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2016

Drone Journalism Lab Operations Manual

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Waite, Matt and Kreimer, Ben, "Drone Journalism Lab Operations Manual" (2016). *Faculty Publications, College of Journalism & Mass Communications*. 96.
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Drone Journalism Lab

Operations Manual

Credits

This manual was created by Matt Waite and Ben Kreimer of the University of Nebraska-Lincoln's Drone Journalism Lab through generous support from the John S. and James L. Knight Foundation.

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Introduction

This text is a guide for safely conducting drone journalism field work. It takes into account America's current drone regulations, our understanding of the public's acceptance of drones, the state of drone technologies, and our own experiences.

The number one goal of any drone journalism operation is safety. At no time should safety be compromised. If there is any doubt, return the drone, also known as an unmanned aerial system (UAS), to the landing zone and terminate the flight. Ethical journalism is responsible journalism, and flying a drone means taking responsibility for the safety of those near you, on the ground and in the air.

The three flight operations roles defined in the Drone Journalism Lab Operations Manual are Pilot In Command (PIC), Observer, and Journalist. One individual can fill all three roles, which we define below:

The Pilot In Command: The PIC is responsible for all flight operations. It is the PIC who has the ultimate authority on any flight. The PIC determines if the aircraft is airworthy and capable of conducting the proposed operations. The PIC is responsible for determining if the airspace allows the proposed operation. The PIC is responsible for conducting operations within all FAA regulations and any restrictions set forth by a grant of exemption. The PIC is responsible for briefing the other members of the flight crew about what the mission is, what their roles and responsibilities are, and what is expected of them before, during and after flight operations.

NOTE: The pilot in command, the one holding the FAA issued Part 107 certificate, is by regulation the final authority on if the aircraft flies or not. If an accident occurs, it is the Part 107 certificate holder who will be held responsible. As such, news managers must accept the pilot in command's decision about flight safety as final.

The Observer: The Observer is responsible for monitoring the operational area to ensure that there are no hazards that may endanger the flight or people not part

of the UAS flight operations team. The Observer is the only member of the team who can speak to the PIC during flight operations. The Observer is to alert the PIC immediately if any aircraft come into the area, or if any person or vehicle comes near the operation. The Observer must remain within speaking distance of the PIC. Do not use radios to communicate.

The Journalist: The Journalist is responsible for communicating flight goals to the PIC before flight and verifying results after landing. The Journalist determines what is needed for the story and communicates that to the PIC. The PIC is responsible for determining if the Journalist's goals are possible under the conditions presented. During flight, the PIC may ask for feedback from the Journalist, but the Journalist should only speak to the pilot if asked while the aircraft is aloft. The Journalist can act as Observer.

Under Part 107, operations can occur with only a PIC. If no additional personnel are available for the flight, care and consideration must be taken for the additional workload that the PIC will take on, including having to watch the operation area for hazards, completing journalistic goals and ensuring flight safety.

NOTE: The greater the number of environmental variables (bystanders, structures, trees, wind, etc.) in an operating environment, the more substantial the demands are on the PIC.

Ethics and Privacy

UAS enable individuals to remotely access spaces and vantage points that may, for many reasons, be otherwise out of reach. Avoid actions in the air that you yourself would not engage in on the ground.

Consider referring to the SPJ Code of Ethics, especially the principles about minimizing harm, such as the ones seen below, which are relevant to UAS operations:

- "Balance the public’s need for information against potential harm or discomfort. Pursuit of the news is not a license for arrogance or undue

intrusiveness." While Part 107 prohibits flights over people it doesn't stop you from flying near them laterally. Be mindful of bystanders and consider their perceptions of drones, and what you're doing in the air with a UAS. Remember: They don't know what you are going to do with a device that makes many uncomfortable. Don't deliberately fly over private property if publicly accessible views are available. Don't use a drone to antagonize.

