

**BY ORDER OF THE  
SECRETARY OF THE AIR FORCE**

**AIR FORCE INSTRUCTION 11-502, Volume 3**

**26 APRIL 2012**

***Flying Operations***

**SMALL UNMANNED AIRCRAFT SYSTEMS  
OPERATIONS**



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This publication implements AFPD 10-9, *Lead Command Designation and Responsibilities for Weapon Systems* and AFPD 11-5, *Small Unmanned Aircraft Systems Rules, Procedures, and Service*. It establishes requirements, responsibilities, and guidelines for operation of Air Force SUAS by Air Force military and civilian personnel, personnel of other services and foreign personnel assigned or attached to USAF units, and contracted Small Unmanned Aircraft System Operators (SUAS-O) as stipulated in contracts. This publication applies to the Air Force Reserve Command (AFRC) and the Air National Guard (ANG.) Headquarters, Air Force Flight Standards Agency (FOA-AFFSA) is the Office of Primary Responsibility (OPR). This AFI may be supplemented at any level, but supplements must be coordinated with the OPR prior to publication. MAJCOMs will forward copies of supplements to HQ AFFSA Workflow ([hqaffsa.cce@tinker.af.mil](mailto:hqaffsa.cce@tinker.af.mil)) for coordination prior to publication. Refer recommended changes, improvements and questions about this publication to the OPR, on AF Form 847, *Recommendation for Change of Publication*. Route AF Form 847s through MAJCOM channels IAW AFI 11-215, *USAF Flight Manuals Program*. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located at <https://www.my.af.mil/afrims/afrims/afrims/rims.cfm>

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## Chapter 1

### POLICY AND RESPONSIBILITIES

**1.1. General.** This instruction prescribes basic policy and guidance for operating USAF SUAS. AFI 11-502, *Small Unmanned Aircraft Systems Operations*, volumes 1, 2, and 3 draw from the respective AFI 11-202, *Flying Operations* volumes 1, 2, and 3, with modifications tailored to Small Unmanned Aircraft Systems; knowledge of the AFI 11-202 series is highly encouraged in order to fully understand the parallels and differences between systems and their supporting instructions.

1.1.1. AFSOC is designated Lead Command for Groups 1-3 UAS (generally referred to as SUAS: see table A5.1). Unmanned Aircraft (UA) of all descriptions fly in the same environment as manned aircraft. UAS operators must follow rules and procedures, as closely aligned as fielded technology permits, to those followed by crews of manned aircraft. Coordinating SUAS with other manned/unmanned aircraft and surface fire support/maneuver units requires detailed integration and understanding of the tactical environment.

1.1.2. Units do not have the authority to obligate the Government to purchase, lease, procurement, or contract of any new Air Force SUAS to include UA, Ground Control Station (GCS), Remote Video Terminal (RVT), Electro-Optical/Infrared (EO/IR), or any other payload prior to coordination with SAF/AQIJ. Include AFSOC/A5KJ, AFSOC/A3OU, and MAJCOM/A3 as information addressees. Exceptions: Air Force Material Command (AFMC) need not coordinate for unfielded test systems and USAFA need not coordinate for unfielded systems for the purpose of conducting research.

#### 1.2. Key Definitions:

1.2.1. “Will” and “Shall” indicate a mandatory requirement.

1.2.2. “Should” indicates a preferred, but not mandatory, method of accomplishment.

1.2.3. “May” indicates an acceptable or suggested means of accomplishment.

**1.3. SUAS Operator.** An individual, qualified and responsible for the safe ground and flight operation of the unmanned aircraft and onboard systems. A single SUAS-O will be specifically identified by responsible authority as the Lead SUAS-O. The Lead SUAS-O, regardless of rank, is equivalent to the Pilot-in-Command (PIC) of a manned aircraft and is responsible for all aspects of the mission, regardless of crew position. A SUAS mission includes equipment preparation, planning, briefing, ground and air operations, recovery, mission debriefing, and equipment accountability.

1.3.1. Most units operating SUAS are not traditional flying squadrons; for this reason, this volume is intended to be a common source of directives applicable to SUAS operations, to include, but not limited to:

1.3.1.1. Air Force-specific guidance.

1.3.1.2. Federal Aviation Regulations (FARs).

1.3.1.3. International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs).

1.3.1.4. Commanders' Guidance.

1.3.1.5. Tactics, Techniques and Procedures (TTP)/Updated TTP.

1.3.1.6. This volume provides broad guidance and cannot address every conceivable circumstance. SUAS-Os are expected to use their best judgment in order to ensure safe conduct of SUAS operations.

**1.4. SUAS Equipment Custodian.** Equipment custodian will be identified in writing by the Squadron Commander. The individual will ensure SUAS equipment is secured and accounted for appropriately IAW the equipments' level of sensitivity. Maintain an account on SUASMAN and keep all equipment status up-to-date. Individuals will be trained prior to conducting field-level repairs on SUAS equipment.

### **1.5. Compliance.**

1.5.1. The SUAS-O will comply, as applicable, with the following:

1.5.1.1. This volume and MAJCOM guidance.

1.5.1.2. UAS Group-Specific instructions and supplements.

1.5.1.3. Federal Aviation Regulations (FARs) applicable to SUAS when operating within the United States to include the airspace overlying the waters out to 12 miles from the US coast, unless the Federal Aviation Administration (FAA) has excluded military operations.

1.5.1.4. International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) applicable to SUAS in international airspace over the high seas, military mission permitting.

1.5.1.5. The specific rules of each individual nation as published in Flight Information Publications (FLIP) Area Planning (AP) and General Planning (GP) documents and the Foreign Clearance Guide (FCG). Theater commanders must ensure the content of FLIP accurately convey the rules of each nation within their area of responsibility when different from this instruction.

1.5.1.6. ICAO SARPs when operating in a nation whose rules are not published.

1.5.1.7. Procedures and special notices in FLIP, Notice to Airmen (NOTAM), aircraft technical orders, Air Force directives, MAJCOM directives, and Air Traffic Control (ATC) instructions.

1.5.1.8. Contractor requirement to comply with Air Force UAS guidance must be stipulated in contracts.

1.5.1.9. UAS leased or loaned to Air Force organizations will be operated in compliance with Air Force guidance.

1.5.2. MAJCOM Supplements. MAJCOM supplements shall not be less restrictive than this instruction. MAJCOM supplements to this instruction must be coordinated with HQ AFFSA prior to publication IAW AFD 11-5. MAJCOMs will forward copies of supplements to AFFSA, HQ AFFSA/A3O and HQ AFFSA/A3FV for coordination prior to publication at [hqaffsa.a3of@tinker.af.mil](mailto:hqaffsa.a3of@tinker.af.mil).

**1.6. FAA Advisory Circulars (ACs) and Technical Standard Orders (TSOs):** IAW AFI 63-1301, *Global Air Traffic Management (GATM)* and Navigation Safety system performance and software development processes for non-civil type certificated aircraft must either satisfy civil standards or provide an equivalent level of safety and performance. FAA Advisory Circulars (ACs) and Technical Standard Orders (TSOs) provide civil standards for the Certification and Operational Approval of GATM and navigation safety systems.

**1.7. “Properly Certified” Aircraft.** In many cases this AFI uses the term “properly certified” in lieu of listing all applicable civil equipment and integration standards for CNS/ATM and Navigation Safety systems. The term “Properly Certified” indicates the aircraft systems comply with appropriate FAA ACs and TSOs or provide an equivalent level of safety and performance. A list of required civil standards may be obtained from the AFFSA web site (<https://www.mil.tinker.af.mil/affsa/affsa.html> – see CNS System Requirements) or aircraft certification matrices maintained by ESC/GA.

**1.8. Waiver Authority.** Unless otherwise specified, HQ AFFSA/A3O is the waiver authority for this instruction. Waivers to the basic guidance in this instruction will be requested through applicable operations channels to MAJCOM/A3, or equivalent level. MAJCOM/A3s will forward request in message or memo format to HQ AFFSA/A3O, with a copy to HQ AFSOC/A3OU. Waivers to supplemental guidance will be handled by the MAJCOM agency that generated the supplement. Unless otherwise specified in AFI 11-5 *UAS Group-Specific, Volume 3*, MAJCOM/A3s are the waiver authority for specific individual SUAS crewmember operations requirements. When the United States Air Force Academy (USAF A) utilizes resources of the 306th Flying Training Group (FTG) (AETC), AETC is the parent MAJCOM. Waivers to this instruction will not exceed 12 months. Units assigned, attached, or under operational control of a combatant commander will request waivers through the Commander, Air Force Forces (COMAFFOR) who may approve, disapprove, or forward to HQ AFFSA/A3O for action.

1.8.1. HQ AFFSA will approve waivers to this instruction only when:

1.8.1.1. Compliance with this instruction creates a hazard.

1.8.1.2. An essential MAJCOM requirement makes a waiver necessary.

1.8.2. MAJCOMs. MAJCOMs may authorize a waiver to this instruction without prior approval from HQ AFFSA, if doing so is “essential to the defense of the United States” because of a military emergency or an urgent military necessity. MAJCOM designated representatives will notify HQ AFFSA within 72 hours of authorizing a waiver at [hqaffsa.a3of@tinker.af.mil](mailto:hqaffsa.a3of@tinker.af.mil) or DSN 339-9783. Unless otherwise specified in appropriate AFI 11-5GP(1, 2, or 3)-SUAS, Volume 3, MAJCOM/A3 is waiver authority for operational procedures. Delegation of waiver authority is at MAJCOM discretion.

1.8.3. Waiver Process. HQ AFFSA will provide only written waivers. Units requiring a waiver will follow the procedure listed below:

1.8.3.1. Units will forward their request for a waiver to this instruction through their chain of command to their MAJCOM/A3. The unit must include a detailed package supporting the request.



1.8.3.2. MAJCOM/A3 will review the request. If approved, MAJCOM/A3 will endorse the request and forward it to HQ AFFSA/A3O and info copy AFSOC/A3OU at least 30 days prior to the waiver requirement.

1.8.3.3. MAJCOMs will track the currency of all approved waivers to ensure waiver renewals are requested a minimum of 30 days prior to the expiration date. HQ AFFSA will review and respond in writing to MAJCOM waiver requests.

1.8.3.4. Approved waivers will include an expiration date.

**1.9. FAR Exemptions and Authorizations.** MAJCOMs will obtain FAA exemptions only through HQ AFFSA.

1.9.1. MAJCOM commanders may unilaterally authorize deviation from air traffic rules if it is considered essential to the defense of the United States and there is insufficient time to follow normal procedures. MAJCOMs will notify HQ AFFSA as soon as practical.

1.9.2. An ATC clearance is not authority to deviate from this instruction.

**1.10. Deviations:**

1.10.1. SUAS-Os may deviate from any flight rule when:

1.10.1.1. An in-flight emergency requires immediate action.

1.10.1.2. Deviation is required to protect lives.

1.10.1.3. When safety of flight dictates. Note: Consideration of hazards created must be factored into a decision to deviate. Preservation of the UA is not paramount.

**1.11. Notification.** When deviating from an ATC clearance, the SUAS-O will notify ATC of the action taken as soon as possible.

**1.12. Post-Flight Actions.** The following post-flight actions shall be taken in the event of a deviation from a flight rule and/or when given traffic priority by ATC in an emergency:

1.12.1. The SUAS-O will notify the immediate supervisor as soon as practical and will make a detailed written record within 24 hours of the incident IAW Attachment 2.

1.12.2. The unit will keep a copy of that record and be prepared to provide that record to the appropriate investigating authority and HQ AFSOC/A3OU IAW the AFIs listed in paragraph 1.12. The record will be kept for one year from the date of the incident.

1.12.3. Minor deviations from assigned airspace or mission profiles that do not qualify for formal reporting and do not result in a Hazardous Air Traffic Report (HATR) are to be reported using the format in Attachment 2. Complete all information except the individual's name/unit and submit to HQ AFSOC/A3OU for trend analysis purposes. Exception: AFMC is lead command for test operations.

**1.13. Violations.** A violation may result when an Air Force SUAS deviates from flight rules. FAA ATC facility deviation reports involving an Air Force SUAS are processed IAW AFI 13-201, *Air Force Airspace Management*. Air Force air traffic control facility deviation reports involving Air Force SUAS are processed IAW AFI 91-202, *The US Air Force Mishap Prevention Program*. Violations that occur in the airspace of foreign nations are handled IAW the procedures of that nation.

1.13.1. The names of the operators will not be released to non-USAF agencies without the permission of the Air Force Representative to the FAA (AFREP) coordinating the investigation.

**1.14. Dimensional Units.** Visibility distances are in statute miles (SM). All other distances referred to in this instruction are in nautical miles (NM) unless otherwise identified.

**1.15. Maintenance and Disposition of Records.** Maintain records IAW Air Force Manual (AFMAN) 33-363, *Management of Records*. Dispose of records IAW Air Force Records Information Management System (AFRIMS) Records Disposition Schedule located at <https://www.my.af.mil/gcss-af61a/afrims/afrims/>.

## Chapter 2

### PREFLIGHT REQUIREMENTS

#### 2.1. Preflight Planning.

2.1.1. SUAS-Os will accomplish preflight planning. Operators will acquaint themselves with all information, procedures and rules appropriate to the SUAS and the mission. This should include:

2.1.1.1. Appropriate sections of the aircraft Technical Order (T.O.), Technical Manuals (TM) or equivalent manufacturers' publications and MAJCOM mission-specific guidance (e.g. FCIF and SIIs).

2.1.1.2. All relevant information, to include NOTAM and GPS NOTAMs, found at <https://www.notams.jcs.mil>. When operating in deployed locations, contact the Space Duty Officer at the AOC for current GPS and SATCOM performance, interference, and jamming information.

