

**OHIO ARMY NATIONAL GUARD**  
**CAMP RAVENNA JOINT MILITARY TRAINING CENTER**  
**1438 STATE ROUTE 534 SW**  
**NEWTON FALLS, OHIO, 44444-8053**

## **CHAPTER \_\_\_\_ Small Unmanned Aerial Systems (SUAS) Operations**

### **1. GENERAL.**

- (A) Purpose: To establish procedures for operations of the RAVEN SUAS from Camp Ravenna for Air Traffic Control (ATC) purposes.
- (B) Scope: The procedures herein apply to Camp Ravenna JMTC Range Control, OHARNG Units, individual SUAS Operators, and their instructors.
- (C) Responsibilities: All units and personnel shall comply with the provisions outlined in this document and any applicable Regulations. Parties are required to comply with:
  - (1) Federal Aviation Regulations and Orders.
  - (2) CRJMTC Reg. 385-63 and CRJMTC Reg. 350-10.
  - (3) AR 95-2 Airspace, Airfields/Helicopters, Fight Activities, Air Traffic Control and Navigational Aids
  - (4) AR 95-23, Unmanned Aerial Vehicle Flight Regulations
  - (5) FM 3-04.155, Army Unmanned Aerial Vehicle System Operations
  - (6) TC 34-212, Unmanned Aerial Vehicle Aircrew Training Manual
- (D) Proponent of UAS Program is the State Army Aviation Office: Adjutant General's Department; ATTN: NGOH-AVO, 2825 W. Dublin Granville Rd, Columbus, OH 43235-2789.

### **2. UAS FLIGHT OPERATIONS.**

- (A) Scheduling/Cancellation:
  - (1) Scheduling: Per CRJMTC REG. 350-10.
  - (2) Range Control will be notified in the event of a cancellation. If it is a foreseeable cancellation, the SUAS Unit will notify Range Control 24 hours in advance. In the event of cancellation for unfavorable weather, the SUAS Unit will notify Range Control once the determination has been made.
  - (3) A NOTAM will be requested NLT 24 hours prior to SUAS operations. The Pilot in Command (PIC) will request a NOTAM through CRJMTC Range Control.
  - (4) All NOTAMS will be submitted 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:
    - a. Date/time SUAS activity will begin and end.
    - b. A description of the operational area using a radial and DME from the Akron (ACO) VORTAC. More than one radial and DME may be used to describe the area.
    - c. The altitudes affected.
    - d. Duration of the operation.
    - e. Record the AFSS representative initials.
- (B) 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 UA flight path. The PIC maybe a Vehicle Operator (VO) or Mission Operator (MO). 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.

- (C) All SUAS operators and Pilot in Command(s) shall receive an Aviation Safety Brief prior to operating SUASs at Camp Ravenna.
- (D) Unit will provide operational range graphics and common nomenclature to Range Control. See Attachment (1).
- (E) SUAS Operational Area. **All SUAS operations will be conducted inside of the designated SUAS operational area.** The SUAS area is defined as follows:

<b>N1</b>	41°12'43.2760", 081°06'46.6733"
<b>N2</b>	41°13'17.3683", 081°06'00.7758"
<b>NE</b>	41°13'15.8239", 081°04'17.6952"
<b>SE</b>	41°10'29.4654", 081°04'17.5141"
<b>S</b>	41°09'59.5580", 081°05'56.1829"
<b>SW</b>	41°09'59.4349", 081°07'58.4864"
<b>NW</b>	41°12'19.8504", 081°07'58.7705"

- (1) Operational Zones A and B (See Annex A) are established to provide common reference and situational awareness to CRJMTC and SUAS operators as well as a line to separate multiple (1 aircraft per zone, 2 maximum in operational area) SUAS operations. During simultaneous SUAS operations, operators are responsible for collision avoidance with other SUAS operating within in these zones. The areas are delineated by the line that runs north to south between N2 and S boundry points. A 300 meter buffer between zones will be used during all simultaneous SUAS operations.
- (2) The designated "Launch and Recovery sites" for the RAVEN SUAS are located at the following locations unless otherwise coordinated:
  - a. Slagle Drop Zone (17T MF 89706115)
  - b. Training Area G "Crash Test Strip" (17T MF 89175790)
  - c. Mk-19 Range (17T MF 92106115)