- "Show compassion for those who may be affected by news coverage. Realize that private people have a greater right to control information about themselves than public figures and others who seek power, influence or attention. Weigh the consequences of publishing or broadcasting personal information. Avoid pandering to lurid curiosity, even if others do." In short, respect people's privacy, and don't use a UAS as a tool for intrusion. Don't fly up to people's windows, and seek permission to fly over private property where practical. While there has been extensive speculation about how high above the ground private property extends, there is currently no clear legal precedent indicating where private property ends and public airspace, in the context of drones, begins. Until a legal standard is set, all due caution should be exercised.

Also, consider referring to the National Press Photographers Association Code of Ethics, including the following standards:

- "Do not intentionally sabotage the efforts of other journalists." When covering a news event along with other media organizations flying UASs, avoid using your UAS to obstruct or take down another UAS. Doing so could not only hurt bystanders and damage property, but also require a report to the FAA, jeopardizing your Part 107 certification. Media using UAS should coordinate with each other, just as manned helicopter pilots have done since the 1950s.

- "While photographing subjects do not intentionally contribute to, alter, or seek to alter or influence events." UAS systems, especially multirotors, are loud. Consider how the noise generated by your UAS, and its presence, influences events, people, and animals.

General Operating Procedures

A professional UAS operation is one that involves careful planning and forethought. Before embarking on using drones to do journalism, pilots and organizations should take several steps. First and foremost, the pilot should practice with the drone to be used. Your first flight with the drone should not be for a story. Familiarization with the platform is essential. News organizations wanting to use drones should speak with local police and fire departments well before news breaks, alerting them of future news-gathering using drones.

The general operating procedures for drone flights are divided into sections: Pre-trip, Pre-flight, Flight, and Post-flight. The general requirements in each are encapsulated in checklists designed to help ensure each step is accomplished. The sections, and the reasoning behind them, are described here:

Pre-Trip

Prior to embarking on any drone operation, the pilot in command must gather information about the proposed flight area to ensure safe operations that comply with Federal Aviation Regulations.

Location

Questions the PIC must answer about the location are:

- What is there? Are there hazards to aviation?
- What airspace is it in?
- Do you need permission from air traffic control (ATC)?
- Are you flying on or over private property? Do you have permission of the landowner to operate there?
- How many people can you expect around the area?
- What is your plan to prevent flight over people?
- Have you pulled publicly available aerial images of the area or conducted a site survey?

- What will the weather be? Have you consulted an aviation weather forecast? Or if the trip is immediate, have you consulted local weather sources, such as an aviation weather report (METAR), or obtained a flight briefing from Flight Services?
- Are your weather parameters within Part 107 minimums?
- Are wind levels below the operational maximums set by the manufacturer or by your own operational guidelines?
- What's the altitude of the location? How might it affect your UAS and payload during flight?
- Have you factored in the effects of temperature on the batteries?

Defining Operational Goals

Before bringing a UAS into an environment, operational personnel should define the goals of the UAS flight before leaving for the location.

- Be specific. What shots do you need?
- What purpose is the drone serving in your story?
- What context is the drone adding to your story?
- How much drone video or photography do you need to tell the story?
- What privacy issues can you anticipate and what steps have you taken to mitigate them?
- What ethical issues can you anticipate and what steps have you taken to mitigate them?

Logistics

Before leaving for the operational area, consider what equipment you will need, and check the status of your equipment.

- When do you need to be at the location?
- How much travel time is involved?
- Have you built in time for a walkthrough of the location to note any hazards only visible on site?
- Do you have sufficient batteries to accomplish the task?

- Are they charged?

Briefing

The PIC is responsible for briefing all operations personnel on each phase of flight. The PIC will designate the observer and the journalist, will explain their roles and what will happen during flight.

A PIC briefing should cover, at a minimum:

- Who is fulfilling each role in flight operations.
- The expectations of each member of the flight crew.
- A general description of the operations area.
- The expected weather at the location.
- Any known hazards, including winds, obstacles, known high traffic areas, any nearby airports or expected air traffic.
- The specific mission goals, including expected shots, angles or subjects.
- Any known privacy or ethical issues and mitigation steps.

