

AVIATION  
UNMANNED AERIAL SYSTEM FLIGHT REGULATIONS

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**Summary.** This regulation establishes responsibilities, procedures, and rules for aircrew training, standardization, and the operation of Army aircraft assigned, attached, or transit to Fort Sill, Oklahoma.

**Applicability.** This regulation applies to commanders and aviation personnel assigned, attached, tenant, or transient to Fort Sill while performing flight operations in the Fort Sill local flying area.

**Supplementation.** Supplementation of this regulation is prohibited without prior approval from the Directorate of Plans, Training, Mobilization, and Security, 7305 NW McNair Avenue, Suite 118, Fort Sill, OK 73503-9016.

**Suggested Improvements.** The proponent of this regulation is the Directorate of Plans, Training, Mobilization, and Security. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to DPTMS.

**Distribution.** This regulation is distributed solely through the DHR, ASD Homepage at [http://Sill-www.army.mil/dhr/Admin\\_Svcs\\_Div/Index.html](http://Sill-www.army.mil/dhr/Admin_Svcs_Div/Index.html).

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## Chapter 1 General

**1-1. Purpose.** This regulation establishes procedures and assigns responsibilities governing Unmanned Aerial Systems (UAS) operations within the Fort Sill Airspace Complex.

**1-2. References.** References are listed in Appendix A

**1-3. Terms and Abbreviations.** Terms and abbreviations used in this regulation are explained in the glossary.

**1-4. Records Management.** Records created as a result of processes prescribed by this regulation must be identified, maintained, and disposed of according to AR 25-400-2, The Army Records Information Management System (ARIMS) and DA Pam 25-403, Guide to Recordkeeping in the Army. Record titles and descriptions are available on the Army Records Information Management

## Chapter 2 Responsibilities

**2-1. Directors, Commanders, Activity Chiefs, and Project Officers.** Directors, commanders, activity chiefs, and project officers scheduling and using Fort Sill Airspace Complex will enforce this regulation. When units are engaged in training exercises or maneuvers, responsibility lies with the unit commander.

**2-2. The Fort Sill Air Traffic and Airspace Officer.** The Fort Sill Air Traffic and Airspace (AT&A) Officer is the approval authority for all UAS missions: (580) 442-2387 (DSN prefix 639).

**2-3. Henry Post Army Airfield Air Traffic Control.** Henry Post Army Airfield (HPAAF) Air Traffic Control (ATC) is responsible for providing control for all Airspace Complex activities, and establishes procedures and separation standards between UASs and manned aircraft: (580) 442-2387/DSN 639-2387.

**2-4. Commanders.** Commanders of each activity operating UASs will--

a. Ensure that all UAS operations, procedures, and training are IAW AR 95-23, UAS Flight Regulations.

b. Complete, or is scheduled to complete, the HQDA Commander's Safety Course IAW Message, HQDA, DAMO-TRZ, 141224Z August 2002, available online at the Army's Combat Readiness Center (CRC): <https://safetylms.army.mil>.

c. Appoint a unit safety officer and safety NCO with the following minimum qualifications. NOTE: The UAS Mission Commander (MC) has overall responsibility for the operation and safety of a UAS mission and should also be the Unit Safety Officer. The unit safety officer and safety NCO will--

(1) Have completed, or is scheduled to complete, the Additional Duty Safety Course available online at the Army's Combat Readiness Center (CRC), <https://safetylms.army.mil> , or its equivalent.

(2) Be of an appropriate grade or experience level to ensure decisive and sound decisions can be made in a timely fashion.

(3) Have thorough knowledge of UAS capabilities, limitations, and safety devices of launch, control, and recovery systems.

(4) Have thorough knowledge of this regulation, Fort Sill Airspace Complex, Fort Sill Reg 95-1, and other applicable references.

d. Define the responsibilities of the MC and delegate decision-making authority to act decisively in case of an emergency or deviation of the UAS from the programmed flight path.

e. Ensure a written UAS mission profile has been coordinated with and approved by the AT&A before the UAS mission is flown (see Appendix C).

f. Develop and maintain a comprehensive written Accident Prevention Plan, certified annually by the commander, which will include the following sections:

(1) Airspace Safety Plan. A written Airspace Safety Plan/SOP (see paragraph 5-3).

(2) Pre-Accident and Recovery Plan. The unit Pre-Accident Plan should supplement and not duplicate the Fort Sill Reg 385-10, Safety Regulation, and be practiced (crash drill) quarterly. See appendix C for additional guidance excerpted from FM 3-04.155, Army Unmanned Aerial System Operations.

(3) Risk Management Plan/SOP IAW FM 100-14 Consistent with the Mission. This plan must be applied to each UAS mission and be continuously evaluated for effectiveness.

g. Ensure that no UAS is flown outside Restricted Area 5601 (R-5601) or other assigned airspace boundary, or deviates from approved altitude or time restrictions.

h. Ensure a Notice to Airmen (NOTAM) for UAS flights are processed through the AT&A and are published NLT 48 hours prior to the day of flight.

i. Ensure that a Risk Management briefing for each participating Air System Operator (AVO) is performed IAW AR 95-23 prior to each UAS mission including maintenance test flights.

j. Ensure each AVO receives--

(1) An Airspace Safety and Range Safety briefing prior to conducting UAS operations at Fort Sill: Airspace POC (580) 442-2387/ DSN 639-2387.

