Mutual Aid Box Alarm Systems
Unmanned Aircraft Systems Program (UAS)

Flight Operations and Deployment

OVERVIEW

This policy presents the standard operating procedures for flight operations and deployment to be conducted by all agencies that operate small Unmanned Aerial Systems (sUAS) under the MABAS-Illinois Public COA. The procedures set forth in this policy must be adhered under the MABAS-Illinois Public COA. Operational guidance and best practices referenced here will be documented in a separate attachment.

SCOPE

This policy is broken down into four procedural parts to address all aspects of a deployment, from pre-flight to post-flight procedures. The four procedural parts are as follows: In service, pre-flight, flight operations, post-flight. Further operational guidance may be provided in addendums or attachments to this document.

A. IN-SERVICE INSPECTION

1. Description

All in service UAS and support equipment shall be kept in an airworthy and deployable state at all times to ensure expedient deployment. The following procedures shall be followed after each deployment so that all UAS and support equipment remain airworthy and ready. This inspection is expected to take an experienced Pilot in Command (PIC) no greater than forty-five (45) minutes to complete.

2. Responsibility of performance

If returning from an operation the Remote Pilot in Command (RPIC) assigned to the previous operation shall be responsible for ensuring the following procedure is conducted before the aircraft is approved to be placed in service. If the equipment is being placed in service from being out of service or is newly acquired, the UAS Coordinator or their designee, shall be responsible for ensuring the following procedure is conducted before the aircraft is approved to be placed in service.

a. Nothing in this policy shall prevent other qualified flight crew or operations personnel in assisting in these tasks, at the sole discretion of the Remote Pilot in Command (RPIC) or UAS Coordinator.

3. Period of performance

The Remote Pilot in Command (RPIC) shall ensure the in-service inspection is completed before the aircraft is placed in service if any of the following conditions are met:

a. The aircraft is returned from a deployment or training, regardless if it was flown.

b. The sterile seal on the aircraft's case is missing, broken or damaged.

c. The aircraft receive routine service or upgrades.

d. Seven (7) days have passed from the time of last inspection.

4. Inspection procedures

a. Records review

The Remote Pilot in Command (RPIC) shall inspect the UAS records to verify the following:

- Aircraft registration current.
- No abnormal operating conditions or previous damage reported
- No recalls, directives, safety bulletins, or warnings from the UAS manufacturer.
- Consumable parts (including but not limited to props and batteries) within manufacturer's specified interval.

NOTE: If any of the above items are found to be deficient, the aircraft shall immediately be grounded and removed from service until the deficient items are corrected.

b. Visual inspection

The Remote Pilot in Command (RPIC) shall inspect the UAS components to verify the following. No cracking, chipping, bending, punctures, heat damage, or any unusual wear, other than cosmetic blemishes on superficial components present on any of the following items:

- UAS airframe
- UAS powertrain (confirm motors spin smoothly, freely and silently by hand).
- Payloads
- Flight control station
- Rotors and aerodynamic components
- Batteries
- Aircraft is clean and free of contamination

NOTE: If any of the above items are found to be deficient, the aircraft shall immediately be grounded and removed from service until the deficient items are corrected in accordance with manufacturers guidance.

c. Software and firmware inspection

The Remote Pilot in Command (RPIC) shall inspect the UAS software and firmware to verify the following:

- Aircraft firmware is up to date on all components per manufacturer's directives.
- Flight control station firmware is up to date per manufacturer's directives.
- Supporting ground control software is up to date per manufacturer's directives.

NOTE: If any of the above items are found to be deficient, the aircraft shall be updated to the requisite firmware and software versions before returning to service.

d. Battery charging

The Remote Pilot in Command (RPIC) shall inspect the UAS batteries and verify the following:

- Batteries are charged and maintained in accordance with manufacturer's guidance.
- Fuel management indications (voltage, current capacity) is calibrated, functional and correct.
- Batteries are maintained at a state of charge to facilitate immediate deployment.

