



DEPARTMENT OF THE ARMY  
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND  
AVIATION AND MISSILE RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER  
5400 FOWLER RD  
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RDMR-AEV

06 Sep 11 R1  
28 May 10

AWR RQ-7B20100528R1

MEMORANDUM FOR Project Manager, Unmanned Aircraft Systems (SFAE-AV-UAS),  
Redstone Arsenal, AL 35898-5000

SUBJECT: Airworthiness Release (AWR) for Operation of RQ-7B Shadow Unmanned  
Aircraft System (UAS) (AWR RQ-7B20100528R1) (TN 84113A)

1. Scope: This memorandum constitutes an Airworthiness Release Qualification Level 3 authorizing operation of the RQ-7B Shadow Unmanned Aircraft System within active restricted airspace (R-5601 A/B/C/D/E/F) and the Federal Aviation Administration (FAA) approved Certificate of Authorization (COA) area at Fort Sill, OK.
2. Validity: This AWR terminates 06 Sep 13, upon changes in configuration of the subject equipment, or upon issuance of a later AWR, whichever occurs first. This AWR is valid only for operations within active restricted airspace and the Federal Aviation Administration (FAA) approved Certificate of Authorization (COA) area at Fort Sill, OK.
3. Appendices: This memorandum and its appendices shall be carried in the logbook, controlling Ground Control Station (GCS), and aircraft historical record file.

Appendix A - Restrictions and Operating Information

Appendix B - Configuration and Installation Detail

Appendix C - Inspections, Maintenance, and Logbook Instructions

Appendix D - Reference List

4. The points of contact (POC) are (b) (6) commercial (256) 313-5364, or  
email: (b) (6) commercial (256) 876-2864, or  
e-mail: (b) (6)

(b) (6)

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## **Appendix A - Restrictions and Operating Information:**

### **WARNING**

The RQ-7B Shadow UAS has not completed full airworthiness qualification. All flight operations shall be conducted in a manner to minimize exposure to manned aircraft and populated ground areas.

### **WARNING**

Accidental operation of the RQ-7B Shadow UAS outside of active restricted airspace and/or the FAA approved COA shall be immediately reported to Air Traffic Control (ATC) / Range Control. The operator shall make immediate actions to correct the flight path and/or follow ATC/Range Control direction.

### **WARNING**

The RQ-7B Shadow UAS has not undergone testing to determine Electromagnetic Interference/Electromagnetic Compatibility (EMI/EMC) or susceptibility to internal or external electromagnetic fields. The aircraft may experience erroneous data reports, and/or loss of control of aircraft, and/or loss of control of laser payload. Operators shall avoid sources of electromagnetic fields such as but not limited to transmitters, power lines, and cell towers.

### **WARNING**

The RQ-7B Shadow UAS has not undergone Explosive Atmosphere testing. A serious fire or explosion may result if the aircraft is powered while flammable vapors are present during ground or flight operations. The precautions in paragraph 3 of this appendix shall be observed in order to ensure safe operations.

### **WARNING**

The RQ-7B Shadow UAS does not have a sense and avoid system. Mid-air collision is a risk. All flight operations shall be conducted to ensure that minimum separation standards are maintained.

### **WARNING**

The RQ-7B Shadow UAS Airborne Computing Equipment (ACE) may experience erroneous reboots (warm boots) in flight. Multiple warm boots in

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flight have resulted in loss of aircraft control. The precautions in paragraph 18 of this appendix shall be observed in order to ensure safe operations.

### **WARNING**

RQ-7B Shadow aircraft equipped with the POP 300D LRF/D Payload employ a high power Infra-Red Laser. The laser is capable of permanently blinding personnel within 13 km. Lasing shall be limited only to boresighting, combat, and training operations.

### **CAUTION**

The RQ-7B Shadow UAS has not been tested for the effects of lightning. Flight operations shall be restricted to no less than 25 nautical miles from lightning activity.

1. The aircraft operating instructions, procedures, and limitations shall be in accordance with the operator's manuals, D-1, interactive electronic technical manual, D-2, checklist, D-3, local flight regulation, D-4, and this AWR. In the event of conflict between these documents, the information in this AWR shall prevail.
2. Flight of the RQ-7B Shadow UAS is restricted to Visual Meteorological Conditions (VMC).
3. Due to lack of SOF Explosive Atmosphere testing, the following precautions shall be observed in order to ensure safe flight:
  - a. The aircraft shall be un-powered and grounded IAW the operator's manuals, D-1, interactive electronic technical manual, D-2, and checklist, D-3, during refueling operations.
  - b. Ground operations of the aircraft shall be conducted at the greatest distance practical (no less than 50 feet) from all other aircraft and fuel depots.
4. Data link frequencies shall be de-conflicted through the local frequency manager/coordinator prior to conducting operations.
5. The Return Home Point shall be inside active restricted airspace, over a suitable ditch point, within range of the omni-antenna, and at an altitude within the FAA approved corridor.
6. An appropriate Return Home Point shall be set such that the aircraft will not exit the COA corridor during lost link flight.