2.1.1.3. Flight Information Publications (FLIP) appropriate to the specific SUAS and mission, including appropriate sectional aeronautical charts or Portable Flight Planning System (PFPS)/Falcon View with FAA/ICAO airspace and/or display of approved working area boundaries (whichever is more restrictive). Ensure PFPS is updated with current Charts, DAFIF/eCHUM.

2.1.1.4. Airfield Suitability and Restrictions Report (ASRR), Special Departure Procedure (SDP) information, and Jeppesen Military Chart Service information. MAJCOMs will provide guidance on the use of additional Airfield Suitability and Restrictions Report (ASRR), Special Departure Procedure (SDP) information, and Jeppesen Military Chart Service, as required. MAJCOMs will establish procedures to ensure personnel can access and use the ASRR. SDP and Jeppesen Military Chart Service information are available at commercial websites. The MAJCOM Standardization and Evaluation office may obtain usernames and passwords from HQ AFFSA/A3OF. The ASRR is available at <https://www.afd.scott.af.mil>.

2.1.1.5. Alternatives available if the flight cannot be completed as planned.

2.1.1.6. Departure, en route, destination, and alternate weather observations and forecasts.

2.1.1.7. Fuel/battery charge requirements per appropriate technical manual.

2.1.1.8. Maximum operating altitudes, minimum safe altitudes, visual line-of-sight, and data link line-of-sight considerations for the planned route of flight and area of operations.

2.1.1.9. Loss-of-Link procedures coordinated through ATC and Range Control agencies.

2.1.1.10. Takeoff and landing limitations.

2.1.1.11. AFI 11-5GP(1, 2, or 3)-SUAS, Volume 3, *SUAS Operations Procedures*.

2.1.1.12. Applicable airfield advisories, bird advisories and hazard information, available through Automated Terminal Information System (ATIS), Internet sources, or as disseminated locally.

2.1.1.13. Operational Environment Assessment. An assessment as to the operational viability which may or may not be based on one or more factors (e.g., intel, weather, legal, C2, terrain, SA).

2.1.2. Due Regard. In international airspace, when operationally necessary, SUAS-Os are authorized to conduct military flight operations with due regard for the safety of navigation of civil traffic IAW FLIP GP "Operations and Firings over the High Seas." Due Regard operations may be conducted under the following restrictions:

2.1.2.1. In Visual Meteorological Conditions (VMC); or

2.1.2.2. Within radar surveillance and under positive communication control of a surface or airborne radar; or

2.1.2.3. Outside the limits of controlled airspace.

## **2.2. Fuel/Battery Charge Requirements.**

2.2.1. General Information. The SUAS-O will ensure sufficient fuel/battery charge is available on board the aircraft to comply with the requirements of this instruction and safely conduct the flight. Before takeoff the aircraft must have enough usable fuel/battery charge aboard to complete the flight to a final landing, either at the destination airport or landing zone or the alternate airport (if one is required), plus the fuel reserves. (Exception: Group 1 SUAS have no alternate airport or reserve fuel requirement and are exempt from the requirements of paragraphs 2.2.2 and 2.2.3. Land the UA before reaching minimum useable battery capacity.)

2.2.2. Alternate Airport Required. Reserved for future operations.

2.2.3. Fuel Reserve. The SUAS-O must ensure the aircraft is carrying enough usable fuel on each flight to increase the total planned flight time between refueling points by 10 percent (up to a maximum of 45 minutes for fixed wing or 30 minutes for helicopters) or 20 minutes, whichever is greater. To compute fuel reserves:

2.2.3.1. For reciprocating engine-driven aircraft and helicopters, use fuel consumption rates for normal cruising altitudes.

2.2.3.2. For turbine-powered aircraft use fuel consumption rates that provide maximum endurance at 10,000 ft. Mean Sea Level (MSL).

2.2.3.3. If the MAJCOM authorizes holding (instead of an alternate airport) for a remote or island destination, do not consider the prescribed holding time as part of the total planned flight time for computing fuel reserve.

2.2.4. Flight Logs. The following are the approved types of flight logs:

2.2.4.1. AF Form 70, *Pilot's Flight Plan and Flight Log*.

2.2.4.2. MAJCOM-approved form.

2.2.4.3. Approved computer-generated flight log. The lead command will approve flight-planning software to meet SUAS group-specific training and operational requirements.

2.2.4.4. Flight planning computations annotated on a navigation chart.

2.2.5. Minimum/Emergency Fuel Advisory. When operating in FAA airspace, SUAS operators will declare minimum/emergency fuel to the controlling agency when in their judgment the aircraft may land at the intended destination with less than the required emergency fuel reserve.

### **2.3. Weather.**

2.3.1. The SUAS-O will obtain sufficient weather information to safely conduct the flight and comply with this instruction. Units employing SUAS should refer to the Flight Information Handbook (FIH) for Operational Weather Squadron (OWS) contact information. When necessary, record the appropriate weather information on a DD Form 175-1, *Flight Weather Briefing*. The following weather sources are authorized:

2.3.1.1. US Military Weather Services.

2.3.1.2. Approved weather sources listed in the MAJCOM supplement to this instruction or UAS Group-Specific, Volume 3.

2.3.2. SUAS-O of Group 1 UAS are exempt from the weather briefing requirements of paragraph 2.3.1. Group 1 SUAS-Os must have reasonable cause to believe that the local weather conditions will permit successful employment and operations will be in compliance with applicable range directives, operations orders, FAA Certificates of Authorization (COA), or other governing directives.

2.3.3. Weather Considerations. All SUAS mission planning requires careful attention to weather and its effects on the UA during flight operations; particular attention should be paid to temperature, winds, precipitation, and hazardous weather phenomena. These factors include, but are not limited to:

2.3.3.1. Wind effects on launch, navigation legs, loiter, and landing. Operators must keep in mind small unmanned aircraft avionics may be more sensitive to turbulence.

2.3.3.2. Wind effects on acoustic signature of the UA at the target.

2.3.3.3. Effects of thermals on altitude, station-keeping and image stability.

2.3.3.4. Restrictions to visibility (fog, smoke, haze, precipitation, sun angle) and effects on observation of the UA and UA sensor capability.

2.3.3.5. Timing and effects of thermal crossover on sensor ability.

2.3.3.6. Temperature extremes and its effects on aircraft, payloads, and batteries.

2.3.3.7. Effects of high humidity on internal and external payloads (sensors).

2.3.3.8. Effects of precipitation on payloads, batteries, and electronics.

2.3.3.9. Hazardous weather (i.e., thunderstorms, turbulence, icing, clouds, precipitation, and poor visibility during launch and recovery) pose hazards to SUAS operations. Present SUAS design and payload limitations do not include any sort of weather avoidance system; SUAS-Os rely on forecast weather and personal observations.

## 2.4. Briefings.

2.4.1. The lead SUAS-O must ensure each crewmember is briefed on items affecting safety or mission completion. These briefings will include, but need not be limited to:

2.4.1.1. Emergency procedures.

2.4.1.2. Airspace/working area and frequencies authorized for operations and method of complying with restrictions.

2.4.1.3. Precautions and restrictions.

2.4.1.4. Special procedures and instructions for use during training, formation, or operational missions.

2.4.1.5. Prohibitions listed in paragraph 2.5.

2.4.2. Briefing Guides. MAJCOMs may develop briefing guides. Use of briefing guides is not mandatory, but all applicable items in the briefing guides must be adequately briefed by the SUAS-O or other members of the crew. Units may augment these guides as required for mission accomplishment.

2.4.3. Briefing Times. Start briefings in sufficient time to complete the briefing prior to flight operations.

2.4.4. Mission Brief. All crewmembers scheduled to fly the mission will receive a mission briefing prior to assuming control of the UAS.

2.4.4.1. Brief an alternate mission for each flight (if applicable).

2.4.4.2. Mission elements and events may be modified and briefed while the UA is airborne as long as changes do not compromise flight safety. Do not fly non-briefed missions and/or events. The SUAS-O will ensure all crewmembers acknowledge all changes.

2.4.5. Mission Debrief. After changeover or landing, debrief all missions.

**2.5. Prohibitions.** The following prohibitions apply to all individuals in vicinity of the GCS. Until engineering evaluations are complete, the provisions of paragraph 2.5. will apply to UAS ground segments including the control element and all associated communication facilities.

2.5.1. Electronic Devices. This section provides guidance on the use of electronic devices during flight operations. **NOTE:** Standard SUAS electronic equipment undergoes extensive design and testing to ensure compatibility. Almost all electronic items produce electromagnetic (EM) energy, thus creating potential interference with sensitive antenna-connected receivers. Transmitting devices produce much higher EM environments; these can potentially interfere with any SUAS electronic equipment (ground or air). For the purposes of this instruction, “electronic devices” are any electronic devices not electrically interfaced with existing SUAS equipment.

2.5.1.1. Authorized Portable Non-transmitting Devices.

2.5.1.1.1. Hearing Aids.

2.5.1.1.2. Heart Pacemakers.

2.5.1.1.3. Electronic watches, hand-held nonprinting calculators, portable tape players that do not have a recording capability (such as Walkmans, etc).

2.5.1.1.4. Electric Shavers.

2.5.1.1.5. Equipment certified by ASC/ENAE, 2530 Loop Road West, Wright Patterson AFB (WPAFB) OH 45433-7101, dsn 785-8929 or 785-2860.

2.5.1.1.6. Still photography cameras (not including digital cameras).

2.5.1.2. Other Devices. Other devices include land mobile and tactical radios, cellular phones, pagers, wireless internet capable devices and similar devices. From the time the aircraft is readied for launch or leaves its parking spot for departure until recovered or parked after landing, SUAS-Os must mitigate any risks associated with Electromagnetic Interference (EMI) from other devices by moving required devices a sufficient distance so as to prevent EMI, turning the device off, or moving the Ground Control Station (GCS). Exception: If an EMI analysis has been completed and approval granted for the specific device to be used in the GCS, the above restrictions need not apply.

2.5.2. SUAS-O Responsibility. The SUAS-O will prohibit the use of any device suspected of creating interference with any component of the UAS or that causes crew distraction.

**2.6. Foreign Object Damage (FOD) Hazards.** MAJCOMs will provide guidance on the wearing of wigs, hairpieces, ornaments, barrettes, pins, clips, other hair fasteners, or earrings in the SUAS ground segment, and at the launch and recovery area. Procedures must ensure operators wearing these items do not create a FOD hazard.

**2.7. Equipment Required for Flight.** SUAS, designed for automatic flight, typically incorporate self-stabilizing subsystems. All equipment necessary for automatic flight is required for operations. Note: The minimum required displays for emergency manual recovery are: airspeed, altitude, heading and last known position.

2.7.1. Flight Instrumentation. Primary flight instrumentation must provide full-time display of attitude, altitude, and airspeed information and the capability to recognize, confirm, and recover from unusual attitudes. Information must be positioned and arranged in a manner enabling an effective crosscheck.

2.7.1.1. The following flight instrumentation must always be displayed and illuminated during night operations:

2.7.1.1.1. Climb/Dive Angle (or pitch and vertical velocity). Exception: Group 1 UAS may use the sensor display for attitude reference.

2.7.1.1.2. Bank Angle. Exception: Group 1 UAS may use the sensor display for attitude reference.

2.7.1.1.3. Barometric Altitude.

2.7.1.1.4. Indicated or Calibrated Airspeed.

2.7.1.1.5. Prominent Horizon Reference. Exception: Group 1 UAS may use the sensor display for attitude reference.

2.7.1.1.6. Heading.

2.7.1.1.7. Fault indications to include lost communication links.

2.7.1.2. Electronic Flight Displays. Many modern instrument displays allow the SUAS-O to optimize GCS instrumentation for a particular mission by de-cluttering, removing or relocating presentations. In some cases, a SUAS-O can omit elements necessary for basic attitude awareness and aircraft control. Regardless of the type aircraft, mission, or mission phase, attitude awareness and paragraph 2.7.1 instrumentation are a full-time Air Force mission requirement.

**2.8. Global Positioning System (GPS) Considerations (If Applicable).** A GPS Notice Advisory to NAVSTAR Users (NANU) is an advisory message to inform users of a change in the GPS constellation. These messages are released 72 hours in advance for planned maintenance. These messages are also used to notify users of unscheduled outages. General NANUs can be used to disseminate general GPS information. NANUs will be checked if intending to operate a GPS-reliant unmanned system. A source is: <http://celestrak.com/GPS/NANU/>

2.8.1. Operators will attempt to verify satellite availability prior to using GPS as the basis of flight operations. Satellites that will become unavailable during the flight should be manually deselected, if possible.

2.8.2. A GPS predictive tool can be found at <http://augur.ecacnav.com/>. This resource should not be used to replace NANUs, but as a preliminary mission planning tool or in the event Notice Advisory to NAVSTAR Users (NANU) are unavailable in the operational area.

2.8.3. Units will develop procedures to disseminate information about GPS reliability to operators in the field.

**2.9. SUAS Hand-off Procedures.** Detailed procedures for hand-off of airborne UAs between ground control stations will be included in each SUAS operator's manual or established in local operating procedures. These are the minimum items that must be accomplished prior to launch of the UA:

2.9.1. Select time and location for hand-off.

2.9.2. Select a safe recovery area for the UA.

2.9.3. Identify a method to confirm positive transfer of control between operators, i.e., voice, UA maneuvering, etc.

2.9.4. Brief all participants on the contingency plan for unsuccessful UA hand-off.

2.9.5. Identify and confirm specific equipment settings, required at each GCS, for hand-off.



## Chapter 3

### AIRSPACE & FREQUENCY COORDINATION PROCESS: FLIGHT PLANS AND FAA CERTIFICATES OF AUTHORIZATION (COA)

**3.1. General.** SUAS operations are conducted only in authorized airspace. SUAS operating characteristics and systems capabilities, mission requirements, and SUAS Crew qualifications drive specific airspace requests. Without a certified “Sense and Avoid” capability, separation from other aircraft is accomplished by mitigating measures such as segregated operating areas, altitude blocks, or external observers. For SUAS operations in the National Airspace System (NAS) outside of Warning and Restricted areas refer to paragraph 3.4. Operations conducted within Restricted or Warning Areas (or within a theater of operations under combat airspace control measures) require only coordination between responsible organizations. SUAS-Os shall be appropriately qualified (or directly supervised by an instructor) in order to conduct operations within the class of airspace authorized for operations.

