Standard Operating Procedures and Guidelines for North Texas Drone User Group

Introduction
This document shall provide best practices and internal procedures for the safe operation of Unmanned Aircraft in all of the environments it may be asked to participate in at an NTDUG event. While it is difficult to make a one size fits all document for the many different types of locations we have flown in this should be considered the guideline to go to. Further, not all of these instructions will apply to all situations, use your best judgment and err to the side of safety.

Personnel qualifications

Pilot in Command (PIC)
The PIC shall be the individual with responsibility for all other personnel involved with the operation. For clarification, this section will include both the Pilot in Command and the Pilot at the Controls although they may both be interchangeable in most circumstances. The PIC shall have the minimum qualifications;

1. Knowledge of general AMA aviation practices
2. 20/20 corrected vision
3. Familiarity and operations of their own aircraft to include;
   a. The operator should have sufficient flights to be familiar of all flight characteristics
   b. Familiar with the latest revision of ground control software
   c. Emergency recovery procedures in failed link situations
4. Familiar with mission planning and preflight procedures
5. Versed in emergency procedures and contingency operations
6. Familiar with acceptable field repair and maintenance procedures

Pilot at controls (PAC)

1. Knowledge of general AMA aviation practices
2. 20/20 corrected vision
3. Familiarity and operations of their own aircraft to include;
   a. The operator should have sufficient flights to be familiar of all flight characteristics
   b. Familiar with the latest revision of ground control software
   c. Emergency recovery procedures in failed link situations
4. Familiar with mission planning and preflight procedures
5. Versed in emergency procedures and contingency operations
6. Familiar with acceptable field repair and maintenance procedures

Ground System Crew

1. 20/20 corrected vision
2. Familiarity and operations of their own aircraft to include;
   a. Familiar with the construction and configuration of each UA
   b. Familiar with GCS electronics and configuration
c. Familiar with field repair procedures for each UA

d. Familiar with the latest revision of ground control software

Observers

1. Shall understand the inherent risks of being in the vicinity of flight operations

Airframes

Materials incorporated into the UA should be tested as much as is reasonably possible and should be new and from a known manufacturer. As configured, the aircraft would be no more than ½ to ¾ of a mile laterally from the pilot at the controls. Each aircraft of type is flight tested in an isolated area to ensure airframe structure and propulsion capability are sufficient for the intended payload, operating environment, and maneuvers required before it will fly any mission stated herein.

Configuration

1. For either fixed wing or rotor or multi rotor aircraft configurations total all up weight shall not exceed 15lbs.
2. No aircraft shall exceed a speed of 70mph and use waypoints, RTL function only
3. Must be able to instantaneously deactivate programmed flight of autopilot systems at any time during flight and resume manual control of the model aircraft

Construction

The UA can be constructed of foam, Kevlar, carbon fiber, wood, plastic or other materials as long as they have a proven track record of being airworthy within the aircrafts flight envelope.

Propulsion

Aircraft may utilize brushless, three phase, AC motors that may require a switching electronic speed control to provide throttle management. Gas powered engines are allowed but must have a kill engine switch accessible on the transmitter and/or GCS.

Fly-Ins

Each Fly-In has its own unique circumstances that may affect the operation of the UA, safety factors, and personnel involved. The PIC will consider the following factors before authorizing any launch of his/her UA.

1. Weather
When possible, the PIC shall contact the closest flight service station for weather in the immediate area of operations. In lieu of that source, the local source of weather may be utilized through the internet, or may be observed on site. The PIC shall have final determination of risk due to weather and authority over any launch of his/her own aircraft

2. Hazards to the public
The PIC shall make every effort to ensure that flight operations will not pose
any undue risk to the public not directly involved with the effort. The PIC shall have final determination of risk to the public and authority over any launch of his/her own aircraft

3. Hazards to property
The PIC shall make every effort to ensure that flight operations will not pose any undue risk to any property in the area involved with the effort. The PIC shall have final determination of risk to the property and authority over launch of his/her own aircraft