NOTE: If any of the above items are found to be deficient, the batteries shall be charged, cycled, calibrated and or maintained according to the manufacturer's guidance before returning to service.

e. UAS test flight

If the inspections above indicate no evidence of material deficiency of the UAS, the Remote Pilot in Command (RPIC) shall conduct a brief test flight, consisting of the following to verify the functionality of the UAS.

- Prepare the UAS for flight as recommended by the manufacturer in a location free of environmental hazards.
- Ensure any applicable geo-fencing unlocks are properly applied to the UAS.
- Ensure proper operation of sensors and payloads through all ranges of motion.
- Ensure proper recording of data from each sensor or payload with recording capability.
- If equipped, verify that the UAS has established a GPS connection in excess of eight (8) satellites. Watch for rapid or unexplained loss of GPS link.
- Verify that the aircraft telemetry does not indicate any warnings or abnormal conditions. If warnings are present, follow manufacture's recommendations.

- Start the motors and confirm no abnormal sounds (such as grinding, scraping, clunking, or rapid pulsations) can be heard.
- Takeoff and hover at a suitable altitude to verify UAS controllability, low enough to make an immediate emergency landing if necessary (approx. 10-15' AGL).
- Ascertain all primary flight controls (throttle, pitch, roll, yaw,) perform as expected. Carefully observe the UAS for unexpected movements.
- If UAS is equipped with return to home feature, validate its functionality consistent with manufacturer specifications.
- If UAS is equipped with flight mode switch, ensure proper operation of sUAS in each flight mode.

f. Tamper indicating seal

- After the aircraft has been deemed airworthy by the Remote Pilot in Command (RPIC) and placed in service, a tamper indicating sealing device shall be affixed around one or more latches on the UAS flight case to prevent tampering before flight.
- If the seal is found to be missing, broken or damaged, the UAS shall be assumed unserviceable, and the inspection must be performed again to return the aircraft to service.
- Batteries may be stored separately from the sealed case, if necessary, to maintain a deployable state of charge.

g. In-service report

Filing of the return to service report shall be performed by any MABAS Remote Pilot in Command (RPIC) responsible for returning a MABAS owned aircraft to service. While not compulsory for non-MABAS owned aircraft, it is highly recommended that agencies document return-to-service inspections to limit liability.

- The in- service report shall be completed and signed by the Remote Pilot in Command (RPIC) returning a MABAS owned aircraft to service.
- Completed in-service reports for the previous ninety (90) days shall be kept with the aircraft and other supporting documentation (registration certificate), and be immediately accessible at all times the UAS is in operation.
- The agency or division to which the UAS is assigned may file or digitize any in-service report older than ninety (90) days.
- It is the responsibility of the division or agency to which the MABAS asset is assigned to maintain all in-service records for twelve (12) months.
- Reports older than eighteen (18) months may be destroyed at the agency's or division's discretion.

B. PRE-FLIGHT PROCEDURES

The following procedures have been developed to ensure proposed UAS operations can be conducted safely and effectively and that UAS flight crews are adequately. Pre-flight procedures shall be performed in advance of each flight operation, regardless of the nature of the operation. The pre-flight procedures consist of both pre-flight planning and operations.

Pre-flight planning

1. Description

Pre-flight planning should be performed in advance of any flight, regardless of type, to ensure the flight crew is familiar with all available information concerning that flight, and has developed strategies necessary to tackle any expected or unforeseen hazards.

2. Responsibility of performance

The Remote Pilot in Command (RPIC) shall be solely and completely responsible for ensuring the following procedure is conducted before flight.

a. Nothing in this policy shall prevent other qualified flight crew or operations personnel in assisting in these tasks, at the sole discretion of the Remote Pilot in Command (RPIC).

3. Period of performance

The Remote Pilot in Command (RPIC) shall ensure this procedure is completed in advance of any flight operation before the UAS asset is deployed.

4. Pre-flight planning procedure

a. Ensure mission feasibility

The Remote Pilot in Command (RPIC) shall ensure that the requested operation is a good candidate for UAS deployment, can be completed safely and legally, and that the operation occurs in an official capacity, in accordance with the policies and procedures of the AHJ.

