smartphone or tablet to control your drone, take a moment to look up (search the App Store) for all available apps for your device. Updates and new apps are likely to appear in the future.

Consider expanding your search in relation to weather, flight simulation, tutorials and other resources.

The apps noted in these flashcards are simply a starting point with some examples of what is required or extremely helpful!

- **Drone Manufacturer** specific Control Station apps … these are what is initially provided by the manufacturer of the drone you purchase.

A: 28

1. Follow the safety guidelines of an FAA-recognized Community Based Organization (CBO). For more information on how to become an FAA-recognized CBO, read Advisory Circular 91-57C.
2. Take The Recreational UAS Safety Test (TRUST) and carry proof of test passage when flying.
3. Have a current FAA registration, mark (PDF) your drones on the outside with the registration number, and carry proof of registration with you when flying.
   Note: Beginning **September 16, 2023**, if your drone requires an FAA registration number it will be also required to broadcast Remote ID information. For more information on drone registration, visit How to Register Your Drone.
4. Do not operate your drone in a manner that endangers the safety of the national airspace system.

These items are part of a 9 item list at:
https://www.faa.gov/uas/recreational_flyers

A: 27

If you are new to flying a drone or need to review current information, please visit: https://www.faa.gov/uas

- Overview
- Getting Started
- Recreational Flyers & Community-Based Organizations
- Certificated Remote Pilots including Commercial Operators
- Public Safety and Government
- Educational Users
- Drone Events
- Critical Infrastructure & Public Venues
- Advanced Operations
- Programs, Partnerships & Opportunities
- Research & Development
- Resources & Other Topics
- UAS en Español
- Contact Us

Q: 29 **FAA Flight Basics (Part 2) When Flying**:	Q: 30 **Develop a Pre-Flight Checklist!**
Q: 31 **Checklist Items to Consider #1**	Q: 32 **Checklist Items to Consider #2**

A: 30

Elements of what a drone Pilot in Command checklist might include are listed in two groups here:

1) **Checklist Items to Consider #1 to 4** (this includes items based on practical experience beyond what might appear on a standard or example list.

2) **Part 107 Related Checklist Items**: a list inclusive of drones and UAs.

Decide on what applies to your flight process and compose your own unique checklist … this will assure safety measures that have value and can be shown to anyone asking you about your flying a drone or UA.

Take the checklist with you!

A: 29

These items are also part of a 9 item list at:
https://www.faa.gov/uas/recreational_flyers

1. Fly only for recreational purposes (personal enjoyment).
2. Keep your drone within the visual line of sight or use a visual observer who is co-located (physically next to) and in direct communication with you.
3. Give way to and do not interfere with other aircraft.
4. 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. **(Learn about all these airspaces by using the flashcard deck "Part 107 Study Guide Notes")**
5. Fly at or below 400 feet in Class G (uncontrolled) airspace. **Note:** Flying drones in restricted airspace is not allowed. Drone pilots should always check for airspace restrictions prior to flight on our B4UFLY app or the UAS Facility Maps webpage.

See cards below about night flights and flying over people.

A: 32

- **Clean the screen** of the smartphone, tablet, or dedicated CS device.
- Adjust **screen brightness** and any other settings to sustain best image on screen during flight.
- **VPN service app** may interfere; consider turning **off** before flying.
- If possible, well in advance, check the intended flight area with **B4UFLY**.
- If flight approval is needed, making the **LAANC** request (week, days, day) in advance is advisable.
- Checking a **weather forecast** in advance is advisable
- Create and use a **packing checklist** before heading out to fly: carry bag, drone, link cable(s), Control Station, pre-flight checklist, extra battery, photo filters, spare props, screw driver, TRUST & registration cards, etc.

A: 31

"Pre-flight might be defined as including some **at home steps** leading up to take off!

