

UNMANNED AIRCRAFT SYSTEMS (UAS)
STANDARD OPERATING PROCEDURES (SOP)
FOR
UNITED STATES AIR FORCE ACADEMY, COLORADO

A. INTRODUCTION. This document covers UAS operations at the United States Air Force Academy (USAFA), Colorado Springs CO. UAS operations will be conducted IAW the DoD/FAA Memorandum of Agreement, dated 24 September 2007. All operation must remain within the defined COA airspace volume, below 3000 feet AGL.

One Pilot in Command (PIC) must be designated at all times and is responsible for the safety of the Unmanned Aircraft (UA) and persons and property along the UAS flight path. The PIC will be held accountable for controlling their aircraft to the same standards as the pilot of a manned aircraft. The provisions of 14 CFR 91.13, Careless and Reckless Operation, apply to UAS pilots. For the purpose of this SOP the terms PIC and Operator are synonymous.

B. FLIGHT NOTIFICATION. Unmanned aircraft operations at USAFA will be coordinated with 306 Operations Support Squadron Airfield Operations Flight (306 OSS/OSA) NLT 24 hours prior to flight operations unless a shorter notification is approved. Notification may be a flight schedule. The schedule shall include, at a minimum, the following for each flight:

1. Takeoff time (all times local).
2. Estimated land time.
3. FM Net/Radio call sign:_____.
4. Pilot/observer cell phone number (back-up comm):_____.

C. NOTICE TO AIRMAN (NOTAM). A NOTAM will be requested NLT 24 hours prior to UAS operations. The PIC will request a NOTAM through 306th FTG Base Operations and via the Automated Flight Service Station (AFSS) at 1-800-487-6867. The following information, as a minimum, will need to be passed to the NOTAM representative:

1. A description of the operational area using a radial and DME from the Black Forest (BRK) VORTAC. More than one radial and DME may be used to describe the area.
2. Date/time UAS activity will begin and end.
3. The altitudes affected.
4. Record the AFSS representative initials here: _____.

D. FREQUENCY AUTHORIZATION AND DECONFLICTION. The PIC is responsible for coordinating the use of UAS frequencies USAFA or Air Education Training Command (AETC) Frequency Manager.

E. USAFA PROCEDURES. One hour prior to UAS operations the PIC, observer, or designated team lead will establish communications with 306 OSS SOF via FM Net radio and commercial telephone. Communications SOF must be maintained throughout UAS operations. UAS operators shall comply with all instructions and restrictions relayed from the SOF given by local ATC. The operator shall maintain all UAS operations within the confines of airspace depicted in figure 1. Operations are not allowed over populated areas or public roads/highways and not allowed within 1000 feet of Interstate 25. All operations will be conducted between sunrise and sunset in Visual Metrological Conditions (VMC) and will remain clear of clouds and

other weather obstructions. The UAS must remain within clear visual range of the pilot, or an observer(s) in ready contact with the pilot, to ensure separation from other aircraft.

F. PRE-FLIGHT BRIEFINGS. Prior to any UAS operations, the PIC will conduct a crew and safety briefing. The briefing will include, at a minimum, the following:

- 1. Mission overview.**
- 2. Weather.** (current and forecasted)
- 3. Flight route/area.**
- 4. Airspace surveillance procedures.**
 - a. Pilots responsibilities.
 - b. Observers responsibilities.
 - c. Pilot responsibilities in the event of ATC notification of observed aircraft in vicinity of UA operations not in two-way communication.
 - d. Pilot/Observer responsibilities when they observe an aircraft in vicinity of UA operations.
- 5. Required items, mission equipment, and personnel.**
- 6. Crew actions, duties, and responsibilities.**
 - a. Modes of flight, who will make radio calls, identification of recovery team, etc.
 - b. Emergency actions.
 - (1) Mission considerations.
 - (2) Actions to be performed by PIC.
- 7. General crew duties.**
 - a. PIC (Vehicle Operator (VO)).
 - (1) Fly the air vehicle.
 - (2) Avoid traffic and obstacles.
 - (3) Cross check display symbology, messages, wind velocity/ direction.
 - b. Assistant PIC (Mission Operator (MO)).
 - (1) Assist in traffic and obstacle avoidance.
 - (2) Manage radios.
 - (3) Navigate.
 - (4) Cross check display symbology, messages, wind velocity/direction
 - (5) Read and complete checklist items as required.
 - (6) Set/adjust pages/switches and systems as required.
 - (7) Note takeoff time.
 - (8) Log events
 - (9) Calculate and monitor times for holding and approaches.
 - (10) When on approach, watch for the air vehicle.
 - (11) Be prepared to direct the VO for a missed approach procedure, if required.
 - (12) When visual is acquired direct VO to the ground if needed.
 - c. Observer
 - (1) Must keep the UAS in sight at all times.
 - (2) Maintain two-way contact with the VO/MO to warn of potential hazards.
 - (3) Provide VO/MO with instructions to steer clear of any potential collisions.
- 8. Analysis of the aircraft.** Logbook and preflight deficiencies.
- 9. Risk assessment considerations.**
- 10. Comments:** Instructor, Mission commander, Crew member, Observer questions, comments, and acknowledgment of the mission briefing.