**3.2. Flight Plans.** There is no file and fly provision for SUAS. This paragraph is reserved for future development.

**3.3. Airspace.** Airspace managers may resolve an airspace conflict by the use of time separation, altitude separation, lateral separation, relocation of one of the airspace users, elimination of one of the users, or by concurrence of the approving authorities (range, airspace, and participating units) to accept the assessed risk of simultaneous operations. SUAS-Os and mission planners will use the procedures in paragraphs 3.4. – 3.6. to facilitate the coordination/deconfliction process. SUAS-Os will comply with the following:

- 3.3.1. FAA Documents (e.g. FAAN JO 7110.512.). **Note:** FAA Advisory Circular 91-57, *Model Aircraft Operating Standards*, does not apply to the operations of SUAS intended for military use.
- 3.3.2. DOD-FAA MOAs.
- 3.3.3. ICAO regulations.
- 3.3.4. Host country rules, regulations, and laws.
- 3.3.5. Military regulations (e.g. AFI 13-204, *Functional Management of Airfield Operations*).
- 3.3.6. DoD FLIP (e.g. General Planning Guide, Area Planning Guides).
- 3.3.7. Local flight regulations and procedures (e.g., Base Flying Regulations).
- 3.3.8. SUAS operations manuals, checklists, and SOP.
- 3.3.9. Frequency Deconfliction directives (contact MAJCOM/A6 Frequency Manager and Base/Range Frequency Manager).
- 3.3.10. Description of operating area or a depiction, showing agreed working area boundaries/limits. Consider identifying a buffer zone to prevent exceeding cleared limits.

**3.4. CONUS National Airspace System (NAS) Operations.**

3.4.1. Units will coordinate use of airspace within the National Airspace System (NAS) IAW this chapter and Federal Aviation Administration (FAA) directives. SUAS operations may be conducted outside of restricted airspace and warning areas only with FAA authorization in the form of an FAA Certificate of Waiver or Authorization (COA) or IAW other established FAA agreements. A DOD/FAA Memorandum of Agreement (MOA), dated 24 Sep 07 permits Group 1 UAS operations in Class G airspace without a COA. UAS operations requiring a COA or operated IAW the Class G provisions of the current DOD/FAA MOA shall contact AFSOC/A3OU through their appropriate MAJCOM to obtain assistance with a COA or the Class G notification. (Exception: AFMC/A3O will process all COAs for AFMC RDT&E missions and units in lieu of procedures below and will forward info copies of approved COAs to AFSOC/A3OU.) For planning purposes, a unit submitting a COA should anticipate a minimum of 70 business days for processing the COA once the COA has been submitted to AFSOC. AFSOC requires ten business days for mission plan approval, COA on line account issuance, COA review, etc., and the FAA requires 60 business days for their process. For Class G notifications, AFSOC/A3OU requires a minimum of three business days prior to the mission. AFSOC/A3OU will assist the requesting unit to ensure a NOTAM is issued NLT 24 hours prior to the Class G operation. **Note:** FAA authorization/approval of a COA is not guaranteed. Units requesting FAA approval to operate SUAS will follow the guidance below:

3.4.1.1. AF units must request authorization/approval for SUAS operations outside of restricted airspace or warning areas through their appropriate MAJCOM POC.

3.4.1.2. If approved, the MAJCOM will forward the request to AFSOC/A3OU via email to [AFSOC.A3OU.WF@Hurlburt.af.mil](mailto:AFSOC.A3OU.WF@Hurlburt.af.mil). If the request is disapproved, the MAJCOM will notify the unit and provide the rationale for disapproval.

3.4.1.3. Upon receipt of MAJCOM approval, AFSOC/A3OU will issue a COA on-line account to the unit (without commit authority). A COA on-line account is required for both COAs and for Class G notifications IAW the current DOD/FAA MOA.

3.4.1.4. Unit requesting the COA or a Class G notification will input the information into the FAA COA on-line system and notify AFSOC/A3OU via email to [AFSOC.A3OU.WF@Hurlburt.af.mil](mailto:AFSOC.A3OU.WF@Hurlburt.af.mil) that the COA application or Class G notification information is complete.

3.4.1.5. AFSOC/A3OU will review the COA application and/or Class G notification for accuracy to include, but not limited to:

3.4.1.5.1. Airworthiness statement.

3.4.1.5.2. Medical qualifications (both observers and operators).

3.4.1.5.3. Training qualifications (both observers and operators).

3.4.1.5.4. System and operational information.

3.4.1.6. Once the COA application and/or Class G notification is complete, AFSOC/A3OU will commit the COA/Class G notification to the FAA and will notify the unit and the MAJCOM with the COA case number or Class G notification number. AFSOC/A3OU will continuously track the COA application status and will update units and MAJCOM as needed.

3.4.1.7. AFSOC/A3OU will notify AF/A3O-BA of the COA details (who, what, where, when, etc.) and/or Class G notifications via email within 1-day of committing the COA or notification to the FAA.

3.4.1.8. The FAA COA process normally takes 60 business days for new COA applications and 30 business days for renewals. AFSOC/A3OUI, working through AF/A3O-BA, will coordinate/ recommend solutions to unit based on FAA feedback, questions, or concerns. AF/A3O-BA will engage with the FAA to resolve any COA issues.

3.4.2. Units requesting UAS operations in the NAS will coordinate with the appropriate frequency manager for authorization to use SUAS communication frequencies (e.g., control and data links, WIFI, LMR, etc.).

3.4.3. Units must remain in communication with the specified controlling agency at all times during operations as well as an independent means of backup communications available from the ground control element to the controlling agency.

3.4.4. If operations spill out of the assigned airspace or a Loss-of-Link (LOL) condition occurs and the UA does not return to the designated return home point, contact the controlling agency as soon as possible and provide the following information to the controlling agency:

3.4.4.1. SUAS type/size.

3.4.4.2. Last known location and time of LOL.

3.4.4.3. Heading, altitude, airspeed.

3.4.4.4. Estimated flight time remaining.

3.4.5. Contact controlling agency if mission is cancelled or terminated early.

3.4.6. Airspace restrictions for the National Airspace System (NAS). The FAA defines the NAS as a common network of United States airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military. There are two types of airspace within the NAS, controlled and uncontrolled.

3.4.6.1. Uncontrolled Airspace. The portion of airspace that air traffic control has neither the authority nor the responsibility for exercising control over air traffic.

3.4.6.2. Controlled Airspace. Airspace of defined dimensions which air traffic control service is provided to IFR flights and to VFR flights in accordance with airspace classification. Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D, and Class E airspace. Listed below is a brief description and depiction of each class of airspace. For more details refer to the DoD Flight Information Publication, *General Planning (GP)*.

3.4.6.2.1. Class A. Generally, that airspace from 18,000 feet MSL up to and including FL600, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska. Unless otherwise authorized, all persons must operate their aircraft under IFR.

3.4.6.2.2. Class B. Generally, that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger handling. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.

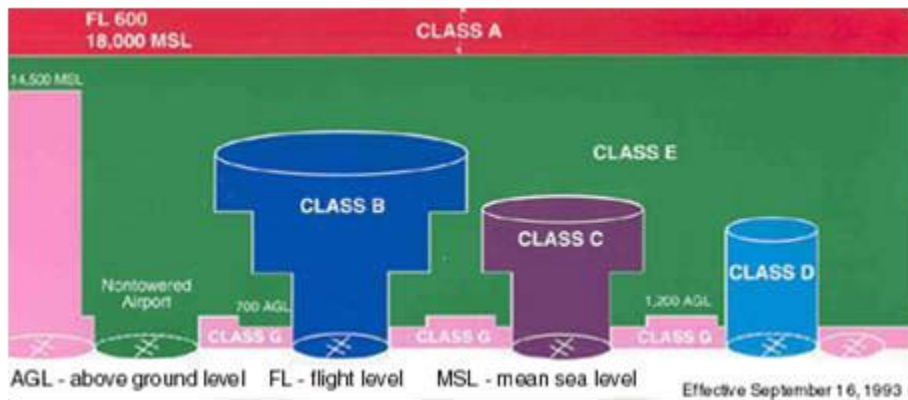
3.4.6.2.3. Class C. Generally that airspace from the surface to 4,000 feet above the airport elevation surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger handling. The airspace usually consists of a surface area with a 5 NM radius, and an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace. VFR aircraft are only separated from IFR aircraft within the airspace.

3.4.6.2.4. Class D. Generally, that airspace from the surface to 2,500 feet above the airport elevation surrounding those airports that have an operational control tower. Unless otherwise authorized, each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. No separation services are provided to VFR aircraft.

3.4.6.2.5. Class E. Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Also in this class are Federal airways, airspace beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or enroute environment, enroute domestic, and offshore airspace areas designated below 18,000 feet MSL. Unless designated at a lower altitude, Class E airspace begins at 14,500 MSL over the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska. Class E airspace does not include the airspace 18,000 MSL or above.

3.4.6.2.6. Class G. (uncontrolled airspace). That airspace not designated as Class A, B, C, D, or E.

**Figure 3.1. Controlled Airspace.**



3.4.6.2.7. Operations in Class D Airspace. SUAS operations in Class D airspace require a Certificate of Authorization (COA) or other FAA approval. Additional guidance in AFI 13-204, paragraph 5.8. states procedures for local SUAS operations must be published in the Base Airfield Operations Instruction, and any other appropriate Lines of Position (LOP).

3.4.6.2.8. Restricted Area. Restricted areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants.

3.4.6.2.9. Warning Area. A warning area is airspace of defined dimensions, extending from three nautical miles outward from the coast of the U.S. that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

**3.5. Coordination Procedures for OCONUS Host Nation Airspace.** Refer to specific host nation agreements and International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs). MAJCOMs are responsible for specifying airspace and frequency request procedures.

**3.6. Coordination Procedures for Combat Zone and other Contingency Operations.** Refer to Joint Publication 3-52, Joint Doctrine for Airspace Control in the Combat Zone, and theater air operations directives.

## Chapter 4

### FLIGHT AUTHORIZATION, APPROVAL, AND CLEARANCE AUTHORITY

**4.1. Flight Authorization.** USAF SUAS flights must be authorized by the unit commander or the first commander in the operational chain of command. Mission validity, planning, and risk mitigation must be considered before authorization. Approving officer will initial the risk assessment checklist (Attachment 4). Exception: AFMC will develop a tailored Operational Risk Management (ORM) Checklist and will define the ORM program requirements for test operations. **Note:** To ensure the noncombatant status of civilians and contractors is not jeopardized, commanders shall consult with their servicing judge advocate office for guidance before using civilian or contractor personnel in combat operations or other missions involving direct participation in hostilities.

4.1.1. SUAS-O. The SUAS-O must be current and qualified in the SUAS to be operated or under the supervision of a SUAS-I.

### 4.2. Approval Authority.

4.2.1. SUAS-Os authorized by the unit commander are the approval authority for their flights with the following exceptions:

4.2.1.1. Unit commanders will approve flights for students or other non-unit SUAS-Os.

4.2.1.2. Unit commanders will approve flights by Group 2 or higher UAS to or from other than established landing surfaces, such as highways, pastures, etc.

### 4.3. Additional Approval and Requirements.

4.3.1. (P) Fields. MAJCOMs may prescribe which Air Force aircraft can file to or land at Continental United States (CONUS) civil (P) airports. MAJCOMs shall approve each airfield from which SUAS may operate.

### 4.4. ATC Clearances and Instructions.

4.4.1. The SUAS-O will ensure compliance with ATC clearances or instructions unless:

4.4.1.1. An amended clearance is obtained.

4.4.1.2. An emergency exists.

4.4.1.3. Deviation is required in response to a Traffic Alert and Collision Avoidance System (TCAS) advisory.

4.4.1.4. Deviation is necessary to ensure safety of flight.

4.4.2. If the SUAS-O is unsure of the ATC clearance he or she should immediately clarify it with ATC.

## Chapter 5

### GENERAL FLIGHT RULES

#### 5.1. Operational Standards.

5.1.1. Reckless Flying. The SUAS-O is responsible for ensuring the aircraft is not operated in a careless or reckless manner that could endanger life or property. SUAS will not be used to conduct flights for personal use.

5.1.2. Off-Station Training. The SUAS-O will ensure the execution of all off-station training activities are unit commander-approved, flown to achieve valid training requirements, present a positive image of the Air Force and does not present an image of waste and/or abuse of government resources.

5.1.3. Unauthorized SUAS Flight Demonstrations. Unauthorized or impromptu SUAS flight demonstrations, maneuvers, or “fly-bys” are prohibited. AFI 11-209, *Air Force Participation in Aerial Events*, addresses authorized flight demonstrations.

5.1.4. SUAS-Os at their Stations. Operators must occupy their assigned duty stations during flight operations, unless absence is normal in the performance of crew duties, or in connection with physiological needs. SUAS-Os shall not leave their duty station unless another qualified SUAS-O is in the ground control station and the new SUAS-O acknowledges control of the aircraft.