(2) Safety and environmental awareness training.

h. Ensure the AVO uses only authorized Up-link and Down-link frequencies. For clarification contact the Fort Sill Frequency Manager (580-442-3407).

### **Chapter 3 Airspace Coordination**

#### **3-1. Special Use Airspace (SUA).**

a. SUA is airspace designated by the FAA with specific vertical and lateral limits, established for the purpose of containing hazardous activities or activity that could be hazardous to nonparticipating aircraft. Limitation on nonparticipating aircraft may range

from absolute exclusion to complete freedom of use within certain areas, depending upon activity being conducted.

b. The Fort Sill Airspace Complex includes the following SUA: Restricted Area 5601 (R-5601) and various Military Operations Areas (MOA) as described in FAA Order 7400.8 and Fort Sill Reg 95-1.

c. UASs will not operate in the Fort Sill Airspace Complex without prior coordination with, and approval from, the AT&A officer, and clearance from ATC.

### **3-2. Coordination.**

a. Requirements for use of, or projects that could affect use of, the Fort Sill Airspace Complex outside of R-5601 must be given sufficient lead time to permit the necessary action by the AT&A in coordination with the Department of the Army Regional Representative (DARR) working with the Federal Aviation Administration (FAA). Nonrule making actions, such as establishment of a temporary Military Operations Area, will require 6 months or longer. Rulemaking airspace actions such as the establishment or modification of a Restricted Area will require in excess of 1 year and funds to complete applicable environmental or other feasibility studies.

b. UAS operations within the Fort SILL Airspace Complex require detailed planning and coordination to ensure that no conflicts will arise with existing airspace usage. Normally, scheduling of the Airspace Complex must be made with the AT&A 30 or more days in advance and will be for a specific period of time. All requests must include a completed Fort SILL UAS Mission Profile Checklist (see Appendix C). Airspace reservations will be given on a priority basis, and use of airspace will not begin prior to or extend beyond the scheduled time period without AT&A approval.

c. The approval and scheduling of the Fort Sill Airspace Complex does not in itself indicate sole occupancy of the airspace. Sole or exclusive use of these areas will be authorized only for emergencies, safety, and/or lack of compatibility of the user's operation with other airspace users.

d. The Fort Sill Installation Aviation Safety Officer (FSIASO), or designated representative, will review all requests to use the Fort Sill Airspace Complex to ensure all operational and safety risk management factors have been considered and that the mission is compatible with facilities available, POC can be reached at (580) 442-2023.

### **3-3. Restricted Area (R-5601).**

a. When cleared to operate in R-5601, UASs must not fly outside R-5601 unless approved by the AT&A and cleared by ATC.

b. In addition to airspace approval, use of R-5601 for UAS operations requires scheduling through Range Control. See Fort Sill Reg 385-1, Post Range Regulation.

c. Use of R-5601 for the purpose of UAS operations does not restrict manned aircraft from entering R-5601; therefore, airspace de-confliction must occur by measures such as all parties (AVO, ATC, and pilots) maintaining lateral and/or vertical distance separation.

d. Paradrops will not occur in the area of R-5601 that is active for UAS operations.

### **3-4. Fort Sill Field Site Operations.**

a. Use of a Fort Sill training area as a UAS launch and recovery site requires coordination and scheduling with Range Control and the AT&A. Multiple launches and recoveries may be performed during the approved time frame.

b. UAS launches and recoveries will be conducted to remain in R-5601.

c. Small or mini-type UAS can launch from a field site provided radio communications or instant phone communication exists (prior coordinated number) between Fort Sill ARAC and the launch site during the duration of training.

d. No Shadow, or similar, or larger type UAS can launch from a field site.

e. The unit will conduct a thorough site survey prior to conducting flight operations. The survey will include, but is not limited to,--

(1) Hazards that can affect the UAS operation.

(2) Suitability of landing surface.

(3) Establishment of a ROZ in coordination with the AT&A (See Figure 2-1).

f. The using unit is responsible for requesting approval of any site improvements; these include, but are not limited to--

(1) Digging permits (PW), if leveling a landing site.

(2) Environmental approval (PW), if removing brush.

**3-5. Multi-Platoon UAS Operations.** Multiple UAS platoons may conduct training utilizing the same launch and recovery area and SUA provided the following minimum conditions are met:

