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US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
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RDMR-AEV

30 Mar 11 R2

17 Apr 09 R1

AWR RQ-7B20070417R2

17 Apr 07

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-7B20070417R2) (TN 43593B)

1. Scope: This memorandum constitutes Airworthiness Release Qualification Level 3 authorizing operation of the RQ-7B Shadow Unmanned Aircraft System within active restricted airspace (R-4301) and the Federal Aviation Authority (FAA) approved Certificate of Authorization (COA) area at Ray S. Miller AAF, Camp Ripley, MN.
2. Validity: This AWR is a revision to AWR RQ-7B20070417R1 and terminates 30 Mar 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 (R-4301) and the FAA approved COA areas within at Ray S. Miller AAF, Camp Ripley, MN.
3. Appendices: This memorandum and appendix A shall be carried in the logbook, Controlling Ground Control Station (GCS) and a complete AWR copy with all appendices kept in the 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 point of contact (POC) is (b) (6) commercial (b) (6) or e-mail:
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Aviation Engineering

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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 Federal Aviation Authority (FAA) approved Certificate of Authorization (COA) shall be immediately reported to ATC/ Range Control. The operator shall make immediate actions to correct the flight path and/or follow /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.

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WARNING

The RQ-7B Shadow UAS Airborne Computing Equipment (ACE) II may experience erroneous reboots (warm boots) in flight. Multiple warm boots in flight have resulted in loss of aircraft control. The precautions in paragraph 19 of this appendix shall be observed in order to ensure safe 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 and D-2, checklist, D-3, interactive electronic technical manual, D-4, standard operating procedure (SOP), D-5, 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 in accordance with (IAW) the operator's manuals, 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. 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 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.

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7. The flight path of the aircraft shall be within a 4:1 glide ratio of a suitable ditching point.
8. Airspace de-confliction outside of the restricted airspace shall be IAW the FAA COA.
9. In case of loss of communications between the aircraft operator and local ATC authority, the aircraft shall be directed to the return home waypoint or as directed in the approved COA.
10. Flight over populated areas inside active restricted airspace shall be avoided.
11. Flight over areas populated outside of active restricted airspace 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 briefed before each flight with expected mission duration to aid in 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 RTB or trouble shooting may be performed within the active restricted airspace.
17. There shall be a minimum of one controlling GCS or portable ground control station (PGCS) and one back-up GCS or PGCS for all flight operations.
18. 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.
19. 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 II warm boot. In the event of a warm boot the operator shall initiate RTB, except as needed to meet mission requirements, and report the anomaly to maintenance personnel. In the event of multiple warm boots initiate RTB immediately.
20. Observer shall maintain uninterrupted visual contact with the RQ-7B aircraft while within the FAA COA. Additionally, the observer shall maintain continuous radio contact with both ATC and the controlling GCS while the air vehicle is within the COA. In the event that visual

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contact with the RQ-7B aircraft is interrupted, the observer shall immediately notify both ATC and the GCS, which shall initiate RTB or flight termination procedures.

21. 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.
22. 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 at all times to include potential emergency conditions.
23. The aircraft shall maintain capability to climb at a minimum of 100 feet per minute (fpm).
24. Flight with the POP 300D Laser Designator Payload is prohibited.
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 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.

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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 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:

In accordance with Department of the Army (DA) Pamphlet 738-751, the following entries shall be made on the DA Form 2408-13-1 and shall be perpetrated on each form during the period of installation, until superseded by another AWR, or until reason for limitation is removed.

a. Place a circled "X" on the form IAW DA Pamphlet 738-751. In the Fault Information Block, make the following entry: "Operate within limitations and restrictions specified in the enclosed airworthiness release dated 30 Mar 11."

b. 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 1 October 2009, with latest updates.
2. Technical Manual 1-1550-689-10-2, Operator's Manual for Shadow 200 Tactical Unmanned Aircraft System (TUAS), dated 1 October 2009, with latest updates.
3. Technical Manual 1-1550-689-CL, Operator's and Crewmember's Checklist for Shadow 200 Tactical Unmanned Aircraft System (TUAS), dated 1 October 2009, 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 System (TUAS), dated 1 October 2009, with latest updates.
5. A CO 1/34 BSTB TUAS Standard Operating Procedures, dated 01 Oct 10.