2023

Drone Preflight Checklist

Ryan Wicks

Giverson Mupambi

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UMassAmherst

Cranberry Station

Ryan Wicks[1] and Giverson Mupambi[2]

[1]UMassAir, University of Massachusetts Amherst, Amherst, MA, USA

[2]UMass Cranberry Station, University of Massachusetts Amherst, East Wareham, MA, USA

Version 1: July 2023

Introduction.

This preflight checklist is designed to assist drone pilots in ensuring the safe conduct of each flight. The information provided offers a general overview and may need to be modified depending on prevailing circumstances. This checklist is applicable for small Unpiloted Aerial Systems (sUAS) weighing under 55 lbs. and meeting the criteria outlined in the Code of Federal Regulations Title 14, Chapter I, Subchapter F, Part 107, which could be referred to in the link below https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-107.

1. **Permissions & Legality** - Before heading to the flight location, the Pilot in Command (PIC) should verify that all necessary permissions have been obtained:

    a. Confirm that the landowner or managing agency has granted access to the launch and landing locations.

    b. Ensure that the PIC has permission from the air traffic controllers of any nearby airports, i.e., airports within 5 miles of any point along the UAS flight path or controlled airspace the UAS may enter. The PIC can check the airspace and proximity to airports using websites such as www.skyvector.com, https://www.airmap.com/.

    c. If flying near an airport's traffic pattern, the PIC should file a Notice to Airmen (NOTAM) before the flight: https://www.1800wxbrief.com/Website/home?desktop=true#!/phone-numbers-quick-steps

    d. In general, the PIC is prohibited from flying in areas with active Temporary Flight Restrictions (TFRs). Before flying each day, the PIC will check for TFRs by calling 1-800-WX-BRIEF and visiting https://tfr.faa.gov/tfr2/list.html.

    e. Register the UAS with the FAA and label the registration number clearly on the exterior of the aircraft. To register, create an account and follow the process at : https://faadronezone-access.faa.gov/#/. The registration fee is $5 per aircraft.

    f. If flying in controlled airspace, where an airspace authorization or waiver is required, complete the necessary application. Whenever possible, use the Low Altitude Authorization Notification and Clearance (LAANC) system to obtain authorization before a launch on the day of the flight. LAANC system could be accessed through programs like Drone Deploy. (https://www.dronedeploy.com/app2/). Approval through the LAANC system takes less than a minute and cannot be done more than 24 hours in advance. The list of participating airports can be found here: https://www.faa.gov/uas/programs_partnerships/data_exchange/laanc_facilities. If an airport controlling the desired/particular airspace does not participate in LAANC, and airspace authorization is necessary, then request airspace authorization at https://faadronezone-access.faa.gov/#/. Approval time varies but typically takes several days, so it is best to allot at least one week in advance of the flight for approval. Approvals with this process can be granted for time periods extending up to 1 year from the date of request.

    g. Remote ID: As of 26 September 2023, all UAS operating in the US National Airspace System must have an active remote ID, except in special circumstances. Verify that the remote ID is active and functioning properly. For additional information, please see: https://www.faa.gov/uas/getting_started/remote_id.

2. Scan the Launch and Flight area - Inspect the area for any obstructions or potential hazards that could pose risks to the flight operation or to which the flight operation could pose a risk. Consider factors such as weather conditions, changes in terrain, vehicle or pedestrian traffic, and radio interference.

3. Review Flight Plan with the Operations team (PIC, spotters, and mission specialists).

a. Ensure that all members of the operations team agree on the flight plan. Discuss any concerns or necessary changes.

b. Verify the communications devices are functioning correctly/properly.

c. Position spotters appropriately.

4. Log Weather Conditions and Relevant Flight Parameters in the Flight Log.

a. While flight log styles may vary, and what specific parameters are recorded might vary depending on the purpose of the flight, it is a beneficial practice to keep an accurate record of every flight that is conducted. Items that might be useful to have recorded:
   i. Who was the PIC? Who are the flight crew members?
   ii. What drone was used? Include the registration number or flight controller ID.
   iii. What was the date and time of the launch?
   iv. What was the date and time of the landing or completion of the mission?
   v. What were the weather conditions? (e.g., temperature, wind magnitude, and direction, humidity, cloud cover, etc.)
   vi. Flight parameters, e.g., altitude, flight path orientation, flight speed, etc.
   vii. Image capture parameters, e.g., shutter speed, image capture rate, type of camera, etc.
   viii. Fertilizer or pesticide application parameters, e.g., chemical name or ID, solid vs. liquid, nozzle type, spray parameters, target droplet size, etc.

5. Prepare and Set Up the Unoccupied Aircraft System (UAS).

6. Prepare the Ground Station - Ensure the ground station has sufficient charge connected to the viewing screen.

7. Check Aircraft for Damages.

a. Inspect the batteries or fuel tank for any signs of cracks, punctures, or deformation.

b. Examine the propellers for cracks or deformation and ensure they are securely attached.

c. Ensure motors rotate freely around a fixed axis and that they don't wobble.

d. Check for abnormalities, cracks, or fractures in the hull or the motor arms.

e. Ensure that all bolts, joints, safety zip ties, cameras, and attachment nuts and grommets are present and secure.

f. If any issues are found, repair or replace necessary parts before flying.

8. Mount Cameras:

a. Ensure that there is enough space on the storage device to accommodate data collection.

b. Ensure cameras are mounted securely.

9. Power-On the Aircraft:

a. Check that the camera and multirotor UAS are properly bound.
b. Verify that the video feed and telemetry data feed are live.

10. Check Systems Status and Calibrate Sensors.

a. For spectrally calibrated camera systems, capture a calibration image of a calibrated reflectance panel (CRP). Ensure that shadows are not projected onto the panel during the image capture.

b. For Long-Wave Infrared (LWIR) cameras, check that Flat Field Correction (FFC) calibration works. The FFC can be executed approximately every 30 seconds during the flight if the camera has a shutter. If no shutter is available, execute the FFC before every take-off and while the camera is looking at a view that has a consistent temperature and emissivity.

c. Confirm that the shutter speed, aperture, white balance, ISO, image trigger period, focus, and color balance are all appropriate for the intended use.

d. Check that any additional payloads are securely attached and functioning properly.

e. Verify that IMU, compass, GPS, autonomous navigation, and emergency failsafe settings are correctly configured for reliable and safe flight.

f. If high accuracy is desired, ensure that Ground Control Points (GCPs) are deployed or that the UAS is using Real-Time Kinematic (RTK) corrections or Post-Processing Kinematic (PPK) capabilities to achieve higher GPS accuracy.

11. Final Launch Preparations - If all systems are operating correctly, then proceed with the aircraft launch with the following steps.

a. Announce “CLEAR PROP” and wait for all nearby individuals to be alert of the imminent flight launch and wait for all crew members to respond with “CLEAR”.

b. Launch the aircraft. Check controls for responsiveness and correctness while flying at low altitudes before proceeding.

c. Execute flight plan.

12. Post Flight Checklist

a. For spectrally calibrated images: capture a post-flight calibration image at the end of the flight plan.

b. Check the batteries or fuel tanks for any signs of cracks, punctures, or deformation.

c. Remove storage devices and back up the collected data.

d. Clean any debris from the UAS and pack it into storage containers.