

# IDRA SAFETY MANUAL

## *Measures to Keep Our Pilots Flying*

January 2017

## **DRONE SAFETY MADE EASY**

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***FOREWORD:** IDRA has a vested interest in ensuring the safe operation of all aerial based systems under the team's banner. The joy and excitement of a brand new era of pilotage drives our commitment to ensure IDRA constituents know and understand the procedures that will maximize safety of flight. To meet this goal, pilots must focus on the adherence to federally mandated guidelines and the development of new drone technologies. Doing so will ensure not only protection of unmanned aerial systems (UAS) but all national airspace (NAS) users. This manual offers key instruction to help pilots fly safely. Being responsible is up to you.*



### **SAFETY IS EVERYONE'S BUSINESS**

The word safety is often used very loosely in the context of many day-to-day practices but this term is significantly more meaningful in the world of drone flying. Not only can a mistake cause irreparable damage or destruction of equipment, in some cases it can lead to personal injury or loss of life. For these reasons, flying responsibly is an absolute imperative for the entire UAS

community. Pilots must remain disciplined in meeting the expected standards of safe aviation activities and demonstrate zero tolerance for those who intentionally create operational flight hazards within NAS. In order to produce the best professional UAS experience, everyone must do their part as safety ambassadors.

## **RULES OF THE SKY**

Pilot proficiency hinges on a firm comprehension of the rules and regulations in place prior to flight activities. IDRA aims to familiarize UAS operators with key safety recommendations to avoid accidents and flight violations internationally. While this manual provides a great baseline for safety practices, keep in mind that every country in the world has different rules. Each pilot must become familiar with local policies that pertain to drone activities.

In conjunction with Chapter 4, Part 107 Subpart A, of the Federal Aviation Regulations as a reference and IDRA best practices the following applies:

### **Altitude Limitations**

- i. Remain below 400 feet above ground level (AGL) at all times.
- ii. (Location dependent) Operations within 5 miles of an active airport may further limit altitude to 100 feet AGL. Requires prior permission from the control tower.

### **Airspace Restrictions**

- i. Airport Proximity: When operating within 5 miles of an active airport, pilots must make coordination with the airport base operations facility (when facility is at the active airport) prior to airspace usage.
- ii. Flight within 3 miles of stadiums or sporting venues is prohibited one hour before and after all major events.
- iii. Do not over fly over people, public or government facilities (especially military bases), and national parks.

- iv. Do not overfly wild fires or natural disaster areas.
- v. Right of Way: Must operate the aircraft in a manner that does not interfere with and gives way to manned aircraft.

\*\* For real-time information about airspace restrictions and other flying requirements based on your location consult with your local governing aviation authority.

### **Operator Guidance**

- i. Never fly fatigued or under the influence of alcohol or drugs.
- ii. Remain aware of your surroundings, conduct obstacle avoidance planning as necessary.
- iii. Clearly mark take-off and recovery zones.
- iv. Conduct a thorough pre-flight inspection before every flight to verify all equipment is functionality properly.
- v. IDRA insurance is highly recommended to ensure coverage of liabilities to during drone activities.
- vi. Do not fly UAS commercially without the proper local aviation governing body endorsement or the proper insurance.
- vii. Maintain positive control of the aircraft at all times and do not out fly the structural limitations of your drone.
- viii. Never fly from a moving vehicle.
- ix. Do not perform photographic surveillance or invade the privacy of others. These acts are illegal and may result in confinement and/or forfeiture of your drone.

\*\*Careless flying may result in flight violations and substantial fines

### **System Limitations**

- i. Register your UAS in accordance with local policies set by the aviation governing authority. (i.e. In the US, the FAA requires all UAS weighing more than 0.55lbs to be registered)

- ii. UAS must be capable of sustained flight in the atmosphere.

### **Visual Line of Sight (VLOS) Requirements**

- i. Subject to local regulations (i.e. The FAA requires the aircraft to remain within VLOS at all times by a flying partner). Recommend flight during daylight hours only if training outdoors.

**\*\* VLOS requirements may be waived for IDRA sanctioned and other UAS events\*\***

### **FLYING SAFELY WITH VISUAL AUGMENTATION**

New visual enhancement technologies have revolutionized the drone pilot experience. Through the use of first-person view (FPV) goggles, pilots gain a vantage point as if they were onboard the aircraft. Cameras integrated into the structural frame of the platform provides the UAS controller with stunning aerial perspectives. FPV further allows the pilot to achieve an unprecedented level of responsiveness in aircraft performance. As a result, operators can now negotiate natural and man-made obstacles with exhilarating speed.

IDRA recommends the following safe practices to maximize FPV utilization:

- i. Conduct operations in an area that will not easily obstruct VLOS. Airparks, large open fields, and designated UAS flight areas are preferred.
- ii. Do not fly within 50 feet of populated areas with small children, elderly, or disabled persons that may impede your flight operations area. may lead to serious injury or damage to equipment.
- iii. Avoid acrobatic and abrupt maneuver flight without the use of a secondary spotter to help clear the aircraft of hazards. Two sets of eyes will reduce your likelihood of an accident.

- iv. Understand that flight near other drones, RC platforms, or model airplanes may produce frequency interference and cause loss of aircraft control. Discuss a plan with the other users on site to mitigate frequency management conflicts prior to flight.

## **FLIGHT PLANNING**

Safe flight operations are predicated on the notion of forward thinking prior to takeoff. Piloting aerial systems, while very exciting, requires a high level of dedication to doing things correctly. Unfortunately, flying a drone is not as easy as riding a bike. Aviation knowledge and flight planning serve as a means to reduce the risk of dangerous missteps and guarantee UAS proficiency. Some things to consider before each launch include site selection, weather considerations, hazards mapping, airspace de-confliction, system limitations (i.e. battery life, max aircraft range, etc....), and local laws.