(F) Pre-Flight

- (1) Briefings. Prior to any SUAS operations, the PIC will conduct a crew and safety briefing. The briefing will include, at a minimum, the following:
  - a. **Mission overview.**
  - b. **Weather.** (current and forecasted)
  - c. **Flight route/area.** Ensure Camp Ravenna operations area is loaded in FalconView.
  - d. **Airspace surveillance procedures.**
    - 1. Pilots responsibilities.
    - 2. Observer's responsibilities.
    - 3. Pilot responsibilities in the event of ATC notification of observed aircraft in vicinity of UA operations not in two-way communication.
    - 4. Pilot/Observer responsibilities when they observe an aircraft in vicinity of UA operations.
  - e. **Required items, mission equipment, and personnel.**
    - 1. Communication plan (Range Control Motorolas, cell phone, SINCGARs if available).
    - 2. Operational vehicles (for transport to/from flight areas and for use as a power source to recharge Raven batteries)

3. Maps/overlays of Flight areas.
4. Binoculars (to aid observers)
5. All applicable TMs/FMs/ARs for SUAS operations on CRJMTC
- f. **Crew actions, duties, and responsibilities.** (Modes of flight, who will make radio calls, identification of recovery team, etc.)
  1. Emergency actions.
  2. Mission considerations and actions to be performed by VO/MO.
- g. **General crew duties.**
  1. Vehicle Operator (VO).
    1. Fly the air vehicle.
    2. Avoid traffic and obstacles.
    3. Cross check display symbology, messages, wind velocity/direction.
  2. 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.  
When on approach, watch for the air vehicle. Be prepared to direct the VO for a missed approach procedure, if required.
    10. When visual is acquired direct VO to the ground if needed.
  3. Observer.
    1. Must remain within 1 nautical miles horizontally and 3000 feet vertically of the SUAS during all operations.
    2. Must keep the SUAS in sight at all times.
    3. Maintain two-way contact with the VO/MO to warn of potential hazards.
    4. Provide VO/MO with instructions to steer clear of any potential collisions.
  4. **Analysis of the aircraft.** Logbook and preflight deficiencies.
  5. **Risk assessment considerations.**
    1. Frequency deconfliction for simultaneous SUAS operations
  6. **Comments:** Instructor, Mission commander, Crew member, Observer questions, comments, and acknowledgment of the mission briefing.

(2) Pre-Flight Procedures. SUAS are particularly sensitive to adverse weather conditions such as moderate to blowing sand and dust, rain, severe turbulence, storms and lightening, and wind gusts. SUAS 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). The PIC will complete the Preflight checklist in Operator's Manual.

(G) Launch and Flight Operations.

- (1) It is the responsibility of the PIC to contact Range Control on CH 1 Range Control (Motorola) at the beginning and completion of daily flight operations.
- (2) IAW Camp Ravenna Regulation 385-63 and Safety Brief, the PIC will ensure ground teams conduct radio checks every 15 minutes on CH 1 Range Control (Motorola) during active flight operations.
- (3) Range Control will be notified immediately in the event of a lost-link event.
- (4) All UAS flights shall be conducted in visual flight rule (VFR) conditions IAW AR 95-23 para 5-2.
- (5) In the event of an emergency, the PIC will contact Range Control to advise them of the situation. Every precaution will be taken to avoid over-flight of no-fly zones.
- (6) Prior to first launch, the PIC will contact Range Control on CH 1 Range Control to request clearance for flight operations. Range Control will advise the PIC that the SUAS flight area is open. All visual observers must be in position and in radio contact with the PIC.
- (7) Once the PIC has conducted the first launch, he will contact Range Control on CH 1 Range Control and identify the operating altitude and maximum ceiling for current flight operations. Any change to the maximum ceiling will be called in to Range Control.
- (8) The PIC will conduct radio checks every 15 minutes on CH 1 Range Control during active flight operations.
- (9) At anytime during the launch or flight, if the VO or MO identifies a problem with the SUAS, the PIC will terminate the flight until the problem has been corrected.
- (10) Unmanned anti-collision lights will be on when SUAS engines are operating, except when there may be other hazards to safety.
- (11) Unmanned aircraft position lights will be ON.
- (12) **Night Operations are not currently authorized for SUAS Operations at CRJMTC.**