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7. In the event of loss of control, local ATC/Range Control and the chase aircraft/observers shall be notified.
8. In the event of an engine failure or other catastrophic failure, local ATC/Range Control and chase aircraft will be notified immediately and the aircraft shall be ditched over the appropriate Return Home Point in active restricted airspace if possible. If not possible to make the Return Home Point, every effort shall be made to visually inspect the probable impact area with the payload prior to parachute deployment.
9. The flight path of the aircraft shall be within a 4:1 glide ratio of a pre-established ditching point.
10. Chase aircraft/observer shall maintain uninterrupted visual contact with the RQ-7B aircraft while within the FAA approved corridor. Additionally, the chase aircraft/observer shall maintain continuous radio contact with both ATC and the controlling GCS while the air vehicle is within the corridor. In the event that visual contact with the RQ-7B aircraft is interrupted, the chase aircraft/observer shall immediately notify both ATC and the GCS which shall initiate Return to Base or flight termination procedures.
11. Flight over populated areas is prohibited.
12. The aircraft shall not be flown at altitudes below 2000 feet Above Ground Level (AGL) except for launch and recovery activities.
13. During preflight someone other than the operator shall verify that the Return Home Point is entered correctly.
14. Local ATC/Range Control shall be notified with a flight plan or flight strip prior to departure, to aid in airspace de-confliction.
15. Verified loss of any aircraft flight-critical subsystem or Ground Control Station (GCS) flight-critical subsystem shall require Return To Base (RTB).
16. All flight operations shall be conducted with a minimum of one controlling GCS or PGCS and one back-up GCS or PGCS at each launch/recovery site.
17. Airspace de-confliction outside of the restricted airspace shall be IAW the FAA COA.
18. Simultaneous loss of primary and secondary data link, loss of fuel load indication, unexplained loss of Return Home Point, or Rotor Air Temperature (RAT) indication of “-0” may be indicative of an ACE warm boot. In the event of a warm boot the operator shall initiate RTB, and report the anomaly to maintenance personnel.

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19. Any unexplained anomaly shall initiate a return to the Return Home Point, or trouble shooting may be performed within the active restricted airspace
20. Any procedural deficiencies or flight anomalies detected during operations shall be corrected, annotated, and reported to the POC listed in paragraph 4 of this AWR.
21. The Laser Designator may only be powered while in an approved Laser Operations Area.
22. There are inherent risks involved in operating a Class 4 laser on a Level 3 unmanned system due to the possibility of permanently blinding personnel. All ground personnel in the immediate vicinity of the launcher who are participating in or observing the launch of Shadow are required to wear appropriate protective goggles at all times, except during the following scenarios.
  - a. While the aircraft is on the ground and the payload is in stow mode.
  - b. While the power bus to the laser is physically disconnected.
  - c. While the boresighting tool is attached.
23. Laser Engagements should not be conducted unless both Command and Control and Video datalinks have adequate signals.
24. A minimum of a 10 knot forward ground speed shall be maintained flying into prevailing winds at flight altitude and all lower altitudes. The intent of this 10 knot buffer is to ensure that the air vehicle will be controllable to remain within the confines of restricted airspace and the FAA COA at all times to include potential emergency conditions.
25. The aircraft shall maintain capability to climb at a minimum of 100 feet per minute (fpm).
26. Commander's Corner:

The RQ-7B Shadow Unmanned Aircraft System (UAS) has not completed full airworthiness qualification testing. Strict adherence to the Operators Manual and this AWR will minimize the hazards of operation. The RQ-7B aircraft may report a flight altitude +/- 200ft of actual altitude, flight altitude should be planned accordingly.

The RQ-7B Shadow UAS currently carries 39 Medium Risks which are identified in the System Safety Risk Assessments (SSRAs), D-5 and D-6.

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**Appendix B - Configuration and Installation Detail:**

Configuration- This aircraft is a production configuration as identified in the operator's manuals, D-1, and interactive electronic technical manual, D-2. Any deviation to production configuration shall be approved in writing by the Aviation Engineering Directorate (POC in cover memorandum paragraph 4) for this AWR to be valid.

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**Appendix C - Inspections, Maintenance, and Logbook Instructions:**

1. In the event any operating limit, or limits established by this release, is exceeded in addition to the normal entry on DA Form 2408-13, appropriate inspections shall be performed prior to next flight.

2. Aircraft Logbook Entries:

a. In accordance with Department of the Army (DA) Pamphlet X-Draft-C1, Functional Users Manual for the Army Maintenance Management System – Unmanned Aerial Vehicle Systems (TAMMS-UAVS), the following entries shall be made on the DA Form 2408-13-1 and shall be perpetuated on each form until superseded by another AWR, or until reason for limitation is removed.

(1). Place a circled "X" on the form IAW TAMMS-UAVS. In the Fault Information Block, make the following entry: "Operate within limitations and restrictions specified in the enclosed airworthiness release dated 06 Sep 11."

(2). A weight and balance form DD365 shall be maintained on file in each aircraft's log book and weight and balance book maintained by the operational unit.



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**Appendix D - Reference List:**

1. Technical Manual 1-1550-689-10-1, 1-1550-689-10-2, Technical Operators Manual for Shadow 200 TUAV System with RQ-7B Air Vehicles, dated 01 Oct 09, with latest updates.
2. Technical Manual 1-1550-689-23&P, Interactive Electronic Technical Manual, Shadow 200 TUAV including Parts Information, dated 03 May 10, with latest updates.
3. Technical Manual 1-1550-689-CL, Shadow 200 Operator's and Crewmember's Checklist, dated 03 May 10, with latest updates
4. Fort Sill Regulation 95-23, Unmanned Aerial System Flight Regulations, dated 22 Apr 2009.
5. System Safety Risk Assessment, Document No. RQ-7-07-NFSP-01.
6. System Safety Risk Assessment, Document No. UAS-09-NFSP-02.