- If a policy or procedure of the AHJ is found to appreciably and irreconcilably conflict with the provisions required by this document, or any provision of any FAA authorization or waiver granted to MABAS or the AHJ, the flight crew shall abide by the procedures described herein, or the applicable FAA waiver or authorization and the procedures described therein.

b. Assign crewmembers

The Remote Pilot in Command (RPIC) shall ensure all flight crewmembers meet the training and currency requirements needed to exercise the duties of their crew position assignment.

c. Check airspace (local hazards)

The RPIC Remote Pilot in Command (RPIC) shall become familiar with the local airspace of the intended operation and ensure any authorization required to operate within the airspace in which the flight will take place is obtained. Additionally, the Remote Pilot in Command (RPIC) shall quantify any physical hazards effecting UAS operations in the vicinity. The Remote Pilot in Command (RPIC) should verify the following:

- Class of airspace flight will occur in.
- Configuration of closest airport.
- Contact number, tower or CTAF frequency for closest airport.
- Any TFRs current or expected for the operating area.
- Identify potential terrestrial hazards to flight.
- Identify potential safe areas for takeoff and landing.

d. Check weather

The Remote Pilot in Command (RPIC) shall ensure that the current and predicted weather in the vicinity of the proposed UAS operation is above legal VFR minimums and does not pose a hazard to the intended operation. The Remote Pilot in Command (RPIC) shall retrieve this information from an approved aviation weather source, and should pay special attention to the following:

- Cloud conditions
- Surface visibility
- Wind direction and speed
- Temperature / dewpoint
- Density altitude
- Precipitation
- AIRMETs, SIGMETs, and other advisories.

e. File NOTAM, SGI or TFR. (If applicable.)

- NOTAM**:** If necessary, due to the nature of the intended flight, weather conditions, airspace or stipulation in any COA or waiver, the Remote Pilot in Command (RPIC) shall file a Notice to Airmen (NOTAM) with flight service as soon as is practicable before the commencement of the operation.
- SGI: If flight operations in the direct support of active emergency response operations require relief from a federal aviation regulation, COA provision, or occur in an active TFR, the Remote Pilot in Command (RPIC) shall file a Special Governmental Interest Addendum (SGI) with the FAA System Operations Security Center before flight.

- TFR: If the Remote Pilot in Command (RPIC) has reason to believe that due to the nature of the intended operation, an undue hazard exists to any and all aircraft in the vicinity (other than the UAS) the Remote Pilot in Command (RPIC) may file a Temporary Flight Restriction (TFR) with the FAA System Operations Security Center before flight.

f. Coordinate with other air assets. (If applicable.)

If the nature of the intended operation requires or expects the presence of cooperative air assets (manned or unmanned) other that the UAS, the Remote Pilot in Command (RPIC) shall coordinate with the Pilot in Command (PIC) of each responding air asset to review the flight plan of each aircraft. The Pilot(s) in Command of all responding air assets shall reach a consensus on risk mitigation, traffic deconfliction, and emergency procedures before flight.

g. Assess flight risk

Once familiar with all available information pertaining to the intended flight, the Remote Pilot in Command (RPIC) shall assess the risk posed by the intended operation, and shall determine if the risk posed by deploying the UAS asset is acceptable given the circumstances and nature of deployment. The Remote Pilot in Command (RPIC) should use an applicable and standardized Flight Risk Assessment Tool (FRAT) to objectively quantify this assessment.

h. Briefing flight crew

Once familiar with all available information pertaining to the intended flight and acceptable risk, the RPIC shall brief the flight crew on the information pertaining to the flight, as required by the flight crew to ensure the safe and effective performance of their duties. The Remote Pilot in Command (RPIC) shall brief the flight crew on implementing any risk mitigations identified in the risk assessment. If multiple flights are to be taking place simultaneously, this briefing shall be done with all RPICs involved and performed by the UAS Coordinator/Lead RPIC.