**5.2. See and Avoid.** SUAS-Os operating in VMC, whether or not under radar control, are responsible to see and avoid other traffic, terrain, obstacles and also maintain VFR cloud clearance. For SUAS operations to comply with see and avoid requirements, they must have the capability to see (or sense) traffic and clouds in sufficient time to perform an avoidance maneuver in a timely manner. This can be done through the use of dedicated surface or airborne observers (chase vehicle) in direct communication with operators. If not capable of see and avoid, SUAS may only be operated in approved segregated airspace (Restricted or Warning Areas, Restricted Operating Zones, etc.). In this case, VFR weather minimums may not apply. MAJCOMs will determine SUAS weather limit requirements based on aircraft equipage, level of autonomy and crew qualification.

5.2.1. SUAS operations that do not comply with paragraph 5.2 will be conducted under specific arrangements with appropriate aviation authorities (FAA, host nation, or military control). FAA COAs issued IAW FAA Order (FAAO) Joint Order (J.O.) 7610.4 Chapter 12, Section 9 or arrangements with host-nation aviation authorities do not waive the FARs nor provide relief from ICAO Rules of the Air. FAAO 7610.4, Chapter 12, Section 9, outlines an equivalent level of safety comparable to see and avoid requirements for manned aircraft. SUAS operations in compliance with a FAA COA are acceptable because they incorporate an equivalent level of safety agreed to by the FAA. SUAS operations in compliance with host nation aviation authorization are acceptable provided they incorporate an equivalent level of safety addressing as a minimum the measures outlined in FAAO J.O. 7610.4, Chapter 12, Section 9. SUAS operations in special use airspace are acceptable provided equivalent level of safety measures are in place with controlling agencies and other airspace users.

5.2.2. Within the NAS, ATC only provides separation between IFR and VFR aircraft operating within Class B and C airspace. In Class D and E airspace, ATC provides traffic advisories on VFR aircraft on a time-permitting basis. Standard IFR separation is provided to all aircraft operating under IFR in controlled airspace. Outside the NAS the crew should consult ICAO and country specific guidance outlined in the FCG and FLIP.

**5.3. Proximity of Aircraft.** The SUAS-O must not allow the aircraft to be flown so close to another that it creates a collision hazard. Use 500 ft. of separation (well clear) as an approximate guide except for:

5.3.1. Authorized formation flights.

5.3.2. Emergency situations requiring assistance from another aircraft. **Note:** If an emergency requires visual checks of an aircraft in distress, the SUAS-O must exercise extreme care to ensure this action does not increase the overall hazard. The capabilities of the distressed aircraft and the intentions of the crews involved must be considered before operating near another aircraft in flight.

5.3.3. MAJCOM-approved maneuvers in which each participant is fully aware of the nature of the maneuver and qualified to conduct it safely (for example, manned-unmanned cooperative teaming).

**5.4. Formation Flight/Cooperative Teaming.**

5.4.1. Non-standard Formation Flight. Non-standard formation flights may be conducted if any of the following conditions are met:

5.4.1.1. When approved by ATC.

5.4.1.2. Operating within an authorized Altitude Reservation (ALTRV).

5.4.1.3. Operating under the provisions of a Letter of Agreement (LOA).

5.4.1.4. Operating in airspace specifically designed for a special activity.

5.4.2. Transponder operations during formation flight. If equipped with IFF and unless otherwise specified in Allied Communications Publication 160, US Supplement 1:

5.4.2.1. Only one aircraft (normally the lead) of a standard formation will squawk the assigned code.

5.4.2.1.1. Unless otherwise directed by ATC, all aircraft within a non-standard formation flight will squawk the ATC-assigned Mode 3A/C beacon code until established within the assigned altitude block and closed to the proper en route interval. Unless otherwise directed by ATC, when aircraft interval exceeds 3 NMs, both the formation leader and the last aircraft will squawk the assigned Mode 3A/C beacon code.

**5.5. Right-of-Way Rules.** Usually, right-of-way is given to the aircraft least able to maneuver, which normally permits that aircraft to maintain course and speed. However, visibility permitting, each pilot must take whatever action is necessary to avoid collision, regardless of who has the right-of-way. When another aircraft has the right-of-way, the yielding aircraft must not pass over, under, abeam, or ahead of the other aircraft until well clear. **NOTE:** Due to the size and paint scheme, a small UA may not be easily seen by other aircraft. Therefore, the SUAS



operator must always be prepared to take evasive action to include flight termination and potential destruction of the aircraft.

5.5.1. Distress. Any aircraft (manned or unmanned) in distress has the right-of-way over all other air traffic. Manned aircraft in distress have the right-of-way over SUAS in distress.

5.5.2. Converging. When converging at approximately the same altitude (except head-on or approximately so), the aircraft to the other's right has the right-of-way. Aircraft of different categories have the right-of-way in the following order of priority:

5.5.2.1. Balloons.

5.5.2.2. Gliders.

5.5.2.3. Aircraft towing or refueling other aircraft.

5.5.2.4. Airships.

5.5.2.5. Rotary or fixed-wing aircraft.

5.5.3. Approaching Head-On. If aircraft are approaching each other head-on or approximately so, each shall alter course to the right.

5.5.4. Overtaking Aircraft. An overtaken aircraft has the right-of-way. The overtaking aircraft must alter course to the right.

5.5.5. Landing. An aircraft established on final approach has the right-of-way over other aircraft on the ground or in the air, except when two or more aircraft are approaching to land. In this case, the aircraft at the lower altitude has the right-of-way if it does not use this advantage to cut in front of or overtake the other.

## **5.6. Communication in Flight.**

5.6.1. Communication with ATC. Establish and maintain two-way radio communications with the proper ATC facility or FSS IAW the procedures appropriate for the class of airspace as outlined in FLIP. For SUAS operations in controlled airspace, two-way radio will be the primary means of communications. Coordinate alternate communications methods with the appropriate ATC facility prior to commencing operations.

5.6.2. Emergency Frequencies. Monitor emergency frequencies at all times (unless the radio equipment does not have this capability).

5.6.3. ATC Communications Failure. Follow the communications failure procedures published in the Flight Information Handbook (FIH). For SUAS operations there must be an independent means of backup communications available from the ground control element to the ATC agency controlling the aircraft.

## **5.7. Aircraft Speed.**

5.7.1. Inside the NAS. The SUAS-O will:

5.7.1.1. Not allow their aircraft to exceed 250 knots indicated airspeed (KIAS) below 10,000 ft. MSL unless the MAJCOM has approved a higher speed and FAA has granted a speed authorization.

5.7.1.2. Not allow their aircraft to exceed 200 KIAS at or below 2,500 ft. AGL within 4NMs of the primary airport of a Class C or Class D airspace area unless authorized or

required by ATC, or required to maintain the minimum safe maneuvering airspeed specified in the aircraft T.O.

5.7.1.3. Not allow their aircraft to exceed 200 KIAS in the airspace underlying a Class B airspace area designated for an airport or in a VFR corridor designated through Class B airspace area, unless required to maintain the minimum safe maneuvering airspeed specified in the aircraft T.O.

5.7.2. Outside the NAS. The SUAS-O will not allow the aircraft to exceed 250 KIAS below 10,000 ft. MSL unless:

5.7.2.1. Mission requirements dictate speeds in excess of 250 KIAS and operations are in international airspace.

5.7.2.2. ICAO or host nation rules permit aircraft speeds over 250 KIAS.

5.7.2.3. Necessary to maintain the minimum safe airspeed as specified in the aircraft T.O.

5.7.2.4. Required by ATC and permitted by host nation rules.

5.7.3. Holding. Conduct holding at airspeeds prescribed in FLIP or operator manual.

## **5.8. Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems and Procedures.**

5.8.1. Self-Contained Approaches. MAJCOMs will publish their policy and restrictions on the use of self-contained approaches, such as Mission Computer Approaches, in their supplement to this instruction.

5.8.2. Navigation System Databases.

5.8.2.1. Expired Database. If the database has expired, the SUAS-O:

5.8.2.1.1. May continue a mission with an expired database, if the database information required for the flight can be verified with current FLIP.

5.8.2.1.2. Shall update the database at the first opportunity.

5.8.2.1.3. Will not fly procedures that require terminal or better accuracy (i.e. terminal or approach).

## **5.9. Airport Operations.**

5.9.1. Takeoff and Landing.

5.9.1.1. Clearances. Obtain a clearance from ATC before taxiing, taxiing onto a runway, takeoff (or launch), or landing (or recovery), at an airport with an operating control tower.

5.9.1.2. Uncontrolled Field Procedures. At uncontrolled fields:

5.9.1.2.1. Use the runway favored by the winds if no other factors make that runway unacceptable.

5.9.1.2.2. Announce your activities on the appropriate frequency. (Refer to the Aeronautical Information Manual (AIM) and AFMAN 11-217, Volume 1, *Instrument Flight Procedures*, for more detail.)

5.9.1.3. Land and Hold Short Operations (LAHSO). USAF SUAS-Os are prohibited from accepting LAHSO landing clearances.

5.9.1.3.1. Air Force SUAS-O may passively participate in LAHSO (land or take-off when another aircraft has been given a LAHSO clearance). The SUAS-O is the final authority whether to take-off, land or continue a touch-and-go when a merging aircraft has received a LAHSO clearance.

5.9.1.3.2. MAJCOMs that require certain units or aircraft to have LAHSO authorization for mission accomplishment, must contact AFFSA to ensure Group-specific data is incorporated into FAA Order (7110.199) appendix 3.

5.9.1.4. Reduced Same Runway Separation (RSRS). MAJCOMs may approve RSRS operations in a supplement to this AFI. Approval shall include RSRS criteria for each applicable SUAS type governing similar and dissimilar landing/touch-and-go operations.

5.9.1.4.1. RSRS is applicable to all non-formation aircraft.

5.9.2. Turns after Takeoff, Low Approaches, or Closed Patterns.

5.9.2.1. Do not turn after a takeoff, touch and go or low approach until at least 400 ft. above the departure end of the runway (DER) elevation, at a safe airspeed, and past the end of the runway (if visible) unless:

5.9.2.1.1. Specifically cleared by the controlling agency.

5.9.2.1.2. Safety dictates otherwise.

5.9.2.1.3. Required by local procedures.

5.9.2.1.4. Required by the published departure procedure.

5.9.2.2. The 400 ft. restriction does not apply when executing a closed pattern.

5.9.3. Traffic Pattern Procedures.

5.9.3.1. At Air Force installations, fly the traffic pattern published in the local flying procedures publication or FLIP, unless otherwise directed.

5.9.3.2. At other than Air Force installations, fly traffic patterns as directed by the control tower or published in FLIP, FAR Part 91 Subpart B, or the AIM.

5.9.3.3. At airports with no control tower, follow the standard light signals or visual indicators that prescribe the direction of traffic and landing runway. Departures must comply with the appropriate route for the airport. (Refer to AIM for detailed information.)

5.9.4. SUAS Landing Areas. SUAS may operate from/to other than established landing areas (i.e., fields, highways, parks, etc.) if a military requirement exists and the user receives appropriate clearances (Range Operations, FAA COA, etc.). To use the area for landing, implement safeguards to permit operations without hazard to persons or property.

5.9.5. Night Runway Operations. The SUAS-O will adhere to the following guidance during night operations from prepared surfaces:

5.9.5.1. SUAS must not be operated from a runway or other prepared surface unless the takeoff and landing area is outlined with operating lights and is clearly discernible.

Covert runway markings may be used by qualified crews using suitable sensors or night vision devices.

5.9.5.2. In Alaska, areas located north of 60° North latitude, Antarctica, and areas located south of 60° South latitude, aircraft may be operated at unlighted airports during the period of civil twilight. Use the latest version of the Air Almanac or computer program "LIGHT PC" to determine or calculate light and moon data.

5.9.6. Landing Gear Reporting Procedures. SUAS-O operating retractable gear aircraft must report "gear down" to the ATC agency or runway supervisory unit after extending the landing gear. This report shall be made during any approach to an airport prior to crossing the runway threshold.

**5.10. Altitude Requirements.** Consider GCS Line of Sight (LOS) to the UA when selecting minimum operating altitudes. If an approved FAA COA is required for operation, comply with the provisions of the COA. If a COA is not required, except for takeoff or landing, do not operate UAs:

5.10.1. Emergency Landing. Below an altitude that, should an emergency landing become necessary, creates undue hazard to persons or property.

5.10.2. VFR. Under VFR above 3,000 ft. AGL at altitudes or flight levels other than those specified in FLIP. In airspace under FAA jurisdiction, these altitudes do not apply when turning or holding in a holding pattern of 2 minutes or less.

5.10.3. Congested Areas. Over congested areas (i.e., cities, towns, settlements) or groups of people if the altitude does not ensure at least 1,000 ft. above the highest obstacle within a 2,000-ft. radius of the aircraft. Exception: SUAS-O operating Group 1 SUAS in the US NAS or operating IAW host nation agreements may operate at lower altitudes and in closer proximity if they do not create a hazard to persons or property on the surface.

5.10.4. Non-congested Areas. Over non-congested areas at an altitude of less than 500 feet AGL except over open water, or in special use airspace, or in sparsely populated areas. Under such exceptions, SUAS-O must not operate aircraft closer than 500 ft. to any non-participating person, vessel, vehicle, or structure. **Exception:** SUAS-O operating Group 1 SUAS may operate at lower altitudes and in closer proximity if they do not create a hazard to persons or property on the surface.

5.10.5. Flight over National Recreation Areas and Wildlife Refuges. Mission permitting, not less than 2,000 ft. AGL over the following areas: national parks, monuments, seashores, lake shores, recreation areas, and scenic river ways administered by the National Park Service; national wildlife refuges, big game refuges, game ranges, and wildlife refuges administered by the US Fish and Wildlife Service; and wilderness and primitive areas administered by the US Forest Service. This paragraph is not applicable to special use airspace, low-altitude tactical navigation areas, and MTRs. Higher altitudes may exist for specific areas. (See AP/1B and sectional aeronautical charts.) Exception: SUAS-O operating Group 1 SUAS may operate at lower altitudes and in closer proximity if they do not create a hazard to persons or property on the surface and when prior coordination and approval has been accomplished. Note: Operations over these areas will typically require a COA.