- Review flight log or notes from previous use of a drone and specific **battery**(-ies) intended for the next flight(s).
- Monitor charging of each **battery** (especially if monitoring each battery cell with a balance charger)—is it OK?
- Condition of all **propeller blades** (if need to replace make sure screw threads have 'Loctite' properly applied and dry before replacing a propeller blade.)
- Charge the **Control Station** (i.e., dedicated CS device or smartphone/tablet) Note: some CS during flight feed charge to a smartphone or tablet—so make sure start with CS and smartphone/tablet all fully charged!

Q: 33 **Checklist Items to Consider #3**	Q: 34 **Checklist Items to Consider #4**
Q: 35 **Part 107 List — Related Checklist Items:**	Q: 36 **Part 107 List — Related Checklist Items (cont.):**

A: 34

Camera: preset video, still photo settings

- Clean lens and apply desired filter
- Memory card (insert proper type, formatted and with desired GB capacity)

At Start Up pre-takeoff, check CS display:

- Battery (% charge on display)
- GPS: How many satellites detected (the more the better!)
- Sufficient free space around takeoff location
- Landing pad (optional when using return to home mode)

Liftoff and hover:

- Elevate to a hover position is the drone drifting laterally? Recalibrate if necessary. If not level a motor may be a problem for continued flight (discontinue unsafe flight).
- Remember to activate video when desired
- If waypoints or other flight mode, elevate, program and execute with sufficient battery power

A: 33

At the flight location pull out a on-site pre-flight checklist, which might or should include:

- Compass calibration
- Horizontal calibration
- Gimbal calibration
- Restart drone (when prompted to finish calibrations)
- Set height of return (return to home (RTH); Assess height relative to objects at the site!)
- Waypoints (e.g., flight height, distance, radius settings)
- Speed settings (vertical, horizontal, yaw)
- Preset display to meters or feet (Imperial)

A: 36

9. Calibrate UAS compass prior to any flight;

10. Control link transceiver, communication/navigation data link transceiver, and antenna(s);

11. Display panel, if used, is functioning properly;

12. Check ground support equipment, including takeoff and landing systems, for proper operation;

13. Check that control link correct functionality is established between the aircraft and the CS;

14. Check for correct movement of control surfaces using the CS;

15. Check onboard navigation and communication data links;

16. Check flight termination system, if installed;

17. Check fuel for correct type and quantity;

A: 35

For both drone and UA:

1. Visual condition inspection of the UAS components;

2. Airframe structure (including undercarriage), all flight control surfaces, and linkages;

3. Registration markings, for proper display and legibility;

4. Moveable control surface(s), including airframe attachment point(s);

5. Servo motor(s), including attachment point(s);

6. Propulsion system, including powerplant(s), propeller(s), rotor(s), ducted fan(s), etc.;

7. Verify all systems (e.g., aircraft and control unit) have an adequate energy supply for the intended operation and are functioning properly;

8. Avionics, including control link transceiver, communication/navigation equipment, and antenna(s);

Q: 37 **Part 107 List — Related Checklist Items (cont.):**	Q: 38 **Pre-Flight Permissions Beyond Use of B4UFLY**
Q: 39 **Control Stations (CS) - Smartphone - Tablet - RC**	Q: 40 **Battery Status**

A: 38

Over many years the original impression was the FAA rules the skies. In many ways this is truthful … however … your ability to fly in any location also encounters city, county, state and private location policies. Some states in the US may also be passing laws related to drone and UA flights.

Experience teaches … take some time on the internet and search for information related to any location and drone or UA flying.

Making a phone call or sending an email ahead of going to a specific location provides clarity on whether permission is granted. Suggestion: take a copy of an email granting permission with you in case someone asks a question.

Also note that **signage** prohibiting drone or UA flying may not be posted at a particular location, yet that location may be regulated by a local policy that prohibits flight.