The mission briefing shall include:

- Airspace authorization.
- Altitudes to be flown.
- Mission overview, including handoff procedures.
- Frequencies to be used, both for aircraft and verbal radio communications.
- Flight time, including reserve fuel or battery requirements.
- Contingency procedures, including lost link, divert, and flight termination.
- Hazards unique to the flight being flown.
- Protocol to prevent in-flight conflict.

Pre-Flight Operations

1. Description

Pre-flight operations should be performed in advance of any flight, regardless of type, to mitigate potential local hazards immediately before the flight, confirm that all UAS equipment is functional and airworthy, ensure the flight crew is in position and has been briefed, and verify that mission objectives can be met.

2. Responsibility of performance

The Remote Pilot in Command (RPIC) shall be solely and completely responsible for ensuring the following procedure is conducted immediately before flight.

a. Nothing in this policy shall prevent other qualified flight crew or operations personnel in assisting in these tasks, at the sole discretion of the Remote Pilot in Command (RPIC).

3. Period of performance

The Remote Pilot in Command (RPIC) shall ensure this procedure is completed in advance of any flight operation, and should be completed when the UAS arrives on scene, shortly before takeoff.

4. Pre-flight operations procedure: (Scene arrival.)

a. Coordinate with Incident Command to determine the following:

- Determine the cold-zone and warm-zone landing and take-off areas.
- Determine UAS operating area.
- Determine mission objectives and the impact to overall flight operations.

b. Pre-flight inspection of the UAS
   - The Remote Pilot in Command (RPIC) shall perform a complete preflight inspection of the UAS, as specified by the UAS manufacturer to ensure the UAS is in a condition for safe operation.
   - If the UAS manufacturer does not specify a preflight inspection, the Remote Pilot in Command (RPIC) should use the inspection procedures described in sections (B) and (E) of this chapter.

c. Establish takeoff and landing areas
   - Upon arrival, the Remote Pilot in Command (RPIC) shall establish areas to be reserved for takeoff and landing of the UAS.
   - These areas shall be clearly demarcated and visible by all persons in the vicinity of the flight operation.
   - The Remote Pilot in Command (RPIC) shall establish one or more locations, separate from normal operating areas for landing in the event of an emergency.

d. Validate risk assessment
   - The Remote Pilot in Command (RPIC) shall reassess the operational risk posed by the intended flight, accounting for any changes in weather, air traffic, airspace, environmental conditions, and incident activity.
   - The Remote Pilot in Command (RPIC) should use an applicable and standardized Flight Risk Assessment Tool (FRAT) to objectively quantify this assessment.
   - The Remote Pilot in Command (RPIC) shall take action to mitigate identified risk, and discontinue the flight if significant hazards to flight cannot be remedied.
   - The Remote Pilot in Command (RPIC) shall ensure that all implemented actions do not create new hazards to the operation.

e. Operation briefing
   - The Remote Pilot in Command (RPIC) shall ensure that each UAS crewmember is adequately briefed on any and all available information pertaining to the flight and mission as well as their respective responsibilities. At a minimum, the briefing should consist of the following.
     - Mission objective, strategy and tactics.
     - Operational environment (airspace, weather, traffic, terrestrial hazards).
     - Identified hazards and remedies.
     - Special procedures for compliance.
     - Any special operating circumstances.
     - Roles, responsibilities and expectations of each crewmember.
   - All briefings shall be conducted with sufficient prior notice to ensure that all crewmembers are adequately informed before flight.
   - All crewmembers assigned to the UAS team shall receive a mission briefing prior to assuming their position.

f. Routine debriefing
   - After mission completion, crew changeover, or landing, the flight crew shall debrief to identify and provide solutions to any hazards encountered before the next flight begins. A post-flight briefing should consist of at least the following:
     - Hazards encountered during flight and necessary mitigations.
     - Progress of mission in comparison to objectives.
     - Strategy and tactics necessary to meet objectives.
     - Any changes in operational strategy or tactics for next flight.