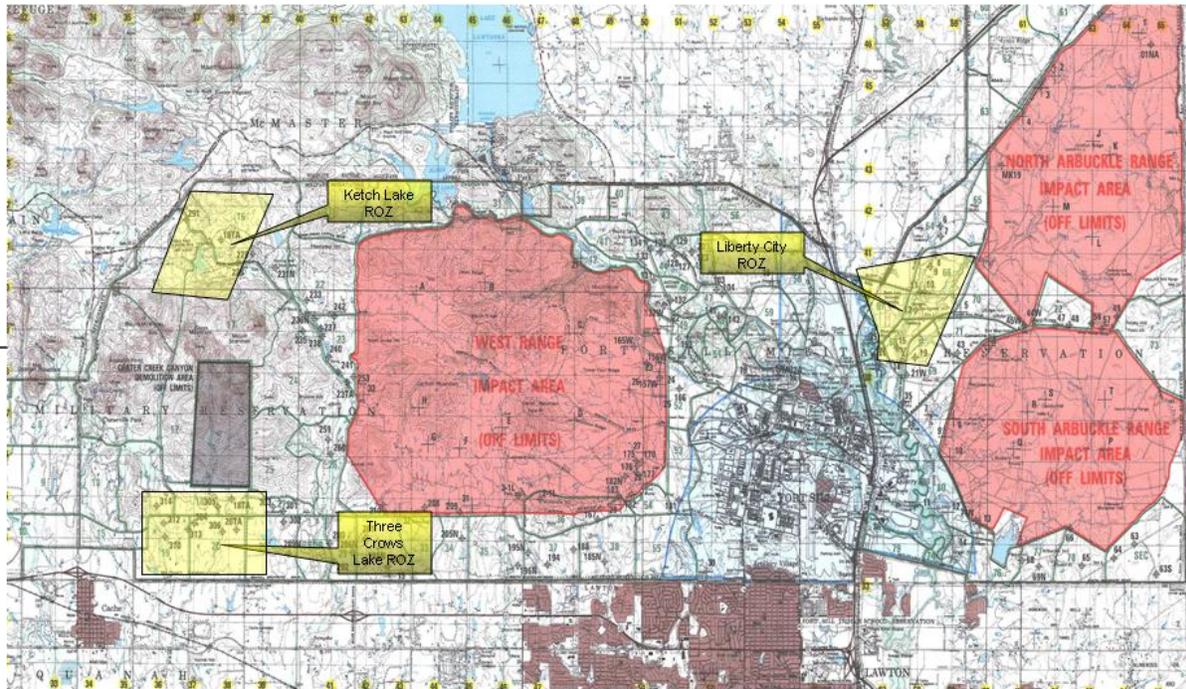
a. Platoons must have conducted coordination and agree on site location(s), frequency usage, and other established de-confliction standards and procedures deemed appropriate.

b. UASs will not conduct launches or recoveries within 30 minutes of the other platoon at the same site (i.e., if a platoon launches at 0800, then the next platoon must wait until 0830 before it may launch; this provides time separation at the launch and recovery site).

c. UASs will maintain at least 1,000 ft horizontal and/or 500 ft vertical separation from each other during the mission.

d. Prior to conducting a climb or descent, the UAS platoon will coordinate with the other platoon(s) to ensure they are clear of the designated climb/descent routes.

RESTRICTED OPERATING ZONES (ROZ)



Ketch Lake	Three Crows Lake	Liberty City
36755 42341	35467 35136	56196 40459
39290 42117	39113 35158	58912 40927
37958 39639	39130 33117	58391 38317
35724 39830	35474 33094	56541 38890

Figure 3-1. Restricted Operating Zones (ROZ)

## **Chapter 4 Safety**

### **4-1. General Safety Procedures.**

a. The MC will be present during a UAS flight mission to monitor the effectiveness of the Safety Risk Management Plan, to include maintenance test flights.

b. To provide separation between UAS and manned aircraft the following altitude restrictions apply unless otherwise authorized by the AT&A and cleared by ATC:

(1) Small UASs, such as the Raven, operating in R-5601 will normally be cleared to fly at a maximum altitude of 500 feet Above Ground Level (AGL) unless otherwise approved by the AT&A. Manned aircraft (jets and helicopters) will operate no lower than 200 feet above (coordinating altitude) the maximum altitude assigned to the UAS.

(2) Large UASs, such as the Shadow, will normally operate at an assigned altitude between 6,000 feet to 10,000 feet Mean Sea Level (MSL). Manned aircraft (jets and helicopters) will operate no lower than 500 feet above or 1,000 feet below the assigned UAS altitude.

c. The Shadow, or similar, UAS:

(1) AVO must file a local flight plan with Henry Post Army Airfield (HPAAF) Base Operations. This may be accomplished by submitting a DD Fm 175 (Military Flight Plan) to Base Operations in person, by fax to (580) 442-7928, or online utilizing the Flight Scheduler Program available from Base Operations.

(2) AVO is required to maintain radio communication with ATC during the UAS mission and must make a communication check with ATC every 15 minutes. If radio communication with ATC is lost, the AVO will call ATC at (580) 442-2004/1882 to report lost radio communication and the UAS will be recovered via the approved recovery route and altitude.

d. UAS operations may be conducted in conjunction with artillery/mortar and/or close air support within R-5601 provided separation coordination has been completed with, and approved by, Range Control and the AVO assumes responsibility to ensure separation from artillery/weapon firing.

e. Each AVO must receive an initial and annual Range and Airspace Safety briefing prior to participating in a UAS flight mission.

f. UASs equipped with a transponder must have it on and set to the code issued by ATC prior to launch. If the transponder fails to function after launch the UAS will be recovered immediately via the approved recovery route and altitude.

#### **4-2. Weather Requirements.**

a. Flight Weather Planning. The MC will obtain departure airfield/airport, enroute, destination airfield/airport, and alternate airfield/airport (if required) weather information before takeoff. If the weather during the mission deteriorates below the weather minimums shown below, the mission will be aborted and the UAS will return for recovery. ATC will exercise appropriate control to separate the UAS from other aircraft during a weather related recovery. The following weather restrictions apply:

(1) Flight into Icing Conditions. UASs will not be flown into known or forecasted severe or moderate icing conditions. If a flight is to be made into known or forecasted light icing conditions, the UAS must be equipped with adequate operational de-icing or anti-icing equipment.