**5.11. Disaster Areas.** SUAS-O shall not operate their aircraft within a designated disaster area. NOTAMs list disaster areas. Exceptions are permitted when an aircraft is:

- 5.11.1. Tasked to aid in airborne relief for the area.
- 5.11.2. Approved to operate from an airport or operating zone in the area.
- 5.11.3. On a flight that has been specifically cleared by ATC.

**5.12. Altimeter Settings.** When capable, set altimeters according to FLIP General Planning and Area Planning documents. In combat zones, comply with guidance in airspace control plan and ATO SPINS.

**5.13. Simulated Instrument Flight.** Reserved for future use.

**5.14. Simulated Emergency Flight Procedures:**

- 5.14.1. Restrictions. See AFI 11-5GP(1, 2, or 3)-SUAS Volume 3 for restrictions.
- 5.14.2. Required MAJCOM Guidance. MAJCOMs must publish guidance for practicing simulated emergency takeoffs, approaches, and landings. This guidance must include, as a minimum:
  - 5.14.2.1. Procedures when a SUAS instructor or evaluator does not have immediate access to the aircraft controls.
  - 5.14.2.2. Instructions to minimize actual engine/motor shutdown when a reduction of power suffices.
  - 5.14.2.3. MAJCOMs must publish restrictions on the practice of fixed-wing simulated engine/motor failure or forced landing approaches under the following conditions:
    - 5.14.2.3.1. If the aircraft T.O.s do not furnish specific guidance for performing simulated engine/motor failure or forced landing approaches.
    - 5.14.2.3.2. Simulated engine/motor failure approaches do not conform to T.O. patterns.
    - 5.14.2.3.3. Preflight briefing does not contain simulated engine/motor failure procedures.
    - 5.14.2.3.4. Approaches are not flown at military airfields or at P-designated fields (where letters of agreement are in effect) that have established simulated engine/motor failure patterns.
    - 5.14.2.3.5. The airport does not have an active tower or Runway Supervisory Unit, enough run way for that aircraft, and proper crash equipment.
    - 5.14.2.3.6. The practice approaches have not been coordinated with the ATC agencies responsible for the airspace that the simulated engine/motor failure or forced landing pattern transits.

**5.15. Touch-and-Go Landings.**

- 5.15.1. Touch-and-go landings are authorized if required by course syllabus or continuation training requirements.
- 5.15.2. MAJCOMs may authorize touch-and-go landings in any command-operated SUAS.

5.15.3. MAJCOMs must provide explicit guidance in its command supplement about operating conditions and operator qualifications.

### **5.16. Dropping Objects.**

5.16.1. Restrictions. The SUAS-O will not allow the dropping of objects from the aircraft except:

5.16.1.1. In an emergency.

5.16.1.2. When mission requirements dictate.

5.16.2. MAJCOM Responsibilities. MAJCOMs will establish procedures to ensure airdrops comply with applicable directives.

5.16.3. SUAS-O Responsibilities. The SUAS-O will:

5.16.3.1. When jettisoning fuel and circumstances permit, notify the appropriate ATC or flight service facility of intentions, altitude, location, and when the operation is complete.

5.16.3.2. Drop chaff containing rope elements according to AFI 13-201, and FAA Handbook 7610.4, *Special Military Operations*.

5.16.3.3. Report any accidental loss of equipment or aircraft parts or jettisoning of cargo according to AFMAN 10-206, *Operational Reporting*, and AFI 91-204, *Safety Investigations and Reports*.

### **5.17. Aircraft Lighting (if equipped).**

5.17.1. Reduced Lighting. MAJCOMs may authorize reduced or light-out operations in restricted areas, warning areas or host nation approved areas in a MAJCOM supplement to this instruction. Host nation approved areas may be documented in a LOA or host nation regulatory documentation.

5.17.2. Aircraft Lighting During Formation Operations. MAJCOMs may authorize formation flights to vary their lighting configuration according to the aircraft type and mission requirement. The MAJCOM must ensure guidance on this type of operation is provided and it ensures an equivalent level of visual identification as a single aircraft.

5.17.3. Position Lights. Aircraft equipped with position lights will display them between the hours of official sunset and sunrise:

5.17.3.1. Immediately before engine start and when an engine is running. Aircraft that do not have power available before start shall turn them on as soon as power is available.

5.17.3.2. When parked in an area likely to create a hazard or while being towed, unless clearly illuminated by an outside source.

5.17.4. Anti-collision and Strobe Lights. Anti-collision lights and strobe lights are not the same. For the purposes of this section, anti-collision lights are the primary flashing light system on the aircraft intended to attract the attention of others to enhance see and avoid operations, while strobe lights are systems such as wingtip strobes or other similar strobe light installations.

5.17.4.1. Ground Operations. Aircraft equipped with anti-collision lights will display these lights IAW AFI 11-218, *Aircraft Operations and Movement on the Ground*.

5.17.4.2. Airborne Operations. Aircraft equipped with anti-collision and strobe lights will operate these lights as follows:

5.17.4.2.1. Anti-collision lights must be on from takeoff to landing.

5.17.4.2.2. Strobe lights shall be operated IAW MAJCOM or aircraft T.O. guidance.

5.17.4.3. The SUAS-O may turn off anti-collision lights when it is in the best interest of safety to do so.

5.17.4.4. The SUAS-O may continue the mission with the failure of any light of the anti-collision light system to the first stop where repairs can be made.

#### 5.17.5. Landing Lights.

5.17.5.1. When mission requirements dictate, use of landing lights (if equipped) is optional during take-off/ landing, if the aircraft is equipped with an operational sensor that provides a visual representation of the runway environment. Operations must comply with paragraph **5.9.5.1**.

**5.18. Aerobatics.** Aerobatics and air to ground tactics which involve aerobatic type maneuvering must be performed in Restricted or Warning Areas, FAA approved COA airspace, or host nation approved airspace. Aircraft deployed or based at overseas locations will operate IAW applicable host nation agreements or ICAO SARPs. If the aircraft operating requirements (altitude requirements, maximum airspeeds, dropping of objects, etc) dictated in the host nation agreement are less restrictive than USAF/MAJCOM guidance, the most restrictive guidance shall be used.

**5.19. Participating in Aerial Events.** The SUAS-O will ensure compliance with AFI 11-209, when participating in aerial events, demonstrations, and static displays. Group/CC must approve any flight operations.

**5.20. Tobacco Use in Air Force GCS.** Tobacco use is prohibited in Air Force ground control stations. For exceptions see AFI 40-102, *Tobacco Use in the Air Force*.

**5.21. Landing with Hot Armament.** This paragraph is reserved for future capabilities.

**5.22. Pilot Weather Reports (PIREPs).** SUAS-Os will immediately report hazardous weather conditions and volcanic activity to the ARTCC, terminal ATC, or FSS. Additionally, SUAS-Os are urged to report any significant flight condition information. SUAS-Os operating in warning areas should forward significant weather reports to the appropriate controlling agency (e.g., ARTCC, military radar unit, Airborne Warning and Control System, etc). In all cases, follow with a report to a Pilot-to-Metro Service (PMSV) to ensure rapid dissemination to other using agencies. See PIREP procedures in the FIH.

#### **5.23. Operating in the Vicinity of Thunderstorms.**

5.23.1. Operations into Thunderstorms. The SUAS-O shall not intentionally operate into a thunderstorm except when operating on a MAJCOM-approved mission specifically requiring thunderstorm penetration. UAS Group-Specific AFIs will specify separation distances.

5.23.2. Takeoff, Approach, and Landing. SUAS operators will not takeoff, land, or fly an approach where thunderstorms are producing hail, strong winds, gust fronts, heavy rain, lightning, wind shear, microbursts, or other hazardous conditions.

5.23.3. **Planned Route.** When observed or reported thunderstorm activity adversely affects the planned flight route, SUAS-Os will delay the scheduled mission or alter the route of flight within approved airspace to avoid the thunderstorm activity. SUAS-Os shall use all available information including surface radar, PMSV, and PIREPs to avoid thunderstorm activity. **Note:** Induced lightning strikes and electrostatic discharges can occur in what may look like benign conditions; a thunderstorm does not have to be present for these discharges. See AFH 11-203, Volume 1, *Weather for Aircrews*, for detailed information on thunderstorms, lightning, and electrostatic discharge.

**5.24. Wake Turbulence and Wind Shear.** SUAS-Os of other than Group 1 UAs will:

5.24.1. Report Wake Turbulence. Notify ATC when encountering wake turbulence on any approach.

5.24.2. Report Wind Shear. Immediately report a wind shear or microburst encounter on takeoff, approach, or landing to the most appropriate agency (e.g., control tower, approach control, PMSV) and, if possible, include:

5.24.2.1. Altitude of the encounter.

5.24.2.2. Loss or gain in airspeed or altitude.

5.24.2.3. Type of aircraft.

5.24.2.4. Location of occurrence (see AFH 11-203, Volume 1).

**5.25. Volcanic Activity.** Air Force aircraft will not be flown in an area of known or reported volcanic activity unless engaging in operations (such as rescue) specifically relating to the incident. Any encounters with pyroclastic clouds (volcanic ash) should be reported as soon as possible to the appropriate controlling agency (ARTCC, military radar unit, AWACS, etc.). In all cases, follow with a report to a PMSV, or other applicable weather agency, to ensure rapid dissemination to other using agencies. See PIREP procedures in the FIH.

**5.26. Night Vision Goggles (NVG) Operations.** Crew will check NVGs prior to each use to ensure proper operation and optimum night visual enhancement. MAJCOMs will prescribe the use of NVGs during SUAS operations.

**5.27. Takeoff with Ice or Frost.** The SUAS-O will not takeoff (or launch) with ice, snow, or frost adhering to the wings, control surfaces, propellers, engine inlets, or other critical surfaces of the aircraft.

**5.28. SUAS Traffic Alerting and Collision Avoidance System (TCAS) Operations.** SUAS equipped with TCAS will only operate in Traffic Alert (TA) Mode.

**5.29. Terrain Awareness and Warning Systems (TAWS).** SUAS-Os will comply with appropriate flight manual procedures upon receipt of a Ground Proximity Warning System (GPWS)/Enhanced GPWS (EGPWS)/TAWS/Ground Collision Avoidance System (GCAS) warning. Terrain warnings need not be followed if the pilot can verify the warning is false by positive visual or EO/IR sensor contact with the terrain/obstacle. MAJCOMs will establish guidance on GCAS use during tactical operations.

**5.30. Imagery and Sensor Operations.** When observing targets outside of government-controlled property, comply with AFI 14-104, paragraph 9.6. "Air Force units with weapon system video and tactical ISR capabilities may collect imagery during formal and continuation



training missions as long as the collected imagery is not for the purpose of obtaining information about specific US persons or private property.” SUAS-Os will ensure imagery and ISR collection assets are utilized for valid mission requirements. Regardless of Operations Area, SUAS ISR will present a positive image/lawful purpose for the USAF and the USA. SUAS-Os and SOs will not transfer mission collected ISR to personal devices or distribute to non-authorized sources.

**5.31. Airborne Operated Air-Launched Off-board SUAS.** Reserved for future operations.

**Chapter 6**

**LIFE SUPPORT SYSTEMS**

**6.1. General Information. Reserved for future operations.**

## Chapter 7

### VISUAL FLIGHT RULES (VFR)

#### 7.1. General Information.

7.1.1. Air Force fixed-wing aircraft will fly under VFR when required for mission accomplishment. Until a certified sense-and-avoid capability is fielded, Small UAS require dedicated observers in order to assure separation from other aircraft and clearance from clouds. Normally, SUAS flights are conducted using procedural airspace control in some form of segregated airspace. When operating outside of Restricted Airspace and Warning Areas, one or more dedicated observers must be employed and the SUAS-O/Observer team must comply with provisions in the operable COA. The UA must remain in the approved airspace and VFR provisions apply:

7.1.1.1. The SUAS-O will request and utilize VFR Radar Advisory Services (Flight Following) to the maximum extent possible/practical (Exception: Group 1 UAS).

7.1.2. The SUAS-O will review the planning documents IAW paragraph 2.1. as appropriate to the area of operations to:

7.1.2.1. Ensure VFR operations are authorized.

7.1.2.2. Check for any applicable restrictions.

7.1.3. If the weather prevents continued flight under VFR on the planned route, the SUAS-O will alter the route of flight, as necessary, so as to continue operations under VFR within approved airspace:

7.1.3.1. To the destination.

7.1.3.2. To land at a suitable location.

7.1.4. SUAS must comply with provisions of FAAO J.O. 7610.4 when operating under VFR.

#### 7.2. Flight Operations under VFR.

7.2.1. National Airspace (NAS). SUAS-Os operating under VFR in the NAS shall adhere to the weather minimums listed in Table 7.1.