C. FLIGHT OPERATIONS, OPERATING LIMITATIONS (DAY)

1. Description

The following section describes the operating procedures and limitations of the UAS during flight, to ensure the safe, effective and lawful operation of the UAS during daylight. For the purposes of this section, daylight is the period between morning civil twilight, and evening civil twilight, as defined in 14 CFR § 1.1.

2. Responsibility of performance

The Remote Pilot in Command (RPIC) shall be solely and completely responsible for ensuring the UAS operates safely, and remains within all operating limitations during flight.

a. Nothing in this policy shall prevent other qualified flight crew or operations personnel in assisting in these tasks, at the sole discretion of the RPIC.

3. Period of performance

The Remote Pilot in command shall ensure that the UAS is within its operating limitations at all times during flight.

4. Operating procedure

a. Startup, takeoff and landing

- When the Remote Pilot in Command (RPIC) is prepared to start the motors of the UAS, the RPI shall ensure that all persons are clear of the takeoff and landing areas and shall announce his/her intention to start the motors; e.g. "***Clear Prop!***" (or similar).
- When the Remote Pilot in Command (RPIC) is prepared to take off and begin initial climb, the RPIC shall ensure that all persons are clear of the takeoff and landing areas and shall announce his/her intention to take off; e.g. "***Taking Off!***" (or similar).
- When the Remote Pilot in Command (RPIC) is prepared to descend to land, the RPIC shall ensure that all persons are clear of the takeoff and landing areas and shall announce his/her intention to land; e.g. "***Landing!***" (or similar).

b. Sterile cockpit

At all times during the UAS operation, no crewmember shall engage in any operation, conversation, activity or duty unnecessary for or unrelated to the safe operation of the UAS.

c. Transfer of flight controls

During operation, it may become necessary to transfer the flight controls to another qualified remote pilot. If the Remote Pilot in Command (RPIC) determines the flight controls should be transferred, the following procedure shall be followed:

- RPIC arranges and briefs the recipient of the flight controls.
- RPIC confirms intentions to transfer flight controls to crewmember; e.g. "***You have the controls***".
- Crewmember confirms positive transfer of flight controls; e.g. "***I have the controls***".
- RPIC confirms positive transfer of the controls; e.g. "***You have the controls***".

NOTE: The transfer of flight controls does not relieve the RPIC of authority over and responsibility for the operation of the UAS, unless the controls are transferred to a qualified remote pilot, and the transfer of authority is briefed in advance.

5. Operation of Multiple UAS

a. UAS Tactical Group Supervisor

When operating more than one UAS on any incident, a UAS Tactical Group Supervisor shall coordinate between flight crews.

b. Requisite training

All flight crewmembers assigned to perform duties on a multiple UAS operation shall have received applicable practical and didactic training on the operation of multiple UAS.

- This training shall be documented by the sponsoring agency and;
- This training shall be conducted in other than congested areas, well clear of residential structures, moving vehicles, nonparticipating persons, and watercraft.

c. Marking of aircraft

Each UAS, ground control station or flight controls should have applicable markings as a means to distinguish the UAS from others at the incident scene.

d. Unique lighting of aircraft

Each UAS shall utilize lighting of an individual color to identify the individual aircraft controlled by each flight crew.

- This lighting shall be used day or night, and shall be designed to be visible from at least three (3) statute miles by the flight crew.
- The intensity of this lighting may be reduced in the interest of safety because of operating conditions.
- This lighting is intended solely for visual reference by the flight crew, and may not comply with the requirements of anti-collision lighting described in section (D) (4) (c) of this chapter.

e. Separate crewmembers

A separate Remote Pilot in Command (RPIC) shall be used for each operating UAS.

- If the UAS operation requires or utilizes a Visual Observer (VO) or Payload Operator (PO), each UAS shall use a separate Visual Observer and Payload Operator.

f. Separation protocol

After conducting a pre-flight briefing as described in section (B) (4) (h) of this chapter, the Remote Pilot in Command (RPIC) shall ensure a suitable protocol is established to prevent conflict between aircraft during the following:

- Launch, takeoff, or initial climb.
- Enroute flight.
- Landing and recovery.
- Lost link, return to home, or emergency procedures.
- Loss of GPS or autopilot.
- Engine or drivetrain failure.