(2) Flight into Turbulence. UASs will not be intentionally flown into known or forecasted extreme turbulence or into known severe turbulence. UASs will not be intentionally flown into forecasted severe turbulence unless MACOM commanders have established clearance procedures IAW AR 95-23.

(3) UAS Flights. UASs will not be flown unless the weather forecast and existing conditions will permit flight under Visual Flight Rules (VFR) and the following weather minimums must be met for the entire mission:

(a) At the launch and recovery site the cloud ceiling must not be lower than 1500 feet, and the horizontal visibility must be at least 3 miles.

(b) During launch, enroute, and recovery, be able to fly the UAS without getting closer to clouds than 1,000 feet from above or below and 2,000 feet horizontally, and have 3 miles flight visibility.

b. Flight Weather Briefing and Current Observation. A Flight Weather Briefing and Current Observation for Fort Sill may be obtained as follows:

(1) Weather Briefing. By DD Form 175-1 (Flight Weather Briefing) from the Air Force Weather Detachment at HPAAF, Base Operations, Bldg P-4907.

(2) Weather Briefing and Current Observation. Online at the Mission Execution Forecast link on the 3d Weather web page:

<http://www1.doim.sill.army.mil/weather/3dws/>

(3) Current Weather Observation. A current weather observation may also be obtained by calling 3rd Weather at (580) 442-4000. NOTE: These observations are for the airfield and may not apply to a remote field site where the conditions could be worse; therefore, the MC must be able to judge the current cloud height and visibility in

the field. There should be no flight activity if there is ever any doubt that the required minimum ceiling and visibility exists.

#### **4-3. Emergency Procedures.**

a. AVO.

(1) If a mishap occurs during any phase (launch to recovery),--

(a) Inform ATC with as much detail as possible, and keep ATC informed.

(b) IAW Fort Sill Reg 385-10, any and all mishaps involving the UAS will be promptly reported to Fort Sill ARAC and Range Control.

(2) Perform UAS specific mishap/emergency procedures and exercise good judgment to avoid an accident.

(3) If control of the UAS is lost, inform ATC of its last know location, heading, and altitude.

(a) The AVO must continue to attempt to regain control of the UAS and if successful inform ATC immediately.

(b) UASs with programmable guidance systems will be programmed to proceed to an AT&A approved recovery site. NOTE: The route and altitude the UAS will use during Lost-Link procedures must be approved by the AT&A and known by ATC prior to the mission.

(4) If the AVO determines that a UAS mishap involves damage to the UAS, or to other equipment or property, or injury to personnel, call 911 or on cell phone call \*PMO to report the accident IAW Fort Sill Reg 385-10.

b. ATC. Depending on the nature of the mishap reported by the AVO, ATC may activate the Aircraft Pre-Accident Plan IAW Fort Sill Reg 385-10.

c. Fire and Emergency Services (FES). The FES will respond IAW Fort Sill Reg 385-10.

#### **Chapter 5 Operations in Public Use Airspace**

**5-1. Authorization.** All UAS operations in Public Use Airspace require a Certificate of Authorization (COA) from the Federal Aviation Administration (FAA) coordinated through the AT&A and DARR. Public Use Airspace is defined as that airspace that is not restricted or specified for sole use.

**5-2. Surveillance Requirements.**

a. One or more methods of surveillance will be provided for all UAS operations (i.e., radar, visual, or manned aircraft). The type of surveillance will depend on the mission and type system flown as specified in the COA.

b. Information obtained from the surveillance system such as position, speed, altitude, and heading will be available upon request to the unit safety representative and ATC. Where manual plotting of surveillance information is necessary, the time between plots must be as short as possible.

c. If at any time the position of a UAS becomes unknown, or the UAS fails to respond to programmed "lost link" instructions, the flight will be terminated in time to preclude the possibility of impact outside the approved flight area.

**5-3. Safety Factors for Operational Planning.**

a. Operational plans for UAS test and training flights must take into consideration the type of system, results to be achieved, and the area in which operations have been approved.

b. The unit must maintain a written Airspace Safety Plan. Each Airspace Safety Plan must take into consideration--

(1) The capability of UASs, such as altitude, range, speed, wind factors, and the amount of guidance which may be commanded to the system (programmed or other), deviations allowable from assigned headings that the UAS may take due to malfunctions, and the type of launch.

(2) The system for flight termination and recovery (i.e., parachute and/or other functions which would affect flight safety).

(3) The methods for obtaining real-time position of the UAS in flight, such as visual, manned chase airplane, radar, telemetry, etc.

(4) The procedures for Area Surveillance IAW paragraph 5-2.

(5) Aerodynamic data used to determine flight safety grids which will include, but not be limited to, glide ratio of the UAS, detailed performance data (including system

time delays), location of launch site, intended recovery site, parameters of the flight area, and method of area surveillance (such as visual, manned aircraft, or radar).