F. PRE-FLIGHT PROCEDURES. UAS are particularly sensitive to adverse weather conditions such as moderate to blowing sand and dust, rain, severe turbulence, storms and lightening, and wind gusts. UAS operators will be responsible to routinely check current and forecasted conditions. It will be the responsibility of the PIC to ensure weather conditions do not exceed system limitations as described in Operator's Manual. All flight operations will be conducted in Visual Meteorological Conditions (VMC) under Visual Flight Rules (VFR).

G. LAUNCH and FLIGHT. The PIC will complete, at a minimum, the following:

1. Follow procedures outlined in the Operator's Manual.
2. Inform SOF via FM Net that the UAS is airborne.
3. Unmanned Aircraft shall remain within defined airspace (see figure 1).

H. POST FLIGHT PROCEDURES. The PIC will complete, at a minimum, the following:

1. Notify SOF upon completion of each sortie.
2. Inventory and account for all equipment
3. Report any discrepancies
4. Conduct a visual and functional equipment inspection
5. Complete an entry to the flight log

I. EMERGENCY PROCEDURES. Preventing a mishap or UAS loss or damage depends on early recognition of dangerous flight conditions or malfunctions followed by appropriate corrective action. Mission planning must include alternative courses of action available for each phase of the proposed flight. To the extent possible, planned courses of actions for emergencies should be made before the flight begins. During flight, operators must maintain situational awareness and should always know which direction to fly to escape hazard. During an emergency, the PIC will complete, at a minimum, the following:

1. Follow appropriate emergency procedures outlined in the Operator's Manual.
2. Immediately notify SOF and advise them of the nature of the emergency situation and/or any other pertinent information.

J. LOST LINK PROCEDURES. These procedures will terminate in a belly-landing at one of two specific locations if communications are not re-established. During simultaneous operations and in the event of a dual-lost-link situation, the aircraft operating in the West UAS Area is to be pre-programmed to execute its lost-link recovery/abort procedure after a 1 hour holding pattern to provide 30 minutes for the first aircraft to terminate (at either Aardvark or abort point) and to permit support personnel to secure the area for the next recovery. If there is a simultaneous lost link situation, both aircraft are preprogrammed to climb 500' after 10 seconds in an attempt to regain link then hold at their distinctive and designated holding patterns.

When an aircraft in the West UAS area is identified as in lost-link status, the aircraft operating in Jacks Valley will climb to an altitude at or above 1000' AGL and proceed to its holding pattern until the lost-link aircraft regains signal or is recovered via Aardvark. If the UA in the West area does NOT regain its link within 10 minutes, the UA in Jacks Valley will recover via SkyHook before West UA can recover.

When an aircraft operating in Jacks Valley is identified as in lost-link status, the aircraft operating in the West Area will continue its mission and monitor the lost-link aircraft until the lost-link aircraft regains signal or is recovered via Aardvark.

Communication among team members is important. Visual observers and PIC must remain vigilant and meticulously coordinate throughout the recovery operations. The table and figure below depicts waypoint placement for the abort flight plan (which can be updated throughout a flight) as well as the holding pattern used in lost link procedures. Not depicted on the figure Wave-off rectangular pattern that will remain west of Aardvark and below 500' AGL.