6. Operating limitations

a. Maximum altitude

The maximum altitude for UAS operations shall be four hundred feet (400ft) Above Ground Level (AGL). If within four hundred feet (400ft) laterally of a structure, up to four hundred feet (400ft) above the structure's uppermost point.

b. Airspace

The UAS shall operate only within Class G airspace unless expressly authorized.

c. Weather

No UAS operations shall occur when the in-flight visibility is less than three (3) statute miles, closer than five hundred feet (500ft) to the base of any cloud, or closer than two thousand feet (2000ft) horizontally to a cloud.

d. Simultaneous operation

No person shall act as a remote Pilot in Command (PIC) or Visual Observer (VO) for more than one unmanned aircraft at one time unless otherwise expressly authorized by a COA, waiver, or SGI addendum.

e. Operations from moving vehicles

No operations from a moving vehicle or watercraft unless the operation is over a sparsely populated area and the Pilot in Command (PIC) and Visual Observer (VO) are co-located (if used).

- Operations from a moving aircraft are prohibited.

f. Medical condition

No person shall manipulate the flight controls of a small unmanned aircraft (sUAS) system or act as a remote Pilot in Command (PIC), Visual Observer (VO), or direct participant in the operation of the sUAS, if he or she has a physical or mental condition that would interfere with safe operations.

g. Visual Line of Sight (VLOS)

With vision that is unaided by any device other than corrective lenses, the Remote Pilot in Command (RPIC) and Visual Observer (VO) shall be able to see the UAS during its entire flight in order to (if one is used):

- Know the unmanned aircraft's location.
- Determine the unmanned aircraft's attitude, altitude, and direction of flight.
- Observe the airspace for other air traffic or hazards.
- Determine that the unmanned aircraft does not endanger life or property.

NOTE: Flight instrumentation may be used to augment situational awareness, but may not be used to extend the operating area beyond the flight crew's line of sight.

h. Operations over nonparticipants

Except when necessary to safeguard human life, the UAS shall never operate directly over persons or moving vehicles, other than qualified non-crewmembers as defined the United States Code, 49 U.S.C. § 40125: Qualifications for public aircraft status.

- If the UAS must operate in the vicinity of nonparticipating persons or moving vehicles, it is the responsibility of the Remote Pilot in Command (RPIC) to ensure that in the case of a powerplant failure, the UAS shall not endanger the safety of persons or moving vehicles below.
- For those operations where it is necessary to operate over persons, in order to safeguard human life, the Remote Pilot in Command (RPIC) shall not operate any lower or in closer proximity to human beings than is necessary to accomplish the operation.
- UAS with non-redundant powertrains (e.g. quadrotors) that will routinely operate over or in the vicinity of persons should be equipped with an automatically activated ballistic airframe parachute or similar device to limit hazards in the event of a failure.

i. Tethered operations

Tethered operations (if conducted) shall adhere to the Obstruction Marking and Lighting Requirements of FAA Advisory Circulator No:70/7460-1L. Standards for marking and lighting obstructions that have been deemed to be a hazard to navigable airspace.

j. Hazardous operation

No person shall operate a small unmanned aircraft system in a careless or reckless manner that could reasonably be suspected of endangering life or property.

k. Emergency deviation

In an in-flight emergency requiring immediate action, the Remote Pilot in Command (RPIC) may deviate from any provision of this policy, FAA regulation, provision or authorization to the extent necessary to meet that emergency.

- After a necessary emergency deviation, the RPIC shall submit within twenty-four (24) hours a completed MABAS Deviation Report Form.

l. Right of way

The UAS shall yield the right of way to all manned aircraft, airborne vehicles, launch, and reentry vehicles, except:

- When the other aircraft is participating in the operation and has been briefed in accordance with section (B) (4) (f) of this chapter.