## **Appendix A References**

### **Section I Required Publications**

**AR 95-1**  
Flight Regulations

**AR 95-23**  
UAS Flight Regulations

**Fort Sill Reg 95-1**  
Flight Regulations

**Fort Sill Reg 385-10**  
Safety Regulation

**FM 3-04.155**  
(Draft) Army Unmanned Aerial System System Operations

### **Section II Referenced Forms**

**DD Form 175**  
Flight Plan, Military

**DD Form 175-1**  
Flight Weather Briefing

### **Section III Prescribed Forms**

This section contains no entries.

### **Section IV Referenced Forms**

**DA Form 2028**  
Recommended Changes to Publications and Blank Forms

**Appendix B**  
**UAS Mission Profile Checklist**

The UAS operator must provide as much of the following information as possible to enable the AT&A, Range Control, Environmental, and Safety Offices at Fort Sill to determine the feasibility of the proposed UAS operation. Also provide any additional information, such as previous feasibility studies that will help determine local feasibility. The UAS operator should anticipate additional specific system related questions and/or requirements to fulfill the needs of the coordinating offices. NOTE: A tabbed folder is recommended.

- B-1.** General description of system to include dimensions, weights, and picture(s).
- B-2.** Description of planned mission and flight profiles at Fort Sill, to include launch and recovery site, route and altitude to and from mission area, mission area, mission altitude, and if applicable, return home (Lost-Link) route and altitude.
- B-3.** Performance data to include climb rate, turn capability, cruise speed, normal and maximum mission altitudes, glide ratio, takeoff and landing distances, and maximum speed, fuel endurance and range.
- B-4.** System flight history data including number of flights, flight hours, system reliability, number of accidents, and types of accidents.
- B-5.** Description of command/control system to include subsystem block diagram, effective range (RF link analysis), frequencies, and personnel required to operate the system.
- B-6.** Description of pretakeoff checks and procedures to verify the UAS control system functions correctly.
- B-7.** What type of information is available to the pilot such as map displays, telemetry data, etc., for the UAS mission?
- B-8.** What happens if the control signal is lost (loss of carrier) (link loss) or if control system does not respond to commands? Does the control system possess automatic reversion or "return home" modes?
- B-9.** Description of the Flight Termination/Recovery System, including an Auto Recovery System if applicable.
- B-10.** Meteorological restrictions on operations.
- B-11.** A Flight Controllers Manual or operating procedures as applicable.
- B-12.** Response to typical in-flight emergencies such as loss of engine.

**B-13.** Identify any classified equipment, hazardous systems, chemicals, pyrotechnics, etc., on the system.

**B-14.** A copy of a risk analysis/assessment on the UAS system.

**B-15.** A risk assessment IAW FM 100-14 for the mission to be flown. NOTE: If the intent is to fly over soldiers we require a risk assessment specifically addressing this requirement.

**B-16.** Pilots certification (who certifies/licenses), hours of time with the system, number of flights.

**B-17.** Environmental assessment documents pertinent to the system and/or operation.

**B-18.** What type of fuel is used, what is the systems fuel capacity, how much fuel will be stored on site and how will it be stored.

**B-19.** Safety area and/or ROZ around the system during launch and/or recovery.

## APPENDIX C Recovery of Unmanned Aerial Systems

### Section I General

**C-1. Recover and Safety.** This appendix is adapted from FM 3-04.155, (Draft) Army Unmanned Aerial System Operations, December 2004, and outlines recovery and safety considerations for downed Army Shadow and Raven UASs. The following procedures are intended to be a major part of the UAS Pre-Accident Plan which is designed to prepare the unit for an accident if one should occur:

**C-2. Pre-Accident Plan.** A Pre-Accident Plan is designed to ensure that each AVO will know what to do if there is a UAS accident. Practicing the plan will ensure that UAS recovery is completed in a safe and timely manner.

**C-3. Safety Risk Management.** Safety Risk Management by all participating recovery personnel is the foremost consideration, as most UASs have one or more items that are classified hazardous materials (HAZMAT) (for instance, FUEL, batteries, parts of the sensor payload, etc.). Commanders should ensure a comprehensive recovery plan is created, documented, and trained on a regular interval.

**C-4. Return Instructions.** A technique to aid in the recovery of any UAS is to mark the UAS with instructions for return to U.S. Army military personnel and/or a promise of a reward in the language of the region. Figure E-1 is an example of a sticker that was created with the help of an Iraqi linguist (Arabic language) and placed on each Raven UAS. A separate sheet of paper with the names of each FOB written in English with the corresponding Arabic spelling to the right, for application to the blank underlined area on the sticker was provided to the Raven units receiving the stickers.



Figure C-1. UAS Recovery Markings

## **Section II Shadow**

### **C-5. Recovery Response Plan.**

a. The recovery response plan outlines the specific duties and responsibilities applicable to the personnel required to perform an accident investigation in the event of a catastrophic failure. Notification includes all initial requirements. A running log of all actions encompasses agencies notified, person's names, and times of contact.

b. If the UAS is over a hostile environment, the recovery parachute is not deployed. The AVO makes every effort not to crash the UAS in the vicinity of civilians.

c. If the UAS is over an isolated area, the MC makes the decision to deploy the recovery parachute.

d. Deploy the recovery parachute if the UAS is within 10 minutes of ground vehicle driving distance.

e. Deploy the recovery parachute during all flights in a training environment.