4. Hazards to personnel
The PIC shall make every effort to ensure that flight operations will not pose any undue risk to the personnel directly involved with the effort. The PIC shall have final determination of risk to the public and authority over any launch of his/her aircraft

5. Proximity to controlled airspace
The PIC shall ensure that all unreported operations take place at least three (3) miles from any controlled airspace. Operations inside any controlled airspace shall be performed with permission of, and in constant communication with, the controlling authority of the airspace. The PIC shall have final authority over launch after clearance has been granted by the controlling authority. The controlling authority maintains the right to abort any flight operation regardless of the stage that operation is in.

Launch and Landing Zones

Launch Site Selection
Launch site selection shall be driven by safety first and foremost. Selection of launch sites will be considered based upon:

1. Ability to maintain adequate buffer zones between aircraft and personnel
   RPSS personnel shall maintain a buffer of at least 50 feet between aircraft operations and all non-essential personnel. Observers shall act as safety supervisors while not performing the duty of in flight observer.

2. Environmental Assessment
   No launches shall occur until all environmental assessments have been considered. Personnel have final authority to abort any launch based upon hazard to the environment, themselves, or other personnel in the area.

3. Departure over sparsely populated corridors
   The PIC shall make every effort to select a launch site that minimizes departures over populated areas. If flights over populated areas must take place the PIC shall plan each flight to minimize the time of areas of concern.

Landing site & Alternate landing sites

1. Primary Landing site
   Typically the primary landing shall be the same as the launch site. The PIC has final
authority for any approaches to the primary site and may wave off any approach deemed unsafe.

2. Alternate landing sites
The PIC shall designate at least one alternate landing site. In the event that a wave off is not possible and the primary landing site is deemed unsafe, procedures to utilize the secondary site will be invoked.

3. Mission Abort Sites
The PIC may optionally designate an “abort site” whereby the aircraft may be “dumped” in an emergency situation. The abort site shall be so far removed as to provide absolute minimal risk should the aircraft be required to vacate airspace in an emergency. Should the PIC deem it necessary the UA may be flown to this site and inserted without regard to the safety of the aircraft or flight equipment.

4. Approaches over populated areas.
The PIC shall make every effort to select a landing site that minimizes approaches over populated areas.

5. Landing Safety & Crowd control
All landing sites shall be maintained and operated as the launch sites. Personnel shall maintain a buffer of at least 50 feet between aircraft operations and all non-essential personnel.

Preflight, Takeoff, and Post flight Checklists

Primary Responsibility
Preflight activities are completed and verified by the PIC before takeoff, generally upon arrival at the location and the operation is to be performed. Activities in this segment refer to all knowledge gathering, area assessment, and actions performed on the aircraft before taxi or takeoff. These include inspection of aircraft, assessment of the operating location, coordination with other crew members involved in the operation, and equipment checkouts.

Mission Plan
The mission plan shall contain all actions and contingencies for the mission planned. Any limiting factors in the flight environment may alter the intended operation and modify the mission plan accordingly. Contingency planning should include safe routes in the event of a system failure, degraded performance, or lost communication link, if such a failsafe exists.

Airframe
The airframe shall be given a thorough inspection thru the use of a checklist. The content of the checklist will be as follows:

1. Before the first flight of the day, verify all transmitter, on-board aircraft, and camera batteries are fully charged.
2. Check all control surfaces for signs of damage, loose hinges, and overall condition.
3. Check the control linkages are secured and the condition of the control horns and brackets.
4. Check the wing to make sure it is in good structural condition and properly secured and aligned to the airframe.
5. Check the motor/engine and mounting system to make sure it is firmly attached to the airframe.
6. Check the propeller or rotor blades for chips, cracks, looseness and any deformation
7. Check the landing gear (if applicable) for damage, for secure attachment, and the wheels are in good shape and rotate freely.
8. Check that the servos are firmly attached to the airframe and all receiver connections are secure.
9. Check all electrical connections making sure they are plugged in and secured to the airframe.
10. Check that the photography equipment and mounting system are secure and operational.
11. Perform an overall visual check of the aircraft prior to arming any power systems.
12. Repair or replace any part found to be un-airworthy in the pre-flight prior to takeoff.