Home Pattern Waypoints		
West UAS Holding		
70	N 39° 02' 14.97"	W 104° 53' 40.72"
71	N 39° 02' 26.91"	W 104° 53' 41.05"
72	N 39° 02' 27.30"	W 104° 53' 09.88"
73	N 39° 02' 15.35"	W 104° 53' 09.47"
Jacks Valley Holding		
80	N 39° 01' 37.45"	W 104° 52' 37.31"
81	N 39° 01' 37.90"	W 104° 52' 06.16"
82	N 39° 01' 26.64"	W 104° 52' 05.97"
83	N 39° 01' 26.09"	W 104° 52' 37.20"
Runway Recovery Waypoints		
Abort Point	N 39° 01' 49.49"	W 104° 53' 05.71"
Rwy 17 FAF	N 39° 02' 26.33"	W 104° 50' 43.96"
Rwy 35 FAF	N 39° 01' 42.03"	W 104° 50' 37.90"

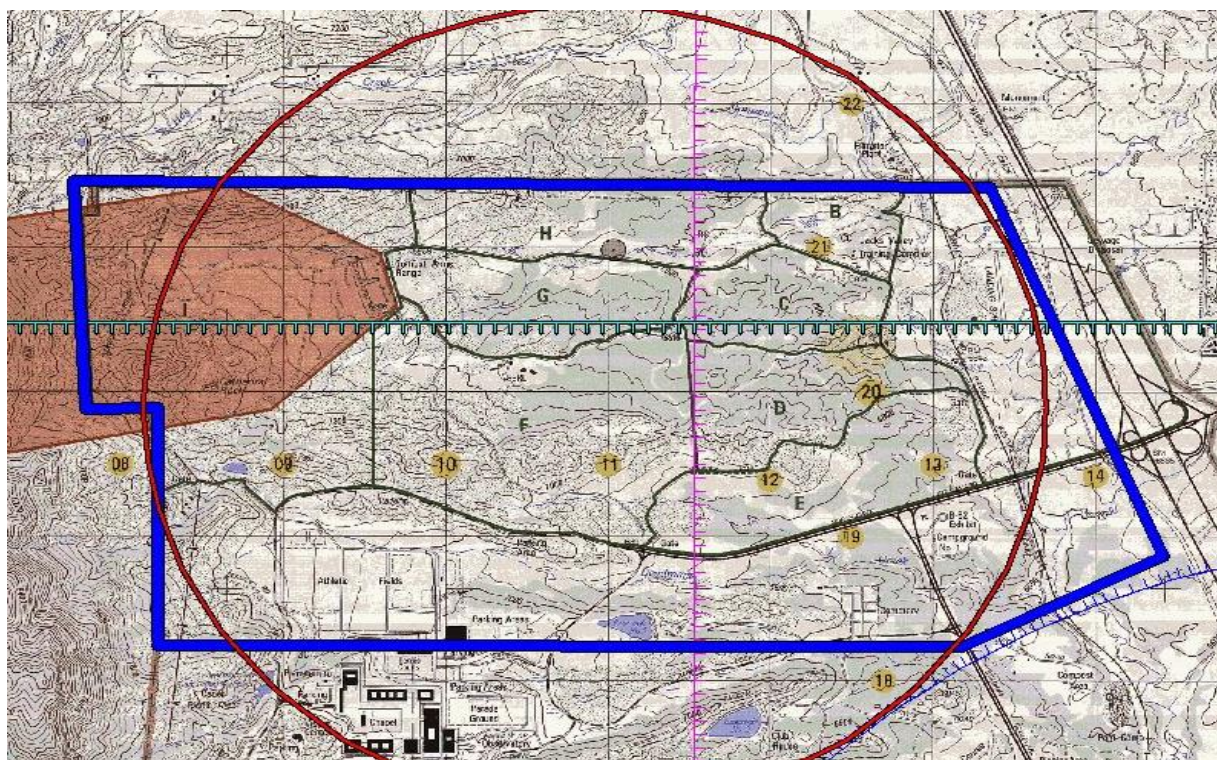


Figure 1. UAS operation area (BLUE Polygon). Note: For NOTAM purposes, the UAS operations area can be defined as a 1.5 NM radius circle (shown in red circle) from the Black Forest (BRK) VORTAC 285 Radial, 12.30 DME.