7.2.2. Restricted Airspace. SUAS-Os operating under VFR in other than FAA airspace will:

7.2.2.1. Adhere to the International Civil Aviation Organization (ICAO) VFR weather minimums listed in Table 7.2.; or

7.2.2.2. Comply with restrictions published in FLIP or FCG.

**Table 7.1. USAF VFR Cloud Clearance and Visibility Minimums (FAA Airspace Class).**

I T E	A	B	C
	FAA Airspace Class	Prevailing or Flight Visibility	Distance from Cloud

M			
1	Class A	Not Applicable	Not Applicable
2	Class B	3 SMs	Clear of Clouds
3	Class C and Class D	3 SMs	500ft. below, 1,000 ft. above, and 2,000 ft. horizontal
4	Class E and G below 10,000 ft. MSL (Fixed-wing)	3 SMs	500 ft. below, 1,000 ft. above, and 2,000 ft. horizontal
5	Class E and G at or above 10,000 ft. MSL (Fixed-wing)	5 SMs	1,000 ft. below, 1,000 ft. above, and 1 SM horizontal
6	Class E Below 10,000 ft. MSL (Helicopter)	3 SMs	500 ft. below, 1,000 ft. above, and 2,000 ft. horizontal
7	Class E at or above 10,000 ft. MSL (Helicopter)	5 SMs	1,000 ft. below, 1,000 ft. above, and 1 SM horizontal
8	Class G below 1,200 ft. AGL (Helicopter)	Day: 1/2 SM Night: 1 SM	Clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstructions in time to avoid a collision.
9	Class G above 1,200 ft. AGL and below 10,000 ft. MSL (Helicopter)	Day: 1 SM Night: 3 SMs	500 ft. below, 1,000 ft. above, and 2,000 ft. horizontal
10	Class G above 10,000 ft. MSL (Helicopter)	5 SMs	1,000 ft. below, 1,000 ft. above, and 1 SM horizontal

**Table 7.2. USAF VFR Cloud Clearance and Visibility Minimums (ICAO Airspace Class).**

I T E M	A	B	C
	ICAO Airspace Class	Flight Visibility	Distance from Cloud
1	Class A	Not Applicable	Not Applicable
2	Class B	8 KM above 10,000 ft. MSL. 5 KM below 10,000 ft. MSL	Clear of clouds

3	Class C, D, and E	Same as Class B.	1,500 m. horizontal 300 m (1,000 ft.) vertical
4	Class F and G Above 900m (3,000ft.) MSL or above 300m (1,000 ft.) above terrain, whichever is higher. (Fixed-wing)	Same as Class B.	Same as Class C, D, and E.
5	Class F and G At and below 900m (3,000 ft.) or 300m (1,000 ft.) above terrain whichever is higher. (Fixed-wing)	5 KM	Same as Class C, D, and E.
6	Class F Above 900 m (3,000 ft.) or 300 m (1,000 ft.) above terrain whichever is higher. (Helicopter)	8 KMs above 10,000 ft. MSL. 5 KM below 10,000 ft. MSL	1,500 m. horizontal 300 m (1,000 ft.) vertical.
7	Class F and G At and below 900 m (3,000 ft.) or 300 m (1,000 ft.) above terrain whichever is higher. (Helicopter)	5 KM (See NOTE).	Clear of cloud and in sight of the surface.
8	Class G Above 900 m (3,000 ft.) or 300 m (1,000 ft.) above terrain whichever is higher. (Helicopter)	8 KM above 10,000 ft. MSL. 5 KM below 10,000 ft. MSL	1,500 m. horizontal 300 m (1,000 ft.) vertical
<p><b>NOTE:</b> Helicopters may be permitted by ATC to operate in lower visibility conditions if maneuvered at a speed that will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision.</p>			

## Chapter 8

### INSTRUMENT FLIGHT RULES (IFR)

**8.1. General.** Fielded Small UAS and SUAS-Os have neither the equipment nor training and certifications required to comply with procedures for operation under Instrument Flight Rules. This chapter is reserved for future capabilities.

## Chapter 9

### REST AND DUTY DAY LIMITATIONS

**9.1. Background Information.** This section prescribes rest and maximum duty periods for operators of Air Force SUAS. Basic guidance for alertness management strategies and waiver authority procedures are also addressed.

**9.2. Waiver Authority.** Procedures in this chapter may be waived when an ORM assessment determines mission requirements justify the increased risk. Waiver authority may be delegated no lower than group or equivalent level of command. Waiver authority is:

9.2.1. MAJCOM/A3.

9.2.2. Commander, Air Force Forces (COMAFFOR) for forces under their operational control.

9.2.3. Exception: During combat operations and tactical field training exercises, group commanders may waive the provisions of paragraphs 9.3 and 9.4 for Group 1 UAS operations.

#### **9.3. Air Force Policy.**

9.3.1. Commanders and mission planners must assess the impact of factors that reduce SUAS-O alertness. Specific considerations include the fatiguing effects of weather, extremes of temperature, nighttime operations and use of night vision imaging systems, poor sleeping conditions (due to both location and time of day), mission delays, and restrictive personal equipment.

9.3.2. Unit commanders may recommend restricting duty time or extending rest periods to the MAJCOM approval authority. SUAS-Os must terminate a mission/mission leg if safety may be compromised by fatigue factors, regardless of authorized duty period.

**9.4. Duty Day.** SUAS-O duty day begins when the SUAS-O reports for duty and ends when all SUAS associated post-flight duties are accomplished (AV/GCS teardown, RTB). The maximum duty period (DP) for single-operator controlled SUAS is 12 hours and 14 hours for dual controlled (e.g. SrA Smith shows for work and performs 8 hours of primary non-SUAS-O duties. He can then perform 4 hours of single controlled SUAS-O duties.). Maximum continuous control time will not exceed 6 hours.

**9.5. Rest Period.** Rest is required prior to assuming SUAS-O duties. Interruption of the rest period for any official duty reinitiates the rest cycle.

9.5.1. Rest is required prior to SUAS flight duties. The purpose is to ensure SUAS-Os are adequately rested before performing flight or flight related duties. The rest period is a non-duty period of 12 hours. Rest is free time which includes time for meals, transportation, and sleep.

9.5.2. Interruption of rest. If the rest period is violated, it is the SUAS-O's responsibility to inform his supervisor and must not perform SUAS-O duties until the rest requirement is satisfied. Interruption of rest includes conducting official business over the telephone.

**9.6. Scheduling Limitations.** Do not schedule SUAS-Os for flight duties when:

9.6.1. The conditions of paragraph 9.4. cannot be met.

9.6.2. A physical condition is suspected or known to be detrimental to the safe completion of flight duties. SUAS-Os must report all medical/dental treatment obtained through civilian sources or any medical condition that hinders duty performance to the appropriate military medical authority. The use of medication or dietary supplements is governed by AFI 48-123, *Medical Examinations and Standards* or as approved by appropriate medical authority.

9.6.3. **3 The SUAS-O is under the influence of or using any medication or substance that affects the ability to safely perform assigned duties.** Operators may not self-medicate except IAW AFI 48-123, *Medical Examinations and Standards*. SUAS operators shall not consume alcoholic beverages within 12 hours of flight operations.

**9.7. Alertness Management Strategies.** Commanders, schedulers, aerospace medicine personnel, and SUAS-Os all share responsibility for dealing with the complex issue of cumulative fatigue.

9.7.1. SUAS-Os must receive adequate rest to maintain optimum mental/physical functioning. The principle factors in determining required rest are: the duration and intensity of work done, quality and duration of sleep in the previous several days, the time of day relative to the body's internal circadian clock, and the degree of circadian disruption (e.g., shift work or jet lag).

9.7.2. When an individual sleeps less than his/her physiologically required duration, or experiences poor quality sleep over successive days, fatigue develops. As little as two hours sleep loss can result in significant reductions in an individual's performance. Likewise delaying sleep too long results in excessive fatigue and degrades performance.

9.7.3. The failure to acquire sufficient sleep over two or more days results in cumulative sleep debt. Effects of cumulative sleep debt include physical and mental performance loss until the individual has achieved adequate sleep. For most individuals, two consecutive night's sleep is needed to fully recover from a significant sleep debt. During periods of high operations tempo, mission planners should give particular consideration to providing SUAS crews regular opportunities to recover from cumulative fatigue.

9.7.4. Skills critical to flying tend to be among the most susceptible to mental fatigue including monitoring tasks, embedded tasks (e.g., instructing while flying), and higher cognitive processes (such as problem solving in emergencies). Performance is most impaired during the period of the circadian trough, normally 0200 to 0600 hours. Therefore, the use of alertness management strategies must be considered for nighttime missions.

9.7.5. The instructions in this chapter cannot provide a solution to all the challenges posed by the 24-hour demands of Air Force SUAS operations. It is essential, therefore, that commanders use other reasonable means to sustain SUAS-O alertness and performance. Consultation with aerospace medicine or other fatigue management experts is advisable. Examples of alertness management strategies that are currently available include tactics to promote effective rest and minimize pre-mission duration of wakefulness, such as extended rest periods, pre-positioning and sleep quarantine facilities; non-pharmacological countermeasures, such as bright light/physical activity breaks; pharmacological agents (go/no-go pills); and alertness management education and training.



## Chapter 10

### NORMAL OPERATING PROCEDURES

**10.1. Read Files.** Review SUASMAN and Unit Read Files before all SUAS missions.

**10.2. Checklists.** Accomplish all checklists with strict discipline. A checklist is not complete until all items are accomplished. The SUAS-O operating the UA will initiate/complete all checklists. Operator checklists will be used for all operations from preflight through post flight.

10.2.1. Carry abbreviated checklists in checklist binders. The only pages/inserts authorized in checklist binders are: T.O. checklists, MAJCOM-approved checklists, briefing guides, and approved information guides. Units may construct locally developed SUAS flight guides.

10.2.1.1. Make personal notes on checklists, briefing, or information guides in pencil, if desired. If added, all notes must be current and not in conflict with AFI and MAJCOM supplements.

10.2.1.2. Abbreviated checklist items that do not apply to unit SUAS may be lined out in pen.

**10.3. Video/Data Capture.** Each flight will be recorded using the system's data recorder in order to capture both telemetry and video data. This data is used for training as well as review in the case of an incident or lost UA. Recordings may be discarded if there is no incident or mishap. Data recordings from any reportable SUAS incident will be secured to support an investigation to determine cause. Dispose of recordings as directed by MAJCOM Directorate of Safety. Data from incidents involving manned aircraft or violation of ATC procedures will be reported to the MAJCOM Safety office and AFSOC/A3OU.

**10.4. Working Area.** Remain within boundaries of approved airspace. Consider identifying a buffer zone to prevent exceeding cleared limits.

10.4.1. Within approved airspace not requiring dedicated observer(s), UA may briefly enter IMC if transit is required to execute the mission and:

10.4.1.1. The applicable AFI 11-5GP(1, 2, or 3)-SUAS Volume 3 does not prohibit this.

10.4.1.2. The transit route is confirmed free of other aircraft and the UA will remain within airspace boundaries.

10.4.1.3. Weather conditions causing Instrument Meteorological Conditions (IMC) are not hazardous to the UA. Example: While operating in a Restricted Area, a Joint Terminal Attack Controller (JTAC) is tasked to positively identify suspected enemy vehicles on a road on the other side of a ridge. The ridgeline is obscured by low clouds. There is only light rain and no significant turbulence or expectation of icing. Supporting helicopters are clear of the target area and fixed-wing aircraft are holding at medium altitude. In this case, the JTAC confirms terrain clearance altitude then commands the UA to overfly the ridgeline in the cloud and descend to VMC in the immediate target area.

**10.5. Communication with external agencies.** When operating in controlled airspace, SUAS-Os must comply with the communications requirements of applicable Air Traffic Control agency

as described in paragraph 5.6. or as defined in an approved COA. When required, maintain contact with the range or special use airspace controlling agency. Notify the controlling agency if the mission is cancelled or terminated early.

**10.6. Observers.** Within non-segregated (shared use) airspace outside of Restricted or Warning Areas, observers must be used. Dedicated observers assist the SUAS-O in duties associated with safe aircraft separation, terrain/obstacle clearance avoidance, and cloud clearance. Observers must be given sufficient training and situational rehearsal on VFR and right-of-way procedures to communicate clearly to the SUAS-O any instructions necessary to keep the UA clear of other air traffic, terrain/obstacles, and clouds. Observer training will be specified in the unit SUAS training program and must be approved by the unit commander.

10.6.1. Observers must meet medical standards as prescribed in AFI 48-123 or the applicable FAA COA, whichever is more restrictive.

10.6.2. Observers will possess and operationally check real-time communications link(s) to the SUAS-O prior to the UA entering or commencing flight operations within the observed airspace. Maintain continual real-time communications with the controlling SUAS-O.

10.6.3. If the SUAS-O is unable to maintain real-time communications with the observer, the UA must be returned home, landed, or returned to an area that provides the SUAS-O visual line-of-sight to the UA.

10.6.4. Within Restricted or Warning Areas, Operational Risk Management mitigation may require observers to be employed.

10.6.5. Observer Duties. Observer(s) duties are to continuously observe assigned airspace sector(s) for any aircraft, balloon, or parachutist. Observer(s) will maintain continual real-time communications with the SUAS-O controlling aircraft operating within or transiting the assigned airspace. Observer(s) make timely standardized traffic reports. If traffic becomes a factor to the UA, the observer assesses closure rate and projected proximity and makes a descriptive call to the SUAS-O controlling the UA. If traffic continues to pose a collision hazard and the SUAS-O controlling the UA has not indicated either awareness or initiation of an avoidance maneuver, the observer directs an avoidance maneuver. Observer(s) advise the SUAS-O when reported traffic is no longer a factor.

**10.7. Wake Turbulence Avoidance.** SUAS-Os must be aware of and avoid wake turbulence caused by other aircraft.

**10.8. Night Operations.** When operating UA in periods of darkness, in other than restricted or warning airspace, the SUAS-O will ensure the UA is marked with overt lights. During training or Combat/Contingency operations the lights may be overt or covert depending on the tactical need to be visually unobserved. Group 1 UAs not equipped with lights may be modified with overt or covert chemical light sticks or other expedient sources of marking. When operating an UA at night with covert lights observers will be equipped with operational night vision devices.