Site selection: Choose the right location and time to train that limits competition for real estate or airspace. Although dedicated UAS training areas will be the best suited to meet performance desires, pick a time of the day that is less crowded to fly. Flying at home is also preferable if you have the requisite space. *See airspace restrictions on page 2 for further guidelines.*

Weather: Never lose sight of your aircraft. Flying in reduced visibility or inclement weather should be avoided at all costs. Additionally, extreme temperatures will limit aircraft performance; cold weather will significantly degrade battery life and high heat will greatly reduce engine performance. Adverse environmental conditions should not be taken lightly, a leading cause of death in the aviation community is bad weather.

Hazards Mapping: Prior to takeoff, conduct a map reconnaissance of your intended flight operations area using google maps or other mapping resource. Make special note of any terrain features, natural and man-made obstacles, and population areas that may impact your flight path. Print a copy

of the map with highlighted hazards areas to help you maximize your situational awareness.

Airspace De-confliction: If flying near several other pilots, discuss a plan to manage frequency use and review intended flight areas. Use additional observers as necessary to help prevent a mid-air collision. Do not fly into manned airspace above 400 feet.

Systems Limits: Know the capabilities of your UAS. Understand what limitations are specific to your aircraft per the operating handbook/user's manual. Knowing items such as the usable battery life and max range of your platform will help prevent injury and crashes.

Local Laws: Every city/state, may have more stringent rules and regulations pertaining to the operation of drones than what is listed in this manual. Research those local policies prior to engagement in flight activities.

## **PRE- & POST FLIGHT INSPECTIONS**

Pre-flight inspections ensure the structural integrity of your UAS is in tact and can meet the demands of flight that you expect. In preparation for flight, the use of a checklist is important so that no item is overlooked. Here is a simple checklist to follow in order to remain safe.

### **IDRA PRE-FLIGHT CHECKLIST**

1. Inspect aircraft for structural condition and security of all attachments. *\*Verify there are no cracks, worn or broken parts, and assembly is complete.*
2. Ensure UAS is fully charged.
3. Verify camera settings and adequate memory storage for flight.
4. Check current and forecasted weather conditions for flight period.
5. Set all flight modes to the appropriate settings for flight.
6. Verify flight operations area is clear of hazards.
7. De-conflict frequency usage with co-airspace users as required.

8. De-conflict operational flight areas with co-airspace users.
9. Check GPS signal reception and strength as required.
10. Secure a safe takeoff and landing zone that is clearly marked.
11. After aircraft start, check full range of motion of flight controls
12. Observe for any abnormal conditions
13. Fly safely

Post flight inspections aim to uncover any unsafe condition that may have occurred over the flight period. Identifying damage to or disassembly of aircraft equipment may prevent further degradation of systems and/or a total aircraft loss. Post flight items to check are found below.

#### **POST FLIGHT CHECKLIST**

1. Re-check condition and security of all aircraft attachments
2. Apply control locks as required
3. Re-check aircraft batteries
4. Log any damage or abnormal aircraft behavior during the flight
5. Log flight time, maneuvers, course data, and lessons learned
6. Clear all obstacles, markers, debris or other emplaced flight aids
7. Clean up your operations area

#### **DATA LINK DETERIORATION**

Electromagnetic interference, frequency saturation, and simply out flying the system's signal range are just a few of many reasons drones might lose link with the controller. The key is to think through this potential problem prior to flight. Depending on your drone variant, more planning may be involved to ensure safe operations are maintained. New technologies have helped ease the stress of dropping link mid-flight by integrating coding into drone flight systems to allow them to return to a pre-designated point rather than falling out of the sky. As the pilot, you must formulate a plan to mitigate the level risk associated with your drone type. By following the aforementioned procedures in this guide and coming up with a lost link plan, you will help best minimize your probability of an unintended mishap.

## **FLIGHT LOGS**

Flight logs are recommended but not required. Transcribing the events that occurred during your flight period can be a very useful resource in the long term. Logs serve as a great way to chronicle historical events and track trends in aircraft performance. Logged data also allows pilots to record their flight hours and note safety tips learned along the way. Flight logs and maintenance logs should be independent documents to avoid losing data and is a technique to keep things organized. Digital and analog products will work so long as consistency is maintained throughout the data management process.

## **RISK MANAGEMENT**

*(FAA System Safety Handbook Excerpt) Risk management, as discussed throughout this handbook is pre-emptive, rather than reactive. The approach is based on the philosophy that it is irresponsible and wasteful to wait for an accident to happen, then figuring out how to prevent it from happening again. We manage risk whenever we modify the way we do something to make our chances of success as great as possible, while making our chances of failure, injury or loss as small as possible. It's a commonsense approach to balancing the risks against the benefits to be gained in a situation and then choosing the most effective course of action.*

Prior to all IDRA sanctioned events, all event organizers must complete the IDRA risk assessment worksheet. However, all IDRA members are encouraged to become familiarized with the risk assessment worksheet document found on the IDRA website. Review risk assessment contents prior to personal flight training or other drone related activities as a guide to decrease the likelihood of an accident.



## **WHERE TO FIND THE REGULATIONS**

See our compliance section for a list of international regulatory agencies to help answer any questions pertaining to drone activities.

The proponent for regulatory guidance concerning UAS operations in the in the United States is the Federal Aviation Administration. Please visit the website at <https://www.faa.gov/uas/> for the latest UAS news and updates to regulations. This is also a good place to start if you have no locally established rules and regulations in your corner of the world.