A: 37

18. Check battery levels for the aircraft and CS;

19. Check that any equipment, such as a camera, is securely attached;

20. Verify communication with UAS and that the UAS has acquired GPS location from at least four satellites; (NOTE: adhere to manufacturer recommended minimum number of satellites)

21. Start the UAS propellers to inspect for any imbalance or irregular operation;

22. Verify all controller operation for heading and altitude;

23. If required by flight path walk through, verify any noted obstructions that may interfere with the UAS; and

24. At a controlled low altitude, fly within range of any interference and recheck all controls and stability.

A: 40

Check the manufacturer's indication of maximum flight time (in low wind conditions).

Monitor the % drop in battery strength during each flight.

Keep track of total flight time per battery (mark each battery, enter battery ID & flight time in your notes or flight log).

If the battery has a problem (from normal use, if in drone during a crash, dropped or possible harmed/damaged in any way) consider stopping use in future.

One possible sign of problem is during a flight the % energy drops rapidly for the remainder of a flight. This may be due to one battery cell's malfunction and depleting faster than others and recharging typically will not solve the problem.

A: 39

The following tips are general and offered in relation to whatever might apply to your CS (control station; remote control unit). In some cases control is coordinated with an app on a smartphone or tablet or a manufacturer's remote control with built in screen:

- Clean Screen
- VPN: Is that on your device and turned on?
- Adjust Screen Brightness

Note: Some drone controllers provide electronic charge to a linked smartphone. Start flying with all fully charged! Keep an eye on percent battery level before, during, and after every flight.

Q: 41 **Pre-Flight - Arrival at takeoff point**	Q: 42 **During Flight**
Q: 43 **During Flight**	Q: 44 **Post Flight**

A: 42

The Pilot in Command is always tasked with keeping a drone within Visual Line of Sight (VLOS), but also monitoring the controller screen display:

- Battery power
- Controller link (to drone) status
- Current flight height

New drone pilots may be easily distracted and getting in the habit of both VLOS and tracking these parameters is vital to a good flight experience.

Also, once elevated to a safe and desired height the pilot can opt for a drone pre-programmed flight options. Make sure there is sufficient power to do the desired option and have power to return to home.

A: 41

Upon arrival, consider the following:

- Check weather onsite to confirm favorable conditions.
- Look for a desirable takeoff location (Example: place landing pad with clear area all around)
- Unfold drone legs (spread propellers so not overlapping)
- Power up controller and drone
- Work through your checklist (e.g., calibrations, etc.)
- Liftoff (e.g., 8 to 10 feet), hover, is drone stable? Recalibrate?
- While hovering, check camera settings and turn on
- Make sure return to home setting is appropriate to your current location (Example: elevate the drone to height of local tree tops or other tall obstacles as a locality measure and confirm or adjust RTH)

A: 44

Suggestion: Leave 10 to 30 % charge on batteries to be stored for a long duration before next flight.

Inspect the drone and especially condition of propellers.

Pack the drone in carry bag and head to next destination (e.g., back home)

Have your notebook or flight log on hand and record all the pertinent information as soon as possible (while fresh in your mind)!

The drone app or dedicated controller is likely to provide information to put into the log.

Some drone apps place flight information into files that you can download to your computer and use with Google Earth

A: 43

Added thoughts to consider:

Different drone models come with various cameras that differ in quality and capability.

Pre-format the SD memory card or built in memory to be sure sufficient space allows for anticipated photography and long video recordings.

Test photo filters on your drone to help assess what works best for the kinds of photos and videos you want to capture!

One option is video panorama mode, but if photographic panorama, then the photos can be stitched together after the day's flight session has closed. See the note card below about **Hugin** and stitching photos!

Q: 45 **Post Flight - Example Flight Log**	Q: 46 **Post Flight - Flight Data and Google Earth Pro**
Q: 47 **Post Flight - Viewing Flight Log in Google Earth Pro**	Q: 48 **Post Flight - Video Editing**

A: 46

If you are able to download flight log files to your computer and find a means to have that information converted into a **KML file**, then the KML data can be used with Google Earth Pro: https://www.google.com/earth/about/versions/

This illustrates flight paths and graphically you can see performance of battery, drone motor (for each arm), flight heights from takeoff to landing …

See next card ...