**10.9. Post Flight Requirements.** Complete Operators Flight Log (See example in Attachment 3) after each flight (to include simulator flights) or as soon as possible in contingency operations. Every operator is required to record his/her flight on a flight log that captures all the information required for entering into SUASMAN and maintain the log until transferred to the SUAS Web Application (e.g. SUASMAN) as soon as possible. EXCEPTION: AFMC is exempt from the

requirement to use SUASMAN. SUAS Log And Debrief Sheet and Operators Flight Log will be turned into the Unit SUAS-I /TM each month or per unit instructions. Exception: AFMC. Flight logs will be used to track flight hours for each specific SUAS, which will be used to determine currency and provide trend analysis. Exception: AFMC will develop a tailored Operators Log for test operations.

## Chapter 11

### ABNORMAL OPERATING PROCEDURES

**11.1. General.** Conduct of flight operations that deviate from the briefed mission for reasons of adverse weather, low fuel/battery state, system abnormalities, or other unforeseen event are defined as “abnormal” and require specific actions.

**11.2. Initial Actions.** Maintain aircraft control and situational awareness. The general priority order of “Aviate, Navigate, Communicate” is the most effective method of handling abnormal events. Well integrated crews will frequently accomplish these tasks in parallel but the priorities remain in order. First priority must always be to maintain control of the aircraft and retain situational awareness. Loss of the aircraft due to loss of situational awareness makes the rest of the process irrelevant. While aviating, the crew analyzes the situation and takes the proper action to mitigate the situation. Navigation must be the second priority. Correct analysis of the situation leads to the decision to continue the mission, navigate to a safe area for further action, or navigate towards a suitable recovery location while remaining clear of unauthorized airspace. The third priority is to communicate information to appropriate agencies. UAS operations typically require airspace control agencies to be notified of any loss of link, navigational difficulty, or UA loss and mission control agencies to be notified of any change in mission capability. Consider communicating with external agencies for assistance in unusual events. However, never cease “aviating” while seeking assistance or troubleshooting.

**11.3. Emergency Procedures (EP).** Each UAS technical order, operating handbook, or equivalent vendor-provided publication specifies critical emergency procedures which shall be committed to memory and acted upon without reference to a checklist. These critical emergency procedures are distinguished from non-critical EPs by bold print (“Bold Face Emergency Procedures”). When encountering a system malfunction, take the time to analyze the situation and select the appropriate emergency procedure. Always execute the appropriate bold face procedure in the order specified. The non-flying crewmember will back up the flying crewmember to insure correct selection and execution of the EP. The crew will execute non-critical EPs with reference to the appropriate checklist.

**11.4. Adverse Weather.** Maintain situational awareness of weather conditions and trends. Avoid turbulence that exceeds operating handbook limitations and be prepared to change altitudes or course to mitigate turbulence and escape headwinds that may prevent recovery. Avoid flight into precipitation that exceeds operating limitations. Be aware of icing levels and follow operating handbook procedures for escaping or mitigating icing. Be vigilant of inflight visibility, not only because of limitations to mission accomplishment and successful recovery but also because of the difficulty imposed on any required observers or manned aircraft in seeing and maintaining visual contact with the aircraft.

**11.5. Impound GCS.** Impound the GCS and preserve operations data for any of the following:

- 11.5.1. Sustained Loss of Link resulting in automatic recovery.
- 11.5.2. Uncommanded control inputs not resolved by published emergency procedures.
- 11.5.3. Loss of UA control resulting in forced landing or uncontrolled flyaway.

11.5.4. Spill out from authorized airspace. Release the GCS for operations only after data is preserved and the GCS is released by the investigating authority. An operations check is required to verify correct function before the GCS is returned to service.

## Chapter 12

### SAFETY/OPERATIONAL RISK MANAGEMENT

**12.1. General.** Commanders will implement an Operational Risk Management (ORM) and mishap prevention program. Commanders will integrate ORM into SUAS mission planning and execution at every level. ORM is a decision-making process to systematically evaluate possible courses of action, identify risks and benefits, and determine the best course of action for any given situation. ORM enables commanders, functional managers, supervisors, and individuals to maximize operational capabilities while limiting all dimensions of risk by applying a simple, systematic process appropriate for all personnel and functions both on- and off-duty. Application of the ORM process ensures more consistent results, while ORM techniques and tools add rigor to the traditional approach to mission accomplishment, thereby directly strengthening the Air Force's war fighting posture. See Attachment 4 for sample risk assessment checklist.

**12.2. ORM Principles.** Four principles govern all actions associated with the management of risk. These principles, continuously employed, are applicable before, during, and after all tasks and operations.

12.2.1. Accept no unnecessary risk. All Air Force missions and daily routines involve risk. The most logical choices for accomplishing a mission are those that accomplish the mission while exposing personnel and resources to the lowest acceptable risk. Risk without a commensurate reward is unnecessary.

12.2.2. Make risk decisions at the appropriate level. Making risk decisions at the appropriate level establishes accountability. Those accountable for the success or failure of the mission must participate in the risk decision process.

12.2.3. Accept risk when benefits outweigh the costs. All potential benefits should be compared to all potential costs. The process of weighing risks against opportunities and benefits helps to maximize unit capability. Even high risk endeavors may be undertaken when there is a well founded basis to believe the sum of the benefits exceeds the sum of the costs.

12.2.4. Integrate ORM into operations and planning at all levels. To effectively apply risk management, commanders must dedicate time and resources to integrate ORM principles into planning and operational processes. Risk assessment of operations is supportive when it's done as a normal way of conducting a mission, not an add-on process performed by people not otherwise involved.

**12.3. Authorized Uses.** SUAS will be used in a safe and controlled manner and will be used for official purposes only. The SUAS-O must conduct a thorough Operational Risk Management assessment prior to any SUAS mission IAW Air Force Pamphlet 90-902, *Operational Risk Management Guidelines and Tools*.

**12.4. Human Factors.** Human factor issues are of particular concern in establishing guidelines for safe UA flight. UA flight presents human challenges different from and beyond those of manned flight primarily because the aircraft and its operator are not collocated. As compared to the pilot of a manned aircraft, an SUAS-O can be said to perform in relative "sensory isolation" from the vehicle under his/her control.

12.4.1. Small UAS can present operators with long periods of low workload which contributes to “vigilance-based stress.” Tasks associated with operating SUAS such as sustained visual scanning of displays requires constant attention and SUAS-Os and supervisors must be aware that alertness deteriorates over time.

## Chapter 13

### REPORTING PROCEDURES

**13.1. General.** HQ AFSOC has been tasked by the Office of the Secretary of Defense (OSD) to track and report the mission capable status of all AF SUAS. Air Force units with an operational SUAS mission will keep SUAS status updated and current in SUASMAN. OSD can generate a mission capable status report from within SUASMAN. Timely notification of SUAS mishaps is required in order to ensure accuracy of AF SUAS status reporting. Exception: AFMC and USAFA need not report status for test and/or research systems.

#### **13.2. System Reporting.**

13.2.1. Units will track each system by the manufacturers' serial number and/or system number. Mission capable status will be determined by the complementary readiness of the following selected major subcomponents: UA, Ground Control Station (GCS), Remote Video Terminal (RVT) and payloads (typically electro-optical (EO) and infrared (IR) sensors). The mission capable status will be reported IAW paragraphs 13.2.2 through 13.2.3.

13.2.2. Terms. The following terms will be used to categorize systems, i.e., Fully Mission Capable (FMC), Partially Mission Capable (PMC) and Non-Mission Capable (NMC).

13.2.2.1. FMC means every UA, GCS, RVT and payload in a system is mission capable.

13.2.2.2. PMC means at least one UA, one GCS, and one payload is mission capable.

13.2.2.3. NMC means either all of the UA, the GCS, or all payloads are not mission capable. Any one of these conditions will make the entire system NMC. Note: The reporting unit may subjectively downgrade system status to NMC if the system has no operational night payload (but an operational day payload) when a night payload is required for successful mission accomplishment.

13.2.3. Status Reporting Schedule. Equipment status will be continually updated in the SUAS Web Application (SUASMAN). This enables higher headquarters to determine current equipment status.

#### **13.3. Mishap reporting:**

13.3.1. Mishaps resulting in the loss of an aircraft, non-repairable damage or requiring depot level repair; injury to personnel or damage to property will be reported using the Air Force Safety Automated System (AFSAS) IAW AFI 91-204 and AFMAN 91-223. Mishaps that do not meet Class A, B, or C thresholds will be reported using AFSAS as Class E event. Reports are kept indefinitely in the AFSAS. The unit may maintain hard copies IAW AFI 91-204.

13.3.2. Mishaps that result in minor damage that do not meet Class A, B, or C thresholds and that can be repaired at home station must be reported to the Unit Safety Representative who will determine if an AFSAS report is warranted.

13.3.3. For the purposes of trend analysis, unintentional LOL incidents (other than brief incidents where link is regained and mission continued) will be reported in SUASMAN and



IAW AFMAN 91-223. Exception: For test operations, AFMC is exempt from the requirement to use SUASMAN.

13.3.4. Incident/mishap reports will be processed IAW MAJCOM supplements to AFI 91-204. The names of the operators will not be released to non-USAF agencies without the permission of the Air Force Representative to the FAA (AFREP) coordinating the investigation. (Non-mishap combat losses will be reported to MAJCOMS and AFSOC/A3OU within 24 hours via e-mail to [AFSOC.A3OU.WF@hurlburt.af.mil](mailto:AFSOC.A3OU.WF@hurlburt.af.mil) / SIPR: [afsoc.UAV@afsoc.af.smil.mil](mailto:afsoc.UAV@afsoc.af.smil.mil) or Fax: DSN 579-2026, Commercial (850) 884-2026. HQ AFSOC/A3OU will then forward to AFFSA and HAF/A3O-AS.)

13.3.5. Use standard security markings and classified handling procedures for classified reports. Do not enter classified information into AFSAS.

13.3.6. Refer all inquiries about SUAS mishaps to the appropriate Public Affairs (PA) office.

13.3.7. Deployed units may relay an incident report via text message in standard line format.

HERBERT J. CARLISLE, Lt Gen, USAF  
DCS, Air, Space and Information Operations, Plans  
& Requirements

**Attachment 1****GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

Allied Communication Publication (ACP) 160, US Supplement 1

AFH 11-203, Volume 2, *Weather for Aircrews*

AFI 11-202, Volume 3, *General Flight Rules*

AFI 11-208(IP), *Department of Defense Notice to Airmen (NOTAM) System*

AFI 11-209, *Aerial Event Policy and Procedures*

AFI 11-214, *Air Operations Rules and Procedures*

AFI 11-215, *USAF Flight Manuals Programs (FMP)*

AFI 11-218, *Aircraft Operation and Movement on the Ground*

AFI 11-403, *Aerospace Physiological Training Program*

AFI 13-201, *Air Force Airspace Management*

AFI 13-204, Volume 3, *Airfield Operations Procedures and Programs*

AFI 33-360, *Publications and Forms Management*

AFI 36-2201, *Air Force Training Program*

AFI 36-2251, *Management of Air Force Training Systems*

AFI 40-102, *Tobacco Use in the Air Force*

AFI 48-123, *Medical Examinations and Standards*

AFI 90-901, *Operational Risk Management*

AFI 91-202, *The US Air Force Mishap Prevention Program*

AFI 91-204, *Safety Investigations and Reports*

AFMAN 11-217, Volume 1, *Instrument Flight Procedures*

AFMAN 10-206, *Operational Reporting*

AFMAN 33-363, *Management of Records*

AFPAM 11-216, *Air Navigation*

AFPD 10-9, *Lead Operating Command Weapon Systems Management*

AFPD11-4, *Aviation Service*

AFPD11-5, *Small Unmanned Aircraft Systems (SUAS) Rules, Procedures and Service*

AFPD 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*

Education and training Course Announcements (ETCA),

<https://etca.randolph.af.mil/default1.asp>

FAA Advisory Circular 20-130A, *Airworthiness Approval of Navigation or Flight Management Systems Integrating Multiple Navigation Sensors*

FAA Advisory Circular 20-138, *Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment for use as a VFR and IFR Supplemental Navigation System*

FAA Advisory Circular 90-45A, *Approval of Area Navigation Systems for Use in the US National Airspace System*

FAA Advisory Circular 90-94, *Guidelines for Using Global Position System Equipment for IFR En Route and Terminal Operations and for Non-Precision Instrument Approaches in the United States, National Airspace System*

FAA Advisory Circular 91-57, *Model Aircraft Operating Standards*

FAA Advisory Circular 97-1A, *Runway Visual Range (RVR)*

FAA Advisory Circular 120-33, *Operational Approval of Airborne Long Range Navigation Systems for Flight within the NAT-MNPS Airspace*

FAA Handbook 7110.65, *Air Traffic Control*

FAA Handbook 7400.2, *Procedures for Handling Airspace Matters*

FAA Handbook 7610.4, *Special Military Operations*

FAA Handbook 8260.19, *Flight Procedures and Airspace*

FAR Part 91, *General Operating and Flight Rules*

FAA TSO-115B, *Airborne Area Navigation Equipment Using Multi-Sensor Inputs*

FAA TSO-129a, *Airborne Supplemental Navigation Equipment Using the Global Positioning System (GPS)*

T.O.-00-20-1, *Preventive Maintenance Program, General Policy Requirements and Procedures*

T.O.-00-20-5, *Aerospace Vehicle/Equipment Inspection and Documentation*

T.O. 1-1-300, *Acceptance/Functional Check Flight and Maintenance Operational Checks*