Pre-Trip Inspection

Before leaving for the operations area, the PIC should conduct a pre-trip inspection of the UAS. A pre-trip inspection includes charging batteries, checking various mounting hardware, and checking the camera and storage media to ensure it is sufficient for the task.

Pre-Flight

Pre-flight operations are done immediately before any flight work is to occur. The pre-flight checklist repeats some of the pre-trip checklist, such as inspecting the aircraft and some of the control surfaces. Pre-trip and pre-flight inspections help ensure airworthiness and will serve as an early warning for both maintenance issues and for mechanical issues that could substantially affect or cancel flight operations.

The general rules of pre-flight are:

- The PIC touches the UAS. The PIC is responsible for the aircraft and all around them. Thus, the PIC will conduct the pre-flight inspection, connect the batteries, etc.
- When on site, operations personnel must delineate a takeoff and landing area of at least 10 feet x 10 feet and ensure it is free of debris.
- When on site, if non-operations people are around, operations personnel may be required to secure an area to be kept free of people so the UAS can operate without flying over people. That place may be the takeoff and landing zone. That space, to remain free of people, should be as large as the PIC thinks is practical.
- Weather can be very localized. When you arrive, you should check your location weather against the weather report you got from a flight briefing or automated observation service. Cloud ceilings will be most difficult to estimate on site, so be reasonable. If the clouds look low, stay low. Don't fly if fog is present.
- Wind conditions also vary by location. An anemometer is a valuable tool for measuring wind on site, informing the PIC if wind speeds are within operational limits and how they may affect flight operations.
- Turn off WiFi connectivity on any UAS mounted devices, such as cameras. Active WiFi devices on the UAS can interfere with critical 2.4 GHz RC and video transmissions. Because most non-military UAS systems use 2.4GHz for either RC or video transmission, only enable WiFi if you are certain there will be no interference with your UAS hardware.
- Before takeoff, make sure your compass is not receiving interference from nearby metal objects, and that you have enough GPS satellite connections.

Flight

The flight checklist isn't really a checklist. It's a Do Constantly list. It's listed as a reminder. UAS operators must:

- Be constantly scanning for airborne traffic or obstacles. The observer must

report them immediately.
- Be constantly scanning for people on the ground in the flight area. The observer must report them immediately.
- Be constantly checking battery levels and returning before reaching 25 percent of the remaining capacity.
- Be constantly checking flight parameters like altitude to ensure they remain within restrictions and operational goals.

At battery changes, and at battery changes only, should the PIC, Observer and Journalist discuss changes to the operational plan. While the UAS is in flight, the PIC needs to focus on flying, and the observer needs to focus on hazards.

Post-Flight

The post-flight checklist is broken into three parts: Shutting down the drone, which is done by the PIC; inspecting the aircraft; and filling out logs. Logging is an important part of aviation safety and will serve as an important document in maintenance of your UAS.

Logging

UAS operations can be divided into three separate logs, largely transported over from manned aviation. They are a maintenance log, a battery log, and a flight log.

Maintenance Log

A maintenance log is a simple list of issues to be checked or fixed between flights. PICs should note any issue that should be checked, from an odd wobble, unusual sound, an unusually hot motor at landing, to a complete component failure. The log should include the date, UAS Make & Model, UAS Registration Number, the ID number of the battery used when the issue occurred, the issue, who reported it, the date repaired, who repaired it and notes.

Battery Log

A battery log serves as a warning for when a battery is getting worn out and could fail. UAS batteries will degrade, providing progressively less flight time. Fully charged batteries that go unused and are not discharged for over a week can also lead to damaged battery cells. A battery log will highlight failing batteries, and give the PIC a guide as to how much time a battery will give in flight. A battery log should note the date, UAS make and model, UAS registration number, the number of past charges, the percentage of battery power remaining at shutdown, total flight time, battery depletion rate, any signs of puffing (an indicator that the battery is damaged), and usage conditions. For example, if you loaded a DJI Inspire with a 360 video camera rig containing six GoPros cameras, and flew it on a 100°F, you would make note of those operating conditions.