A: 45

FLIGHT LOG:

DATE:	TIME:	Camera settings, filters:
Location	Estimated Wind Speed	
Model:	Battery No: A ( ): # _____ B ( ) 30 - # _____ C ( ) 42 - # _____	Battery: Start % _____ ___ _____ End % _____ ___ _____
# Take Off / Landings	Purpose/Objective:	
Notes: Post flight info: Time: _____ Distance: _____ Duration time: _____ Max Height: _____ Time: _____ Distance: _____ Duration time: _____ Max Height: _____ Time: _____ Distance: _____ Duration time: _____ Max Height: _____		

This is just an example, with several of these entries per page, but may give you some ideas when creating your own flight log.

A: 48

There are many types of software available for video editing. Several commonly referred to are **Adobe Premier Pro**, **Apple Final Cut**, and **Black Magic Design's DaVinci Resolve**.

Use which ever program you prefer, but note that DaVinci Resolve has a free version that is very capable of sophisticated editing, with many online videos to train even the newest of users.

You may need to hook up your drone to the computer or simply insert an SD card (from drone used during flight) into an access slot to transfer video and photo images to the computer.

A: 47

Search the web and hopefully find a no-cost option to create such an interesting way to graphically review a flight!

YouTube Examples:

How to Get DJI Flight Data to Google Earth

https://www.youtube.com/watch?v=v_XR2Si25CQ

Google Earth flight path for DJI Mavic, Phantom, Inspire…

https://www.youtube.com/watch?v=dhgQ8aPUq_U

Viewing Hubsan Zino/ZinoPro/Zino2 flight logs in the Google Earth (no-cost and probably EXO as well)

https://www.youtube.com/watch?v=-ohq5ra0iHo

Q: 49 **Flying at Night (part 1)**	Q: 50 **Flying at Night (part 2)**
Q: 51 **Flying over people ...**	Q: 52 **LiPo Batteries**

A: 50

To get an update on what is current advice regarding recreational flights at night, one recommendation is to **search the web** with key terms like “recreational drone night flight,” “FAA requirements for drone night flight,” and read several sources or watch YouTube videos.

One requirement that absolutely needs to be met is mounting **anti-collision lights** on your drone. These need to be visible over a distance of **3 statue miles**.

In October of 2021, the FAA made it possible for commercial drone pilots to use LAANC to get instant approval for night flying.

As of February 20, 2023, recreational pilots can also get permission to fly at night using LAANC.

A: 49

A recreational drone pilot can now fly a drone at night, however there are several points of consideration to briefly share here:

1. The FAA web page regarding recreational flight requirements … https://www.faa.gov/uas/recreational_flyers ... does not specifically focus on night flight (or flight over people). Consider visiting the flashcard deck “**Part 107 Study Notes 2**” to read about information regarding Part 107 night flying.
2. How your eyes adjust to the dark is an important topic!
3. How you visualize other flying objects at night is also important!
4. Taking a moment to plan ahead and think about the area where you intend to fly and even look at that area during daytime reduces potential risks and adds to increasing the safety during a night flight.

A: 52

Charging: Many batteries are ’smart’ and charge with the manufacturer’s supplied charger. Older multi-cell batteries can also be charge with devices that monitor the charge of each battery cell. All batteries wear down over time and eventually need to be retired from use. Keep track of use with your flight log!

Storage: Advice on the web indicates percent charge of 10 to 30% is desirable for storing long term—this helps sustain battery performance in the future. Also, find a LiPo battery storage bag designed to reduce any potential fire hazard, especially if you have more than just a couple batteries.

Carrying to flight location: Best advice is to use a carry bag designed for a drone and space(s) built in for batteries.

Travel: Best advice is to look up the airline, train, bus company to see commercial policy regarding traveling with any and all types of batteries. Also for air travel, check with the TSA or other security bureau for their screening policy. And if international travel, research the destination for use of a drone and process to obtain permission to fly.