(H) UAS Recovery Operations

- (1) Due to the continuous flight - recovery cycle of the SUAS, only the first and last launch and recovery will be called in to Range Control. Air space will be considered active throughout the training period, unless specifically suspended by Range Control or the PIC.
- (2) Upon completion of daily flight operations, the PIC will contact Range Control on CH 1 Range Control to notify them that flight operations are complete for the day.
- (3) Prior to departure from launch/recovery sites, the PIC will contact Range Control on CH 1 Range Control to identify that all personnel have departed and to close the training area.

**3. OPERATIONAL FREQUENCIES.**

- (A) The Raven B Digital Data Link (DDL) SUAS uses separate transceivers for CONUS and OCONUS operations. Only the M2 Transceiver is authorized for CONUS operation and only the frequencies below are authorized by the OHARNG J6 for use on Camp Ravenna. The frequency in use on a given training day will be identified on the training area graphic on file with Range Control. During simultaneous Raven operations, Range control will identify two frequencies for use.

- (1) Ch 003 / M1758

- (2) Ch 013 / M1768
- (3) Ch 023 / M1778
- (4) Ch 033 / M1788
- (5) Ch 043 / M1798
- (6) Ch 053 / M1808
- (7) Ch 063 / M1818
- (8) Ch 073 / M1828
- (9) Ch 083 / M1838
- (10) Ch 092 / M1847

(B) Range Control: CH 1 Range Control (Motorola)

(C) FM: 31.100

(D) Range Control phone (614) 336-6041 office or (614) 202-5783 cell.

#### 4. LOST LINK/LOST COMMUNICATION/MISSION ABORT.

(A) In the event of a loss of link (LOL), the aircraft shall proceed in accordance with the following programming:

- (1) Before the mission begins, the LOL action is preset to proceed to a given Rally waypoint ("Launch/Recovery" site) and then to "Autoland". The LOL is automatically engaged after 3 continuous seconds of LOL after which the aircraft will return to the preset Rally waypoint. Once the aircraft reaches the rally point, the aircraft will "Autoland".
- (2) If link is reacquired at any time prior to "Autoland", the operator may return the SUAS to its original course.
- (3) If the SUAS becomes "dumb" (loses GPS link) and becomes "lost" for thirty seconds, default system program will initiate the "Autoland" function and immediately land the aircraft.
- (4) The SUAS is fitted with a tracking beacon, "Falcon Tracker," to guide the SUAS Team to the recovery site, in the event the SUAS lands out of visual observation of the SUAS Team.
- (5) In the event of loss of communications with CRJMTC Range Control, the PIC will cease operations and contact Range Control to reestablish two-way communication.
  - a. via CH 1 Range Control (Motorola).
  - b. via cell phone to (614) 336-6041 or (614) 202-5783 (Range Control cell).
  - c. if unable to reach Range Control, call **East Gate Guard Shack** via cell phone (614) 336-6399.

#### 5. OPERATING LIMITATIONS.

(A) Unmanned Aircraft Systems operations at CRJMTC will be conducted over the military leased land at or below 1200 AGL (Class G). As depicted in Annex 1, the SUAS operations area is divided into two areas; SUAS Ops Area A Class G airspace - surface up to but not including 1200 feet AGL to the West and SUAS Ops Area B Class G - surface up to but not including 1200 feet AGL to the East. While over land the UAS will not be operated with 500 ft of the CRJMTC property boundary. Operations will be conducted a maximum of 5 times a week, and up to 8 one-hour flights per day. Operations will be conducted in VMC during the hours of sunrise to sunset. Visual observers will remain in contact with the PIC and will be positioned

so that they remain within 1 nautical mile horizontally and 3000 feet vertically of the SUAS during all operations.