Flight Log

A flight log will highlight the important events that occur from the time a UAS takes off to the time it has landed and been powered down by the PIC. Each UAS will have it's own log. It should note the date, the battery used during flight, and the total flight time. Each entry should also have space for important and relevant notes about the flight, which may include a mission overview, flying conditions, distance flown, take-off and landing locations, a hard landing, etc.

Normal Operating Checklists

What follows are the normal operating checklists to be completed for each flight.

Pre-Trip Checklist

Date: _____

Item	Action	Status
Batteries	Charge	
Controller Batteries	Charge	
Propeller nuts	Check and tighten	
Landing strut screws	Check and tighten	
Motor mount screws	Check and tighten	
Gimbal wiring	Check and tighten	
Gimbal mount	Check and tighten	
Gimbal camera harness	Check and tighten	
Compass wiring	Check and reseat	
Airframe check	Inspect for damage	
Registration markings	Check for display	
Camera battery	Charge	
Camera memory card	Check and empty	
Mission planning meeting	Record goals of the flight	
Airspace check	Consult airspace map, NOTAMs, TFRs	
Airport check	Contact ATC, if needed	

Pre-Flight Checklist

Date: _____

Item	Action	Status
Weather	Check location conditions against weather reports	
Wind conditions	Measure at location, check operation maximums	
Flight area	Visually inspect for hazards, note, and report	
Takeoff/landing area	Delineate and clear of debris	
Operations area	Delineate > 15 feet from takeoff area	
Flight area	If needed, secure flight area to be kept free from people to ensure safety	
Pre-flight meeting	Review goals	
WiFi	Turn off WiFi connectivity on any UAS mounted device, including cameras	
Airworthiness check	Visually inspect aircraft	
Airworthiness check	Visually inspect control surfaces and linkages	
Airworthiness check	Inspect props for balance, damage	

Pre-Flight Checklist Continued

Item	Action	Status
Airworthiness check	Check camera/gimbal security	
Airworthiness check	Verify controller batteries	
Airworthiness check	Verify controller is on	
Airworthiness check	Verify UAS battery	
Airworthiness check	Verify UAS battery is on	
Airworthiness check	Verify display panel working properly	
Airworthiness check	Calibrate compass, if necessary	
Airworthiness check	Check navigation and telemetry connection	
Non-PIC personnel	Leave takeoff area, if present	
PIC	Leave takeoff area before launch	
Video monitor	Check wireless connection	
All clear check	Check takeoff area, airspace, flight area	
Power up	Unlock motors, increase throttle	
Final pre-mission check	At low hover, check telemetry status	
Final pre-mission check	At low hover, check prop balance and controls	

Flight Checklist

Date: _____

Item	Action	Status
Airborne hazard check	Observer reports immediately (Over-communicate)	
Ground hazard check	Observer reports immediately	
Battery check	PIC monitors battery levels frequently	
Flight parameter check	PIC evaluates altitude	
Low battery alert	Return to landing area	
Battery change	Pilot in command changes the battery	
Battery change meeting	Evaluate mission goals	

Post-Flight Checklist.

Date: _____

Item	Action	Status
Battery removal	Pilot in command removes the battery	
Controller	Turn off after battery removal	
Motor check	Touch motors to check for overheating	
Camera	Turn off if required	
Memory card	Remove from camera	
Propellers	Visual inspection, log changes	
Landing struts	Visual inspection, log changes	
Gimbal	Visual inspection, log changes	
Housing	Return UAS to case after inspection	
Flight log	Update flight log	

Emergency Procedures

Lost Link/Mission Procedures

General Operational Guidelines: The RC link is for the PIC to directly control the aircraft. If the PIC enables the UAS to operate autonomously and automated flight functionality is lost, the drone will revert to RC control and the PIC will take over flight, return it to the landing zone and land. If the UAS starts showing any sign of not following the automated flight path, and the manual override doesn't happen automatically, the PIC should take the steps necessary for manual control. Check your UAS manual for how to manually override autonomous operation. If the RC link is lost, many commercial based UAS systems are configured with an automatic return to home procedure built-in to the UAS flight controller to prevent drift outside of the operation area.