Flight Control/Ground station
1. Ensure there are no frequency conflicts by use of frequency scanner before turning on transmitter.
2. Ensure that there are no identical NET ID's operating in your area.
3. Make sure that all of your body parts, clothing, other obstructions, and bystanders are well away from any propeller or rotor and its arc before turning power on to any systems. Make sure the aircraft is secure and will not move if the motor was suddenly powered up.
4. Announce out loud - "CLEAR PROP".
5. Turn on the transmitter. If it displays information such as aircraft memory and battery voltage, be sure these numbers are correct.
6. Make sure that the throttle stick on the transmitter is in the power off position.
7. Connect the battery and/or turn on the power switch to the aircraft.
8. Follow the recommended range test procedures as outlined in your radio transmitter/receiver owner's manual.
9. Check for proper operation of control surfaces.
10. Check that all servos are steady and not chattering or making any other abnormal noise when in operation or idle.
11. Check the motor/engine for proper operation. Firmly secure the aircraft and gradually increase the throttle to full power and back down to idle - checking for lack of thrust, vibration or other possible anomalies. Check that the motor stops completely when the throttle stick is at the off position.
12. Ensure the triggering device is working correctly.

Before Take Off:
1. Confirm transmitter antenna is fully extended.
2. Confirm transmitter trims settings in proper position.
3. Confirm receiver antenna is fully extended.
4. Check that the take off area is clear of obstructions and people.
5. Double check weather conditions and review potential emergency landing areas.
6. Set flight timer alarm.
7. Announce out loud - "PREPARING TO TAKE OFF."
8. Launch aircraft.

In-Flight:
1. Climb to a safe altitude away from potential hazards and check control systems.
2. Reset trims if necessary.
3. Keep aircraft at a safe operating distance from people and buildings.
4. If aircraft must be flown over buildings or people, maintain a safe altitude for recovery & make every effort to minimize exposure.
5. Continually scan the flight and ground areas for potential hazards.

Landing:
1. Check the control systems and set the trims that if necessary, an emergency abort landing can be made.
2. Scan landing area for potential obstruction hazards and recheck weather conditions.
3. Announce out loud - "PREPARING TO LAND."
4. Always be prepared to go around.
5. Carefully land the aircraft away from obstructions and people.

Post-Flight:
1. Turn the power off to the aircraft and/or disconnect the batteries.
2. Turn off the transmitter.
3. Turn the power off to the photo equipment.
4. Visually check aircraft for signs of damage and/or excessive wear.
5. Remove the unused fuel if applicable.
6. Secure the aircraft.

Field Repairs
After recovery of the aircraft, if an inspection should reveal any damage, the PIC may authorize the field repair of the aircraft. Field repairs can consist of two types, critical and non-critical.

1. Non-critical repairs are repairs made to the airframe or components that are not critical to the flight control or function of the aircraft in its assigned mission. Repairs of this nature are patches to covering, replacing fairings or cowlings, or repairs that enhance the mission payload.

2. Critical repairs or those repairs that must be made that directly affect the ability of the aircraft to perform its function and to continue the mission. Typical repairs of this nature would be such as replacing a motor, or replacing a flight control servo.

Clearing the scene

Environmental considerations
Personnel shall leave as small an environmental footprint as possible. The immediate area around the flight operations shall be policed for equipment,
personal items, or trash. Any material that was removed to make way for flight operations shall be returned and re-established as it was found.

The above guidelines and SOP's will be adhered to at all NTDUG events. Failure to adhere to the guidelines shall be, on a case by case basis, grounds for expulsion from NTDUG. Further, any member knowingly operating their aircraft in a manner that is grotesquely dangerous (at an NTDUG event or otherwise) will not be welcomed at any future NTDUG event.