(B) The RAVEN-B small unmanned aerial system (SUAS) is a 4.2 lb hand-launched reconnaissance and surveillance tool with a normal operating altitude of 150-1500 ft AGL. For operations on CRJMTC the RAVEN-B SUAS will only be operated under the following restrictions:

(1) Max operating ceiling will be 1200 ft. AGL sunrise to sunset.

(2) The RAVEN-B has a cruise speed of 30 mph, a range of 10 km (line of sight), and a 60-90 min flight time. The RAVEN-B can operate in winds over 20 knots, but for the purposes of training, will be limited to that maximum.

(C) The system transmits live airborne video images, compass headings, and location information to a ground control unit (GCU) and remote video terminal (RVT). This capability enables operators to navigate, search for targets, recognize terrain, and record all information for analysis.

(D) SUAS density is limited to a maximum of two SUAS (one per operational zone). The PIC will ensure separation in designated operational zones and utilize designated launch and recovery sites during multiple SUAS operations. Operating SUAS Systems must operate no closer than **300 meters** apart.

(E) Operators will not fly into known Instrument Meteorological Conditions (IMC)

6. **EMERGENCY PROCEDURES.** Preventing a mishap or SUAS loss or damage depends on early recognition of dangerous flight conditions or malfunctions followed by appropriate corrective action.

(A) The PIC shall keep Range Control apprised of any potential or actual emergencies. Manned aircraft emergencies will take priority over unmanned aircraft emergencies.

(B) The PIC, VO and MO will memorize the immediate action items of each emergency procedure outlined in the Operator's Manual.

(C) 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 to include ensuring the Rally waypoint (in the event of loss-of-link) and waypoint "E" (for routine landings) are within the designated COA airspace.

(D) During flight, both operators must maintain situational awareness and VO should always know which direction to fly to escape hazard. MO: Should always know UA position relative to hazards and be ready to give VO headings and altitudes to fly to safety.

(E) Those steps that must be performed immediately in an emergency are underlined and in bold print in the Operator's Manual. The operators must be able to perform these steps without referencing the checklist or manual. Non-underlined steps can be accomplished with use of the checklist.

(F) During an emergency, the PIC will complete, at a minimum, the following:

(1) Follow procedures outlined in Operator's Manual.

(2) Immediately notify CRJMTC Range Control and advise them of the nature of the emergency situation and/or any other pertinent information.

(G) Inadvertent Instrument Meteorological Conditions (IIMC) procedures are encountered:

(1) The PIC will immediately notify both Range Control and the flight following agency that they are IIMC.

(2) Any SUAS entering IIMC will immediately return to the center of mass of the Slagle Drop Zone Area and land.

- (3) Route of flight will be from present position direct to center mass of the Slagle Drop Zone. The SUAS will remain below 1000' AGL during the recovery.
- (H) "Fly-Away Aircraft" Loss of Control emergency.
- (1) The PIC will immediately Contact CRJMTC Range Control and advise them of the following information:
    - a. Last known position of UAS.
    - b. Direction of flight.
    - c. Estimated flight time remaining (based on remaining battery life or fuel load)
    - d. Last known altitude.
  - (2) CRJMTC Range Control will immediately notify Cleveland ARTCC and appropriate TRACON as required based upon known route of flight:

<u>ID</u>	<u>Name</u>	<u>Phone Number</u>
ZOB	FAA Cleveland ARTCC	440-774-0320
KCAK	FAA Canton-Akron ATCT/TRACON	330-492-3801
KCLE	FAA Cleveland ATCT/TRACON	216-898-2020
KYNG	FAA Youngstown ATCT/TRACON	330-856-4806

- (3) CRJMTC Range Control will immediately notify the following airports as required based upon the known route of flight:

<u>ID</u>	<u>Name</u>	<u>Heading</u>	<u>Distance</u>	<u>Phone Number</u>
1G3	<u>Kent State Univ Airport</u>	252°	8.2	330-672-1940
KAKR	<u>Akron Fulton International Airport</u>	231°	14.2	330-733-3950
4G3	<u>Miller Airport</u>	153°	16.7	270-863-1799
7G8	<u>Geauga County Airport</u>	038°	16.7	440-632-1884
KCAK	<u>Akron-Canton Regional Airport</u>	214°	19.7	330-499-4059
3G6	<u>Tri-City Airport</u>	155°	21.5	330-938-1216
38D	<u>Salem Airpark Inc Airport</u>	139°	23.7	330-332-4400
1G5	<u>Medina Municipal Airport</u>	266°	23.7	330-239-1606
KCGF	<u>Cuyahoga County Airport</u>	341°	23.8	216-289-4111
3G3	<u>Wadsworth Municipal Airport</u>	249°	26.0	330-334-9861
KYNG	<u>Youngstown-Warren Regional Airport</u>	091°	26.1	330-856-1537
KBKL	<u>Burke Lakefront Airport</u>	321°	26.8	216-781-6411

- (I) Incident / Accident Reporting: The following information is required to document unusual occurrences associated with UAS activities in the National Air Space System.
- (1) The Ohio Army National Guard and/or its representatives are responsible at all times for collision avoidance with non-participating aircraft and the safety of persons or property on the surface with respect to the UAS.
  - (2) Units and CRJMTC Range Control shall provide the following information to State Aviation Office on a monthly/annual basis (Note: reporting is not required until the first flight occurs. Then reporting must continue on a monthly/annual basis even when no flights are executed):

- a. Number of flights conducted under this COA.
- b. Pilot duty time per flight.
- c. Unusual equipment malfunctions (hardware/software).
- d. Deviations from ATC instructions.
- e. Operational/coordination issues.
- f. All periods of Loss of Communications.
- g. All spill outs from COA airspace.

(3) The following shall be submitted to State Army Aviation Office within 24 hours:

- a. Deviations from the "Special Provisions" contained in the COA.
- b. All periods of Loss Link, including duration.
- c. All incidents involving the UAS as defined in 49 CFR 830.
- d. All accidents involving the UAS as defined in 49 CFR 830.

(J) Medical Evacuation.

- (1) If the PIC is notified of an AEROMEDEVAC mission in progress within their operational area, they will immediately land the SUAS. The PIC will contact Range Control via FM or landline until the Range Control net is clear of all MEDEVAC or AEROMEDEVAC coordination traffic.
- (2) The PIC will maintain a copy of the CRJMTC MEDEVAC Procedures Handout dated 13 June 2009.
- (3) In the event of a medical emergency involving the SUAS team, the PIC will contact Range Control to coordinate with Emergency Services.
  - a. via CH 1 Range Control (Motorola).
  - b. via cell phone to (614) 336-6041 or (614) 202-5783 (Range Control cell).
  - c. if unable to reach Range Control, call **East Gate Guard Shack** via cell phone (614) 336-6399.
- (4) UAS team will initiate first aid and begin either CASEVAC or movement to the nearest Medial Transfer Point/EMS entry gate.

7. **EXCEPTIONS.** Waiver requests to any of the above shall submitted through Camp Ravenna Range Control (NGOH-TIC-CR) to State Army Aviaton Office (NGOH-AVO).

## **Glossary**

### **Section I Abbreviations**

**AGL**  
Above Ground Level

**AR**  
Army Regulation

**ASO**  
Aviation Safety Officer

**ATC**  
Air Traffic Control

**COA**  
Certificate of Authorization

**CRJMTC**  
Camp Ravenna Joint Military Training Center

**DARR**  
Department of the Army Regional Representative (to the FAA)

**DOD**  
Department of Defense

**DZ**  
Drop Zone

**FAA**  
Federal Aviation Administration

**IAW**  
In Accordance With

**IFR**  
Instrument Flight Rules

**IMC**  
Instrument Meteorological Conditions

**MSL**  
Mean Sea Level

**NGB**  
National Guard Bureau

**NOTAM**  
Notice to Airman

**NLT**  
No Later Than

**ROZ**

Restricted Operating Zone

**SOP**

Standard Operating Procedures

**SUAS**

Small Unmanned Aircraft System

**VFR**

Visual Flight Rules

**VMC**

Visual Meteorological Conditions

**Appendix A -**