### **C-6. Accident Reporting.**

a. In the event of a downed UAS, the MC ensures ATC and the ALO are notified via FM, VHF, UHF, DNVT or mIRC Chat to confirm last known location of UAS via mode 3A/C IFF.

b. The MC informs the C2 Cell of location, time, and possible cause of downed UAS.

c. The C2 Cell opens a running log (DA 1594) of all actions taken, agencies notified, and names with times of contact.

d. The C2 Cell notifies the BDE S3 / DIV G3 (based on level of support) relaying necessary information and current SITREP. Bde S3 determines availability of nearest maneuver unit in order to move in and secure UAS crash site.

### **C-7. Recovery and Investigation.**

a. Due to the small amount of fuel on board, the likelihood of significant damage to the environment or surrounding structures is small. The UAS is made out of carbon fiber and burning produces hazardous fumes. Respirators must be used within 300 feet of a burning UAS. The normal procedure is to let the aircraft burn if it is not endangering life or property. In the event that the UAS experiences an in-flight

emergency warning or severe weather, the AVO contacts ATC and requests Emergency Return to Base for landing.

**C-8. Vicinity United States Troops.** It is the responsibility of MC to evaluate the situation quickly and activate the Pre-Accident Plan when warranted. If the UAS crashes within a secure area, then the Bde S3/Div G3 will deploy a four-person downed UAS recovery crew with any additional security team (based on situation) to investigate/recover the wreckage and secure the IFF transponder. The downed UAS recovery crew utilizes the investigation kit and completes the required forms. The Bde TOC is notified immediately and an initial Serious Incident Report (SIR) is filed within four hours, if applicable. Upon completion of the investigation and photos (time permitting), the UAS is loaded into the HMMWV with maximum effort on preserving any of the wreckage possible for further analysis.

**C-9. Isolated Areas.** Based on the situation surrounding the downed UAS, the Bn Cdr determines the requirement to recover the UAS. It is the responsibility of supervisory personnel to evaluate the situation and activate the Pre-Accident Plan when warranted. If the UAS crashes in an isolated area the Bde S3/Div G3 will notify the Avn Bde S3 Operations Section and request support for observation/movement of downed UAS recovery crew to crash site. Bde S3/Div G3 informs Avn Bde S3 if additional assistance is required to locate and secure the UAS. A four-person downed UAS recovery crew with an additional security team (based on situation) will fly out to investigate, recover the wreckage, and secure the IFF transponder. Upon completion of investigation and photos (time permitting), the UAS is loaded onto the aircraft with maximum effort on preserving any of the wreckage possible for further analysis.

**C-10. Emergency Recovery Team Checklist.** The following is an example of a Shadow Emergency Recovery Team Checklist:

**Table C-1. Emergency Recover Team Checklist**

	Secure Downed UAS Kit, recovery vehicle with trailer and map with downed UAS plotted.
	Assemble recovery team and if possible a Combat Lifesaver (CLS).
	Confirm downed UAS grid location with MC and establish route to site.
	Perform communications checks prior to departure to site.
	Perform communications checks with aviation assets as required.
	Insure team members are personally equipped for mission.
	Link up with additional Security Team.
	Thoroughly brief team members on actions to be taken.
	Upon arrival at site, extinguish/contain fires when appropriate (Do not attempt to extinguish UAS if burning, standoff 300 feet upwind).
	Secure / contain hazardous materials as required.
	Provide medical assistance as appropriate.
	Secure the site, report property damage and make every effort to preserve wreckage without destroying the evidence.

	After a thorough investigation is complete and photos are taken (time permitting), secure the UAS in the HMMWV trailer attempting to preserve as much of the wreckage as possible.
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**C-11. Responsibilities.**

a. Platoon Leader (PL) / Warrant Officer (WO). The PL/WO will ensure personnel execute the plan by producing exact guidance, appropriate checklists, and POCs. Ensure the Pre-Accident Plan is distributed to all major areas (maintenance, operations, etc.). Execute notification and ensure DA Form 1594 is complete. In the event of a downed UAS, the PL or WO proceeds to the operational site to oversee rescue/recovery efforts.

b. Mission Commander. The mission commander will contact ATC to confirm location of downed UAS with last known location of mode 3 A/C IFF, plot crash on crash grid map, monitor radio transmissions regarding downed UAS, brief/update PL/WO on current situation.

c. Maintenance (52D & 33W). Maintenance will select maintainers not involved with the flight or maintenance of the downed UAS. Collect fuel and oil samples for evaluation (QA). Provide recovery equipment as required. Assist in investigation as required. All related items to include samples must be secured in a locked box with an updated checklist. Leave the shelter as is with a full tank of gas and secure the door if an investigation is to be conducted.

d. Supply. Supply will inventory and maintain downed UAS kit. Issue necessary Class I supply items for response and recovery team. Obtain items as necessary in the event of activation of this plan. All personnel with an assigned position on the downed UAS recovery crew will be familiar with their assigned responsibilities and thoroughly knowledgeable with the investigation.