- When the UAS flight crew is able to establish and maintain communications with the other aircraft and has coordinated adequate separation.
    - For the purposes of this chapter, yielding the right of way means that the small unmanned aircraft must give way to the aircraft or vehicle and may not pass over, under, or ahead of it unless well clear.

D. FLIGHT OPERATIONS, OPERATING LIMITATIONS (NIGHT)

1. Description

The following section describes the operating procedures and limitations of the UAS during flight, to ensure the safe, effective and lawful operation of the UAS during night. For the purposes of this section, night is the period between evening civil twilight, and morning civil twilight, as defined in 14 CFR § 1.1.

2. Responsibility of performance

The Remote Pilot in Command (RPIC) shall be solely and completely responsible for ensuring the UAS operates safely, and remains within all operating limitations during night flight.

a. Nothing in this policy shall prevent other qualified flight crew or operations personnel in assisting in these tasks, at the sole discretion of the RPIC.

3. Period of performance

The Remote Pilot in Command (RPIC) shall ensure that the UAS is within its operating limitations at all times during night flight.

4. Operating Procedure

The operating procedure for UAS operations that occur at night shall be identical to those conducted during day, with the following exceptions:

a. Requisite training

All flight crew members shall have completed requisite training to recognize and overcome visual illusions caused by darkness, and understand physiological conditions which may degrade night vision.

b. Visual Observer (VO)

All operations at night shall use one or more visual observers.

c. Anti-Collision Lighting

The UAS must be equipped with anti-collision lighting visible from a distance of no less than three (3) statute miles. The intensity of the anti-collision lighting may be reduced if, because of operating conditions, it would be in the interest of safety to do so.

- Additionally, in order to comply with 14 C.F.R. § 91.209, the aircraft must have position lighting that enables determination of location altitude, and direction of flight.

d. Site Illumination

The area of operation must be sufficiently illuminated before flight to allow both the Remote Pilot in Command (RPIC) and Visual Observer (VO) to identify people or obstacles on the ground.

- (Add unless preplanned.)

E. POST FLIGHT OPERATIONS

1. Description

The following section describes the logging and reporting procedure that is expected to be completed after each flight occurring under the MABAS COA.

2. Responsibility of performance

The Remote Pilot in Command (RPIC) shall be solely and completely responsible for ensuring the requisite reporting is completed after flight.

a. Nothing in this policy shall prevent other qualified flight crew or operations personnel in assisting in these tasks, at the sole discretion of the Remote Pilot in Command (RPIC).

3. Period of performance

The Remote Pilot in Command (RPIC) shall ensure that the following reports are completed no later than seventy-two (72) hours after the completion of the flight.

4. Required reporting

a. Post-flight report

- Shall be filed by the Remote Pilot in Command (RPIC) after any flight operation in response to a terrestrial emergency as part of a MABAS deployment.
- May be filed after routine operations that are conducted under Part 107 of the Federal Aviation Regulations.
- Submit to UAS Section Chief within seventy-two (72) hours.

b. Accident report shall be filed to the UAS Section Chief within twelve (12) hours in the event of:

- Serious or life-threatening injury to any person.
- Major airframe damage to the UAS or third (3rd) party property.

c. Deviation report shall be filed with the UAS section Chief within twenty-four (24) hours in the event of:

- An in-flight deviation from any applicable federal aviation regulation, provision granted in the MABAS COA, or MABAS UAS Policy, including, but not limited to, the following:
  - Deviation from an air traffic control clearance or procedure.
  - Deviation from altitude or operating limitations.
  - Automated and inadvertent activation of a failsafe procedure (return-to-home, auto-land).
  - Deviation from weather minimums.
  - Necessary deviation to meet the needs of an inflight emergency.

F. EMERGENCY PROCEDURES

1. Description

The following section describes the logging and reporting procedure that is expected to be completed after each flight occurring under the MABAS COA.

2. Responsibility of performance

The Remote Pilot in Command (RPIC) shall be solely and completely responsible for ensuring the requisite emergency procedures are conducted to reduce risk to persons or property in the event of an inflight emergency.

