



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

25 Oct 11 R1
27 Mar 09

AWR RQ-7B20090327R1

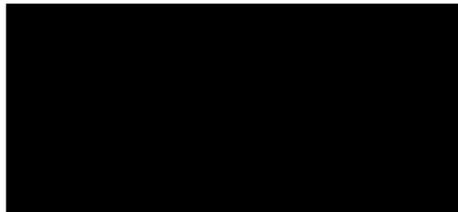
MEMORANDUM FOR Project Manager, Unmanned Aircraft Systems (SFAE-AV-UAS),
Redstone Arsenal, AL 35898-5000

SUBJECT: Airworthiness Release (AWR) for Operation of RQ-7B Shadow Unmanned
Aircraft System (UAS) (AWR RQ-7B20090327R1) (TN 68322B)

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-3704) and the Federal Aviation Administration (FAA) approved Certificate of Authorization (COA) area at Godman Army Airfield in Ft. Knox, KY.
2. Validity: This AWR is a revision and terminates 25 Oct 2013, 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 (R-3704) and the Federal Aviation Administration (FAA) approved Certificate of Authorization (COA) area at Godman Airfield in Ft. Knox, KY.
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)



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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. 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

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

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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 manual, D-1 and D-2, checklist, D-3, interactive electronic technical manual, D-4, flight regulation, D-7, 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 manual, D-1 and D-2, checklist, D-3, and interactive electronic technical manual, D-4, 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. Use of data links is limited to approved frequencies for all ground and flight operations. Data link frequencies shall be de-conflicted through the local frequency manager/coordinator prior to conducting operations.
5. The Return Home Point shall be over a suitable ditch point and within range of the omni-antenna.
6. An appropriate Return Home Point shall be set such that the aircraft will not exit the approved operational airspace during lost link flight.
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 authority shall be notified immediately and the aircraft shall be ditched over the Return Home

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Point. 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 suitable ditching point.

10. In case of loss of communications between the aircraft operator and local ATC/Range Control authority, the aircraft shall be directed to the Return Home Point.

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 sub-system shall require Return to Base (RTB.)

16. Any unexplained anomaly shall initiate Return to Base (RTB) or trouble shooting may be performed within the active restricted airspace.

17. All flight operations shall be conducted with a minimum of one controlling GCS or PGCS and one back-up GCS or PGCS.

18. Airspace de-confliction outside of the restricted airspace shall be IAW the FAA COA.

19. 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.

20. The Laser Designator may only be powered while in an approved Laser Operations Area.

21. 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.

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22. Laser Engagements should not be conducted unless both Command and Control and Video datalinks have adequate signals.

23. 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.

24. The aircraft shall maintain capability to climb at a minimum of 100 feet per minute (fpm).

25. Commander's Corner:

The RQ-7B Shadow Unmanned Aircraft System (UAS) has not completed full airworthiness qualification testing. Strict adherence to the Operators Manual, local flight regulations 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 Unmanned Aircraft System (UAS) has not completed full airworthiness qualification testing. The TAMAM POP 300D LRF/D Payload employs a Class 4 high power laser to designate targets for Hellfire missile systems. There is always inherent risk associated with lasing.

The RQ-7B system software has neither been developed nor qualified to any Software Design Assurance Level

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 manual, D-1 and 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 25 Oct, 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, Operator's Manual for Shadow 200 Tactical Unmanned Aircraft System (TUAS), dated 8 April 2011, with latest updates.
2. Technical Manual 1-1550-689-10-2, Operator's Manual for Shadow 200 Tactical Unmanned Aircraft System (TUAS), dated 8 April 2011, with latest updates.
3. Technical Manual 1-1550-689-CL, Operator's and Crewmember's Checklist for Shadow 200 Tactical Unmanned Aircraft Systems (TUAS), dated 03 May 2010, with latest updates.
4. Technical Manual 9-1550-689-23&P, Interactive Electronic Technical Manual (IETM) Field Maintenance Manual for the Shadow 200 Tactical Unmanned Aircraft Systems (TUAS), dated 03 May 2010, with latest updates.
5. System Safety Risk Assessment, Document No. RQ-7-07-NFSP-01.
6. System Safety Risk Assessment, Document No. UAS-09-NFSP-02.
7. Fort Knox Regulation 95-1, Aviation, Fort Knox Flight Rules.