Lost Autonomous Flight Procedure Checklist

Actor	Action
PIC	Verifies automated flight has stopped
PIC	Verbally notifies Observer
PIC	PIC assumes control via RC, if possible
Observer	Observer notifies other operations personnel
PIC	Returns UAS to pre-determined landing area as safely practical
PIC	Land UAS

Lost RC Control Procedure Checklist

Actor	Action
PIC	Verifies lost link
PIC	Verbally notifies Observer
Observer	Verbally notifies other operations personnel
PIC	Turns off RC controller
PIC	Turns RC controller on
PIC	If positive control returns, PIC lands immediately
PIC	If positive control does not return, PIC alerts Observer
PIC	Verifies that Return to Home function has engaged
PIC/Observer	Verifies that landing area is clear, clear if necessary
PIC	Upon UAS landing PIC turns off battery immediately

Emergency Assumption of Control

During any automated flight, if there is any concern that the UAS is not flying the planned mission or that control characteristics are abnormal, the PIC will take manual control of the UAS with RC control, return it to the landing zone if possible, and land it. There may be minor problems that do not require emergency assumption of control. In these cases, the GCS communication can direct the UAS to land or the PIC can manually land the UAS.

Emergency Assumption of Control Checklist

Actor	Action
PIC	Verifies abnormal operation
PIC	Verbally notifies Observer
Observer	Verbally notifies other operations personnel
PIC	Assumes control of UAS using RC
PIC	If necessary, begin emergency landing at a safe location
PIC	If practical, return UAS to pre-determined landing zone, execute landing

Loss of Sight

Regulations require that the UAS remain within Visual Line of Sight(VLOS) at all times. If, that VLOS is broken, the PIC should return to VLOS immediately if possible. If PIC cannot return UAS to VLOS, using the GCS, the PIC should execute a preprogrammed flight path to return to the landing zone.

Loss of Sight Checklist

Actor	Action
PIC	Notifies Observer of broken VLOS
Observer	Reports if UAS is within Observer's VLOS
Observer	If UAS is out of VLOS, alert PIC to begin Loss of Sight procedures
PIC	If possible, reverse course to return to VLOS as soon as safe
PIC	If course reversal is not possible, execute return to home procedure via RC Control or GCS
PIC	Report when UAS is in VLOS
Observer	Report when UAS is in VLOS
PIC	Post flight, record conditions that led to loss of VLOS

Other In-Flight Emergencies

In most emergency situations, the general protocol is to land as soon as is safely practical. In many emergency situations, landing at the pre-determined landing zone will not be possible. The goal is a controlled, safe landing.

Loss of Power/Motor

Actor	Action
PIC	Attempt control the UAS to land in open, safe area
PIC	Alert operations personnel of emergency situation
Observer	Alert others to emergency situation
PIC	Post flight, record details of flight for report

In-Flight Fire

Actor	Action
PIC	Attempt control the UAS to land in open, safe area
PIC	Alert operations personnel of emergency situation
Observer	Alert others to emergency situation
PIC	Post flight, record details of flight for report

Glossary

AGL - Above Ground Level.

GCS - Ground Control Station.

Journalist (as defined in this manual) - Responsible for communicating flight goals to the PIC before flight and verifying results after landing.

NOTAM - Notice to Airmen. A notice released by an aviation authority to alert PICs of potential hazards on a flight route, or at a location that could affect the safety of the flight.

Observer (as defined in this manual) - Responsible for monitoring the operational area to ensure that there are no hazards that may endanger the flight or people not part of the UAS flight operation team.

PIC - Pilot In Command. Responsible for all flight operations.

UAS - Unmanned Aerial System.

METAR - Aviation Weather Report.

VLOS - Visual line of sight. Part 107 requires PICs to fly their UAS within visual line of sight. Binoculars and other devices to extend vision are not allowed.