### ***Forms Adopted***

AF Form 942, *Record of Evaluation*

AF Form 847, *Recommendation for Change of Publication*

DoD Form 175-1, *Flight Weather Briefing*

AF Form 70, *Pilot's Flight Plan and Flight Log*

AF Form 8, *Certificate of Aircrew Qualification*

### ***Abbreviations and Acronyms***

**ACM**—Airspace Coordinating Measure

**AFI**—Air Force Instruction  
**AFRC**—Air Force Reserve Command  
**AFMC**—Air Force Materiel Command  
**AFSOC**—Air Force Special Operations Command  
**AGL**—Above Ground Level  
**ANG**—Air National Guard  
**ATC**—Air Traffic Control  
**BCD**—Battlefield Coordination Detachment  
**C2**—Command and Control  
**CAOC**—Combined Air Operations Center  
**CMR**—Combat Mission Ready  
**COA**—Certificate of Authorization  
**CONUS**—Continental United States  
**DoD**—Department of Defense  
**EP**—Emergency Procedures  
**FAA**—Federal Aviation Administration  
**FAR**—Federal Aviation Regulation  
**FLIP**—Flight Information Publication  
**FMC**—Full Mission Capable  
**FMP**—Full Mission Profile  
**GCS**—Ground Control Station  
**IAW**—In Accordance With  
**ICAO**—International Civil Aviation Organization  
**IFR**—Instrument Flight Rules  
**IMC**—Instrument Meteorological Conditions  
**MAJCOM**—Major Command  
**MSL**—Mean Sea Level  
**NANU**—Notice Advisory to NAVSTAR Users  
**NAS**—National Airspace System  
**NOTAM**—Notice To Airmen  
**OCONUS**—Outside Continental United States  
**ORM**—Operational Risk Management

**PIC**—Pilot in Command  
**PMC**—Partial Mission Capable  
**SOF**—Safety of Flight  
**SOP**—Standing Operating Procedure  
**Stan/Eval**—Standardization and Evaluation  
**SUA**—Special Use Airspace  
**SUAS**—Small Unmanned Aircraft System  
**SUAS-E**—Small Unmanned Aircraft System Evaluator  
**SUAS-I**—Small Unmanned Aircraft System Instructor  
**SUAS-O**—Small Unmanned Aircraft System Operator  
**TDA**—Table of Distribution and Allowances  
**TM**—Technical Manual  
**TOC**—Tactical Operations Center  
**TM**—Training Manager  
**TTP**—Tactics, Techniques and Procedures  
**TUAV**—Tactical Unmanned Aerial Vehicle  
**UA**—Unmanned Aircraft  
**UAS**—Unmanned Aircraft System  
**UCMJ**—Uniform Code of Military Justice  
**USAF**—United States Air Force  
**USAFA**—United States Air Force Academy  
**UTC**—Unit Type Code  
**VFR**—Visual Flight Rules  
**VMC**—Visual Meteorological Conditions

### *Terms*

**Air traffic**—Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

**Catastrophic failure**—Any failure that leads to the loss or destruction of the UA.

**Controlled airspace**—A generic term that covers the different classification of airspace (Class A, Class B, Class C, Class D, and Class E airspace) and defined dimensions within which air traffic control service is provided to instrument flight rules flights and to VFR flights in accordance with the airspace classification (see the Aeronautical Information Manual).

**Land**—For purpose of this AFI, includes all actions appropriate to transition the UA from flight to the ground (e.g., recovery, wheeled or skid landing, parafoil recovery, deep stall landing, arrested engagement, etc.)

**External Operator (EO)**—The SUAS crewmember who, in the absence of full automatic takeoff and landing systems, visually controls the UA flight path, generally during takeoff and/or landing.

**Internal Operator (IO)**—An SUAS crewmember that operates the UA from within a control station that exercises complete control over the air vehicle.

**Lead SUAS-O**—The SUAS-O specifically identified by responsible authority and tasked with the overall responsibility for the operation and safety of the SUAS mission. Equivalent to the Pilot-in-Command of a manned aircraft.

**Maintenance**—The inspection, overhauls, repairs, preservation, and/or the replacement of parts, but excludes preventive maintenance.

**National Airspace System (NAS)**—All of the airspace above the surface of the earth over the United States and its possessions.

**Night**—The time between the end of evening nautical twilight and the beginning of morning nautical twilight converted to local time.

**Restricted area**—Airspace designated in FAR 73 within which the flight of aircraft, while not prohibited, is subject to restriction(s).

**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. Limitation on nonparticipating aircraft may range from absolute exclusion to complete freedom of use within certain areas, depending upon activity being conducted. Comprises Restricted, Warning, and Prohibited areas.

**SUAS Evaluator (SUAS-E)**—A SUAS crewmember who conducts evaluation of SUAS-Os, SUAS-I and other evaluators in designated SUAS and promotes safety among SUAS crew members. Evaluations include air vehicle operation, qualification, unit employment, visual flight, and crew performance.

**SUAS Instructor (SUAS-I)**—A SUAS crewmember who conducts training and evaluation of SUAS-Os and SUAS unit trainers in designated SUAS and promotes safety among aircrew members. Training and evaluation include air vehicle operation, qualification, unit employment, visual flight, and crew performance.

**SUAS-O**— An individual who has completed IQT in a specific UAS.

**Takeoff**—For purposes of this AFI, includes all actions required to transition the UA from ground to flight (e.g., launch, throwing, catapulting, wheeled takeoff, etc.)

**Traffic pattern**—The traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport or airfield.

**Training mission**—Missions flown for flight qualification, refresher, or proficiency/currency training; ATP requirements, and authorized training exercises.

**Unmanned Aircraft (UA)**— An aircraft or balloon that does not carry a human operator and is capable of flight under remote control or autonomous programming. Also called **UA**. (Joint Publication 3-52) A UA may be expendable or recoverable, carries a payload, is not operated for sport or hobby, and does not transport passengers or crew. For purposes of compliance with 14 CFR 1, subchapter A, part 1.1., UAs are to be considered “aircraft,” typically either an “airplane” or “rotorcraft,” as defined in 14 CFR 1, subchapter A, part 1.1. (FAA refers to these aircraft as remotely operated aircraft).

**Unmanned Aircraft System (UAS)**— That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft. Also called **UAS**. (Joint Publication 3-52)

## Attachment 2

## SUAS MISHAP WORKSHEET

This worksheet should be completed in the field, whenever there is an incident that involves the loss of a SUAS, damage that renders the SUAS non-repairable/non-recoverable, or an injury incurred as a result of SUAS operation. Use standard security markings and classified handling procedures for classified reports.

1. **Owning Unit:** \_\_\_\_\_

2. **Date of loss** \_\_\_\_\_ (DD/MO/YR) Time \_\_\_\_\_ (Local/Zulu)

3. **Type of system:** \_\_\_\_\_

4. **Recovered:** \_\_\_\_\_ Not recovered: \_\_\_\_\_

5. **Site/location of incident:** \_\_\_\_\_ MSL altitude of GCU \_\_\_\_\_

6. **Map sheet reference number:** \_\_\_\_\_

7. **UA (or lost/destroyed item) fuselage number:** \_\_\_\_\_

**8. Flight Log information:**

A. Unit \_\_\_\_\_

Channel: \_\_\_\_\_

GPS Keyed: \_\_\_\_\_ Y \_\_\_\_\_ N \_\_\_\_\_

Launch Time: \_\_\_\_\_

Land/Crash Time: \_\_\_\_\_

Duration of Flight: \_\_\_\_\_

Weather Conditions: \_\_\_\_\_ Temperature: \_\_\_\_\_ Wind Speed: \_\_\_\_\_

Wind Direction: \_\_\_\_\_

Lighting: Night \_\_\_\_\_ Dawn \_\_\_\_\_ Day \_\_\_\_\_ Dusk \_\_\_\_\_

GCU# \_\_\_\_\_

RVT# \_\_\_\_\_

UA Battery type:

Camera Type: \_\_\_\_\_ Day \_\_\_\_\_ F/L \_\_\_\_\_ Night \_\_\_\_\_ S/L Night

Other Factors:

Moonlight/illumination: \_\_\_\_\_

Precipitation: \_\_\_\_\_

Clouds: \_\_\_\_\_

Other): \_\_\_\_\_

**9. Crew information**

A. SUAS-O (Name, Rank, SSN): \_\_\_\_\_

B. Date/location of SUAS-O completion of certified training:

C. Mission Controller (Name, Rank, SSN): \_\_\_\_\_



D. Date and location of MC completion of certified training:

\_\_\_\_\_

**10. Circumstances:**

- A. Origin/launch site: \_\_\_\_\_
- B. Mission: \_\_\_\_\_
- C. Launch problem: \_\_\_\_\_
- D. Landing problem: \_\_\_\_\_
- E. Problem during flight: \_\_\_\_\_
- F. Fight mode at time of loss: M\_\_\_ A\_\_\_ H\_\_\_ L\_\_\_ N\_\_\_
- NOTE:** M=Manual, A=Autopilot, H=Hover, L=Loiter, N=Night
- G. Commanded altitude or throttle setting: \_\_\_\_\_
- H. Air vehicle altitude above ground (AGL): \_\_\_\_\_ Feet
- I. Air vehicle heading: \_\_\_\_\_ Degrees magnetic
- J. Last known UA location: \_\_\_\_\_
- K. Rally point location and altitude: \_\_\_\_\_
- L. Loss-of-Link indications: \_\_\_\_\_
- M. GPS startup problems: \_\_\_\_\_
- N. Previous problems/maintenance issue that may have contributed:
- \_\_\_\_\_

**11. Flight recorded/taped? Y/ N** Location of data \_\_\_\_\_

**12. Summary of mishap and damage:**

\_\_\_\_\_

\_\_\_\_\_

**13. Actions taken upon/after loss (search pattern used, number of searchers, duration of search, use of aircraft to assist, etc.):** \_\_\_\_\_

\_\_\_\_\_

**14. Damage**

- A. Aircraft: \_\_\_\_\_
- B. DoD property damage: \_\_\_\_\_
- C. Private property damage: \_\_\_\_\_

**15. Injuries**

- A. Names of injured person: \_\_\_\_\_
- B. Status/extent of injuries: \_\_\_\_\_
- C. Actions at time of injury: \_\_\_\_\_

**16. Witnesses:** (Name, Rank, SSN and role (i.e., RVT Data Capture, SUAS Team Leader, etc.) \_\_\_\_\_

**17. Worksheet completed by:**

- A. Name/Rank: \_\_\_\_\_
- B. Unit/Office Symbol: \_\_\_\_\_
- C. Duty Phone: \_\_\_\_\_

**Attachment 3****SAMPLE OPERATORS FLIGHT LOG****(AFMC: For test operations, see AFI 11-5FT Vol 3)**

Pilot:

Mission Controller:

Location:

Mission:

Unit:

AV #:

GCU#:

RVT#:

AV Battery/Pri/Rech:

Channel:

GPS Keyed? Y/N:

Date:

Weather:

Temp:

Wind Direction/Speed:

Lighting: (Night, Dawn, Day, Dusk)

Launch Time:

Land Time:

Duration:

Camera: (Color, S-IR, F-IR)

Comments/Damage Assessment:

**Attachment 4**

**SAMPLE SUAS OPERATIONAL RISK ASSESSMENT CHECKLIST**

**(AFMC: For test operations, see AFI 11-5FT Vol 3)**

FLIGHT No: _____	Date: _____
<b>Aircraft Type &amp; Tail Number</b> CO: _____, Op: _____ IO: _____, MC: _____ Ground Observer: _____, Ground Crew _____ _____	

Mission Analysis	Weight		Fit Endurance		
Tactical Mission	5		First 1/3 of Duty Day	1	
Non-Tactical	2		Middle 1/3 of Duty Day	2	
Student training	3		Last 1/3 of Duty Day	4	
Simulator	1				

Fit Condition			Special Mission Tasks		
Day	1		Link-up w/ground user	12*	
Night	4		Link-up for PR	12*	
Chase Plane	1		PSYOP Xtrans/Leaflet	12*	
No Chase Plane	3		HG/T / Reduced Perf opns	5	
WX > 3000/5	1		Return to alternate site	12*	
WX > 1000/3	5		AC Outside Sched Maint	12*	
WX < 1000/3	10				
Winds > 15kts g20	12*		<b>TOTAL:</b>		
Winds 10 to 14kts	5				

Terrain	
Flat Terrain	1
Mountain > 4000'	4
Overwater	3
Jungle	3
Dens. Alt > 3000ft	3
Urban	12*

Command Operator Signature \_\_\_\_\_

Risk Approval Authority Signature: \_\_\_\_\_

Crew Mix	
Student/IO	5
BO/BO	3
AO/BO	2
AO/AO	1
Op/IO	2

Remarks:

Threat	
Real Threat	10
Training	2

Timeline	
Deliberate(>24-hours)	1
Crisis Action Plan	3
Hasty Plan(<6 hours)	7

Post Mission Remarks (Mission Completed (y/n):  
  
 If Not, Why:

Payloads	
EO/IR	-2
Hellfire	12*
Ext Hook re-supply	12*
Radio/PSYOP	12*

\*Mandatory Approval by SLED ACTD TM and OM  
 Low <15 Non-crew Operator (BO, AO, or IO)  
 Medium 15-24 non-crew IO  
 High 25-35 SLED ACTD TM or OM  
 Ex High >35 SLED ACTD TM and OM

**Attachment 5**  
**DOD UAS CATEGORIES**

**A5.1. DoD UAS Categories.**

Figure A5.1. DoD UAS Categories.

<b>UAS Category</b>	<b>Maximum Gross Takeoff Weight (lbs)</b>	<b>Normal Operating Altitude (ft)</b>	<b>Speed (KIAS)</b>
<b>Group 1</b>	0-20	<1200 AGL	<100
<b>Group 2</b>	21-55	<3,500 AGL	<250
<b>Group 3</b>	<1320	<18,000 MSL	
<b>Group 4</b>	>1320	>18,000 MSL	Any Speed
<b>Group 5</b>			