A: 51

Searching the web reveals: “… **difference between recreational drone pilots and those flying under Part 107 certification is that recreational pilots are not allowed to operate their drones over people** … “

If you look at the flashcard deck “**Part 107 Study Notes 2**” to read about information regarding Part 107 flying over people.

As a recreation pilot, the best advice is to **not fly over anyone**. However, if people are ‘under cover’ or ‘crew members’ standing with you when flying, then you are okay.

Again, this is a topic worth an added look:

https://www.faa.gov/uas/public_safety_gov

https://www.faa.gov/uas/commercial_operators/operations_over_people

Again, this is a topic worth future searches for information as updates and new regulations may appear over time.

Q: 53 **Panoramic Photos** - Stitching Photos Together!	Q: 54 **Hugin** — Example Instructions
Q: 55 **CFR 14 Part 107 Knowledge & Certification Test**	Q: 56 **Summary Points to Consider**

A: 54

1) Open Hugin

2) Select “1. Load Images” (open photos location, select images, then click “Open”)

3) Popup Window > enter 90 HFOV (example setting); “Ok”

4) Select “2. Align” [this takes time, especially with more photos] Once done can click and drag on image center line.

5) Use “Crop” to remove excess black area—use “HDR Autocrop” button

6) “Assistant” tab, select “3. Create Panorama”

7) from popup select LDR Format (TIFF, JPEG)

8) for a 360 spherical panorama try

Width 3600 and Height will self adjust; Quality set to 100%

9) select "Exposure Correct” and “Exposure Fused …”

10) when prompted enter file names … SAVE … thus panorama created

A: 53

The **Hugin** program is free and something you can download to your computer.

https://hugin.sourceforge.io/

You can stick 2 or more photos together and that even includes 360 spherical images that number 48 in total.

Here are examples of two (of many) online instructional video to see how this works:

https://www.youtube.com/watch?v=06jXEJMTQds

https://www.youtube.com/watch?v=DMYlm3D3NhY&t=9s

The next card is an example outline of a process you might try. This is based on the video at:

https://www.youtube.com/watch?v=3JXjUqMSK3s

A: 56

There may be lots of great advice to gain from YouTube videos. Do take a look and especially for a drone or UA that is the brand you own.

Just be prepared out in the field to explain that you follow the basic FAA requirements.

Have on hand your FAA registration card, registration number on your drone, the T.R.U.S.T. test card so that you may demonstrate compliance.

Even better is to have a flight log on hand and any printout of NOTAMs that apply to where you are flying and especially any copies of emails where it states you have permission to fly.

Given all the above, if someone, especially a law enforcement person, approaches you, you will be prepared to show you are a responsible recreational flyer!

A: 55

There are examples, instructions, guidelines, and data that are necessary to study to pass the Part 107 Unmanned Aircraft System (UAS) pilot certification test.

Once certified, the drone pilot can make photos and videos for commercial purposes. A recreational pilot cannot accept any compensation (be it money or anything as payment) for providing photos or videos to anyone.

The suggestion here goes beyond just considering any commercial application … you have access to flashcards that go over the Part 107 information … and if you even just make a once over review you will see information that will make you a knowledgable recreation pilot even without having to take a Part 107 test. Then again, you might study the flashcards and take the test!

Bottom line: studying regulations, weather, flight approval processes, and other aspects of Part 107 will simply be helpful! What you learn you can share and impress others as being truly knowledgable!

And remember, you do need to take the T.R.U.S.T. test as a recreational pilot!

Q: 57 **Final Card**	

	A: 57 Everything provided here has come from experience, from watching YouTube videos, from correspondence with the FAA and locations like a local county, a state park system, and other locations when requesting permissions. There is more that might be added here and updating this deck of Flashcard Hero flashcards may come in the future. Hopefully you have been reminded of some things that are important or even learned some things that are fun (like how to stitch photos or use Google Earth to illustrate flight data for any site you have recently flown).