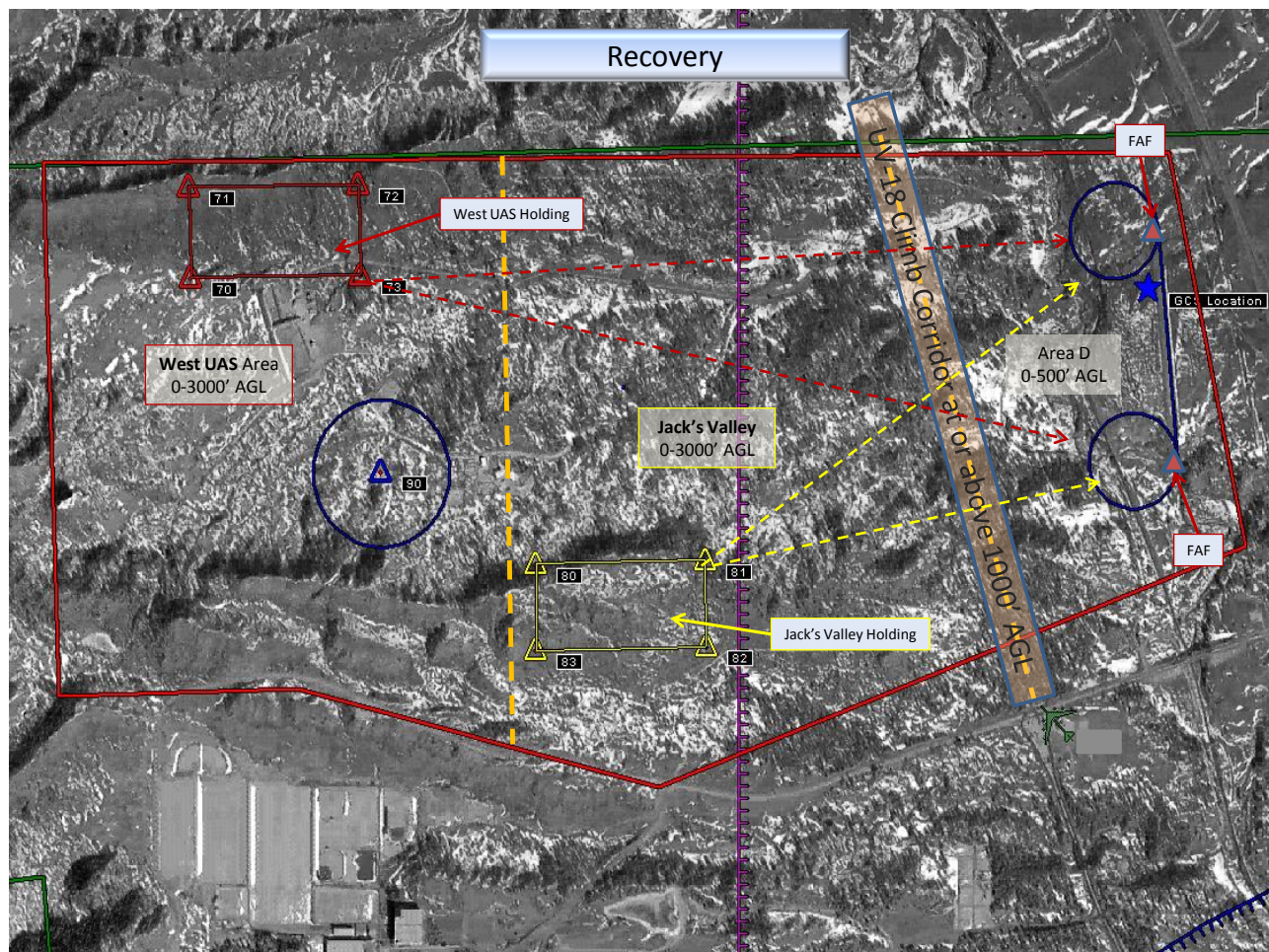


Figure 2. UAS Lost-Link Plan