**C-12. Downed Aerial System Kit List.** All items contained in the downed UAS kit will be secured. The downed UAS kit includes, but is not limited to the following items:

**Table C-2. Example of a Shadow Downed UAS Kit Checklist**

	<b>Items</b>	<b>Quantity</b>
	Cell phone or two-way radio to base	1 each
	Digital or Standard Camera	1 each
	Standard Camera film	*
	Camera batteries	*
	Lap Top computer for compiling data	1 each
	Tape recorder (small)	1 each
	Blank tapes	3 or 4 each
	Tape Recorder batteries	*
	GPS to plot wreckage, obtain headings, and spot elevation	1 each

Map - 1:50,000 (good), 1:25,000 (preferred).	*
Magnifying glass	*
Magnetic compass	*
Tape measure: 50' or 100' (preferred).	*
Ruler (12" or 18").	*
First-aid kit with tweezers	*
Latex/vinyl gloves	3-4 dozen
Leather gloves	4 pairs
Dust masks	2-3 dozen
Goggles or safety glasses	4 sets
Boundary tape to mark site perimeter 500'	*
Constantine Wire	*
Graph paper on clipboard	*
Pens/pencils, indelible markers, chalk, and one can of spray paint.	*
Pocket-size notebooks	4 count
Calculator	2 count
Baggies	4 dozen—gallon size
Prelabeled AOAP Bottles	1 each-fuel
* Quantity at unit discretion	

**C-13. Spill Kit.** All items contained in the spill kit will be secured. The spill kit includes, but is not limited to the following items:

**Table C-3. Example of a Shadow Spill Kit Checklist**

Items	Quantity
Absorbent pads	2 boxes
Short handle shovels	2 each
Pick axe	1 each
Sledge hammer	1 each
Wood stakes	25 each
Large garbage bags w/ties	100 count
Sand bags	25 each
55 gal removable top drum	1 each
Lights (portable):	1 set
Gloves (chemical):	10 sets
Safety masks (dust):	10 each
Sheet, plastic	1 roll
Yellow "off limits" tape	1 box
Dry sweep	1 bag
Goggles	3 pairs
*Quantity at unit discretion	

### **Section III Raven**

The Raven UAS is designed with an autoland feature that is initiated between 50 and 100 feet AGL and causes the UAS to descend in a deep stall. The UAS is designed so that a hard impact with the ground will allow for UAS components to separate. This is normal and helps dissipate the impact of landing and protect the UAS. A landing pad on the bottom of the fuselage also provides impact protection. The durable nature, and design features of the UAS means the UAS is salvageable after an accident involving an uncommanded landing. There is a greater chance of UAS damage at altitudes higher than 100 feet.

#### **C-14. Downed Aerial System Recovery.**

a. If a UAS lands outside of visual range,--

(1) Go to BLACK SCREEN—Record all necessary flight data. (The term BLACK SCREEN is defined as simultaneously pressing ENTER and PAGE to disable/enable the video signal to the applicable controller. This allows the operator to view text overlay when static is excessive.)

(2) Assemble recovery equipment and refer to TTP manual.

(3) Plan the recovery mission.

(4) Attempt to locate UAS based on last known location

b. If UAS is not located--

(1) Check for signal from UAS using RVT.

(2) Conduct search based on last known location and heading.

#### **C-15. Recovery and Inspection.**

a. Retrieve the fuselage first, keeping the body away from the propeller area.

b. Disconnect the battery from the aircraft.

c. Gather the remainder of the aircraft components.

d. Inspect all components for damage. Generally, minor dents or cracks do not require immediate maintenance before launching again. However, be wary of flying an aircraft with damage to the leading edge of the center wing and wingtips, the horizontal stabilizer, or the vertical stabilizer as these control flight. Detailed inspection procedures appear table C-4 below.

**Table C-4. Example of a Raven Downed UAS Recovery Kit Checklist**

	<b>Items</b>	<b>Quantity</b>
	Rope	*
	Saw	*
	Tree spikes and climbing harness (for tree climbing)	*
	Folding ladder	*
	Extension pole / hook	*
	Net or poncho liner to catch / prevent further damage to UAS falling from tree	*
	Trading material (food, candy, money, or other items can be used to barter with civilians for return of lost UAS).	*
	Gloves	*
	Goggles	*
	Night vision devices	*
	RVT (utilize RVT to acquire signal from downed UAS).	*
		*
*Quantity at unit discretion		

**C-16. Inspection.** There are three main ways to identify problems with the aircraft. They are--

- a. To conduct a visual inspection.
- b. To observe incorrect response to correct input.
- c. To swap working parts from another working aircraft to identify whether or not a part is damaged. The aircraft should be frequently inspected for damage. Any discrepancies found should be repaired at the appropriate level.

**C-17. Nose.** In inspecting the nose, check--

- a. For dents and cracks in the skin.
- b. Camera lenses and clean them off with the lens brush and/or glass cloth.
- c. Nose/fuselage connectors for cracks and a secure connection.
- d. That electrical contacts are free of grit or dust.

**C-18. Center Wing and Wingtips.** In inspecting the center wing and wingtips, check--

- a. For dents and cracks in the skin.
- b. For buckling in the wing spar caps (reinforcing structure in the wing that appears as a gray shadow along the length of the center wing and wingtips); damage to

the wing spar caps prevents the aircraft from flying and necessitates a depot level repair.