3. Period of performance

The Remote Pilot in Command (RPIC) shall ensure that the following procedures are implemented immediately in the event of an inflight emergency.

4. Procedure

a. Manufacturer's specified procedure

For the purposes of this section, any procedure designed or intended by the manufacturer of the aircraft and specified in the Pilot's Operating Handbook shall be used as the primary method to respond to any inflight emergency.

- If no such procedure is specified, the Remote Pilot in Command (RPIC) shall use the procedures described below.

b. Lost link procedure

If the UAS experiences loss or substantial interference of the Command and Control (C2) datalink that appreciably effects the primary flight controls for greater than three (3) seconds, the following failsafe procedure should be executed:

- An automated return-to home procedure shall be executed at an altitude which ensures no conflict with obstacles, aircraft or terrain, or;
- An automated direct-landing procedure shall be executed in the event that conflict with obstacles, aircraft or terrain cannot be ruled out.

c. Loss of VLOS

If the Remote Pilot in Command (RPIC) and/or Visual Observer (VO), are unable to maintain visual contact with the UAS, the following procedure shall be followed in order to attempt to regain visual contact:

- The RPIC shall Immediately arrest all linear motion of the UAS and return to a hover.
- The RPIC shall climb to the established minimum obstacle clearance altitude established prior to flight.
- The RPIC shall activate any anti-collision or position lighting aboard the aircraft.
- The RPIC and VO, if used shall establish situational awareness with reference to the instrumentation, and a visual scan of the surrounding airspace and terrestrial hazards.
- The RPIC shall maneuver the aircraft to within VLOS of the RPIC and VO (if a VO is used).
- If VLOS cannot be regained in a reasonable period of time after conducting this procedure, the RPIC shall execute the lost-link procedure.

d. Failure of avionics

If a non-flight-critical avionics component, (including, but not limited to, a magnetometer, GPS receiver, optical flow position sensor, or sonar altimeter) fails during flight, the following procedure shall be conducted:

- The RPIC shall immediately disable any mode of flight automation reliant on the failed component, and return the UAS to a mode of flight not reliant on the failed component (eg: Disable GPS position hold in the event of a GPS failure).
- The RPIC shall ensure that the failure is isolated to non-critical components, and;
- The RPIC may elect to continue the flight if the RPIC has reason to believe the failure is isolated to non-flight critical components, and the RPIC is able to maintain safe and effective primary control authority over the UAS.
- In all other instances, the RPIC shall immediately discontinue the flight and remove the UAS from service pending inspection.

e. Powertrain failure

In the event of a substantial powertrain failure, any rotorcraft of a non-redundant drivetrain configuration (such as a quadrotor) will not be able to maintain controlled flight. Thus, it is the primary objective of the flight crew to ensure the failed UAS will not cause a hazard to persons or property on terrain contact.

- For UAS with a redundant powertrain configuration (such as rotorcraft consisting of 6 rotors or greater) the Remote Pilot in Command (RPIC) shall land the UAS immediately, as soon as is safely practicable.
- For UAS equipped with a ballistic airframe parachute, the parachute shall be deployed immediately upon failure of any flight-critical component.
- For all other UAS, the Remote Pilot in Command (RPIC) shall maneuver the UAS during the decent such that the impact shall not cause undue hazard to persons or property on the surface, and;
- The flight crew should immediately attempt to locate the UAS, assess the scene for injuries, and render first aid as necessary.
    - In the event of damage to the UAS, injury to persons, or damage to third (3rd) party property, a report shall be filed as described in section (E) (4) (b) of this chapter.

f. Emergency deviation

The Remote Pilot in Command (RPIC) may deviate from any federal aviation regulation, COA or waiver provision, departmental or MABAS policy to the extent necessary to meet the needs of an emergency, and/or mitigate hazards to other aircraft, or persons and property on the ground.

- This deviation shall be reported as described in section (E) (4) (c) of this chapter.