- c. That the wingpins (that hold the wingtip to the center wing) are not damaged.
- d. The o-rings on the wingpin for damage (these hold the wingtip securely to the center wing).
- e. The wing snap screw on the center wing.
- f. That the leading edge of the wing has maintained its shape.

**C-19. Fuselage.** In inspecting the fuselage, check--

- a. For dents and cracks in the skin.
- b. Wing snap screws.
- c. That electrical contacts are free of grit or dust.
- d. That the antenna is intact.
- e. That the landing pad is secure and not damaged.

**C-20. Propeller.** In inspecting the propeller, check--

- a. Propeller for cracks and nicks.
- b. That propeller is secure.

**C-21. Tailboom.** In inspecting the tailboom, check--

- a. For dents and cracks in the skin.
- b. That the tail boom fastens securely to the fuselage.
- c. That electrical contacts are free of grit or dust.
- d. That the stabilizer horn pivot housing is firmly seated in the end of the tailboom.
- e. That stabilizer pivot pin is centered in the housing.

**C-22. Horizontal Stabilizer.** In inspecting the horizontal stabilizer, check—

- a. For dents and cracks in the skin.

b. The stabilizer clip for damage.

**C-23. Final Check.** The final check should be for general alignment. Looking down the nose of the aircraft, all the components should be straight and aligned without any skewing.

## **Glossary**

### **Section I Abbreviations**

**AGL**

Above Ground Level

**ARAC**

Army Radar Approach Control

**ARIMS**

Army Records Information Management System

**ASD**

Administrative Services Division

**AT&A**

Air Traffic and Airspace

**ATC**

Air Traffic Control

**AVO**

Air System Operator/Crewmember

**COA**

Certificate of Authorization

**CRC**

Combat Readiness Center

**DARR**

Department of the Army Regional Representative (to the FAA)

**DD**

Department of Defense

**DHR**

Directorate of Human Resources

**DPTMS**

Directorate of Plans, Training, Mobilization, and Security

**EP**

External Pilot

**FAA**

Federal Aviation Administration

**FES**

Fire and Emergency Services

**FM**

Field Manual

**FSIASO**

Fort Sill Installation Aviation Safety Officer

**HPAAF**

Henry Post Army Airfield Air Traffic Control

**HQDA**

Headquarters, Department of the Army

**IFR**

Instrument Flight Rules

**JUAS**

Joint Unmanned Aerial System

**MOA**

Military Operations Area

**MSL**

Mean Sea Level

**NCO**

Noncommissioned Officer

**ROA**

Remotely Operated Aircraft

**ROZ**

Restricted Operation Zone

**SUAS**

Small Unmanned Aerial System (Raven, TACMAV, etc.)

**TALS**

Tactical Automated Landing System

**TUAS**

Tactical Unmanned Aerial System (SHADOW, HUNTER, etc.)

**UAS**

Unmanned Aerial System

**VFR**

Visual Flight Rules

**Section II**

**Terms**

**Airspace Complex.** The airspace under control of the Army Radar Approach Control (ARAC) to include R-5601, MOAs, and Public Use Airspace within approximately 40 nautical miles of Fort Sill, OK.

**Airspace Safety Plan.** A written plan that describes the overall Safety Risk Management Plan to include: normal and emergency operations, methods of control and surveillance of the UAS, and communications with Range Control and ATC.

**Air Traffic and Airspace (AT&A) Manager.** The individual responsible for supervision and enforcement of applicable FAA and Army regulations governing use of the airspace and conduct of activities within the purview of AR 95-2 is (b) (6), (580) 442-2387/ DSN 639-2387.

**Coordinating Altitude.** A procedural airspace control method used to separate fixed and rotary wing aircraft by determining an altitude below which fixed-wing aircraft will normally not fly, and above which rotary-wing aircraft will normally not fly. The coordinating altitude is normally specified in the Airspace Control Plan and may include a buffer zone for small altitude deviations.

**Special Use Airspace (SUA).** Airspace designated by the FAA with specific vertical and lateral limits, established for the purpose of containing hazardous activities or activity that could be hazardous to nonparticipating aircraft. Limitations on nonparticipating aircraft may range from absolute exclusion to complete freedom of use within certain areas, depending upon the activity being conducted.

**UAS Mission Profile.** A detailed description of a UAS mission from launch to recovery to include UAS operating characteristics and limitations, launch and recovery site requirements, and airspace requirements.

**Section III**

**Special Abbreviations and Terms**

**UAS Designations**

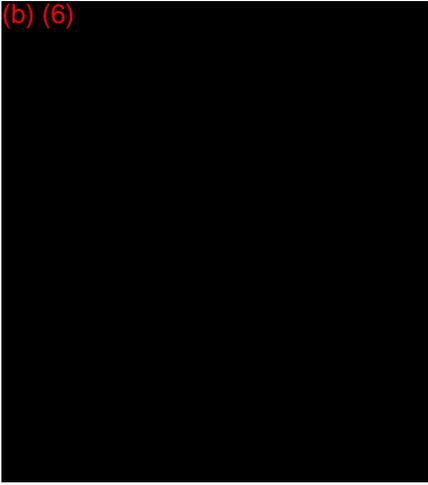
**RQ-1. PREDATOR**

**RQ-2. PIONEER**

**RQ-5. HUNTER**

**RA-7. SHADOW**

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