UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

SPECIAL AIRWORTHINESS CERTIFICATE

A	CATEGORY/DESIGNATION EXPERIMENTAL (UNMANNED AIRCRAFT)		
	PURPOSE Research & Development, Market Survey, Crew Trng.		
B	MANU-FACTURER	NAME N/A	
		ADDRESS N/A	
C	FLIGHT	FROM N/A	
		TO N/A	
D	N-721UA		SERIAL NO. 106
	BUILDER L-3 BAI Aerosystems		MODEL Viking 100
E	DATE OF ISSUANCE (A) April 16, 2009		EXPIRY April 15, 2010
	OPERATING LIMITATIONS DATED 4/16/09		ARE PART OF THIS CERTIFICATE
	SIGNATURE OF FAA REPRESENTATIVE Henry K. Cooper		DESIGNATION OR OFFICE NO. ANE-MIDO-44

CANCELLED APR 15 2010

Any alteration, reproduction or misuse of this certificate may be punishable by a fine not exceeding $1,000 or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE TITLE 14, CODE OF FEDERAL REGULATIONS (CFR).

FAA FORM 8130-7 (07/04) *SEE REVERSE SIDE* *NSN: 0052-00-693-4000*

A	This airworthiness certificate is issued under the authority of Public Law 104-6, 49 United States Code (USC) 44704 and Title 14 Code of Federal Regulations (CFR).
B	The airworthiness certificate authorizes the manufacturer named on the reverse side to conduct production flight tests, and only production flight tests, of aircraft registered in his name. No person may conduct production flight tests under this certificate: (1) Carrying persons or property for compensation or hire: and/or (2) Carrying persons not essential to the purpose of the flight.
C	This airworthiness certificate authorizes the flight specified on the reverse side for the purpose shown in Block A.
D	This airworthiness certificate certifies that as of the date of issuance, the aircraft to which issued has been inspected and found to meet the requirements of the applicable CFR. The aircraft does not meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention On International Civil Aviation. No person may operate the aircraft described on the reverse side: (1) except in accordance with the applicable CFR and in accordance with conditions and limitations which may be prescribed by the Administrator as part of this certificate; (2) over any foreign country without the special permission of that country.
E	Unless sooner surrendered, suspended, or revoked, this airworthiness certificate is effective for the duration and under the conditions prescribed in 14 CFR, Part 21, Section 21.181 or 21.217.

4/16/2009

New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

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Operating Limitations
Experimental: Research and Development, Market Survey, and/or Crew Training

(Amended)

Registered Owner Name: L-3 BAI Aerosystems **Registered Owner Address:** 9040 Glebe Park Drive Easton, MD 21601 **Aircraft Description:** Viking 100 Unmanned Aerial System **Aircraft Registration:** N721UA	**Aircraft Builder:** L-3 BAI Aerosystems **Year Manufactured:** 2008 **Aircraft Serial Number:** #106 **Aircraft Model Designation:** Viking 100 UAS **Engine Model:** 3W Modellmotoren 3W157iBTF-TS

The following conditions and limitations apply to all unmanned aircraft system (UAS) flight operations for the Viking 100 UAS while operating in the National Airspace System (NAS).

1. General Information.

a. Integrated system. For the purposes of this special airworthiness certificate and operating limitations, the Viking 100 UAS operated by L-3 BAI Aerosystems is considered to be an integrated system. The system is composed of the following:

(1) Viking 100 UA, serial number 106.

(2) UAS control station(s), that is, fixed, mobile, or ground-based.

(3) Telemetry, launch, and recovery equipment.

(4) Communications and navigation equipment, including ground and/or air equipment used for command and control of the Viking 100.

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(5) Equipment on the ground and in the air used for communication with other members of the flight crew, observers, air traffic control (ATC), and other users of the NAS.

b. Compliance with 14 CFR part 61 (Certification: Pilots, Flight Instructors, and Ground Instructors) and part 91 (General Operating and Flight Rules). Unless otherwise specified in this document, the UA pilot-in-command (PIC) and L-3 BAI Aerosystems must comply with all applicable sections and parts of 14 CFR including, but not limited to, parts 61 and 91.

c. Operational requirements.

(1) No person may operate this UAS for other than the purpose of research and development, market survey, and/or crew training, to accomplish the flight operation outlined in L-3 BAI Aerosystems program letter dated 04/06/2009, which describes compliance with § 21.193(d), Experimental certificates: General, and has been made available to the UA PIC.

(2) This UAS must be operated in accordance with applicable air traffic and general operating rules of part 91 and all additional limitations herein prescribed under the provisions of § 91.319(i), Aircraft having experimental certificates: Operating limitations.

(3) L-3 BAI Aerosystems must accumulate at least 50 flight hours under its experimental airworthiness certificate before customer crew training is permitted, in accordance with § 21.195(d), Experimental certificates: Aircraft to be used for market surveys, sales demonstrations, and customer crew training.

d. UA condition. The UA PIC must determine that the UA is in a condition for safe operation, and in a configuration appropriate for the purpose of the intended flight.

e. Multiple-purpose operations. When changing between operating purposes of a multiple purpose certificate, the operator must determine that the aircraft is in a condition for safe operation and appropriate for the purpose intended. A record entry will be made by an appropriately rated person (that is, an individual authorized by the applicant and acceptable to the FAA) to document that finding in the maintenance records.

f. Operation exceptions. No person may operate this UA to carry property for compensation or hire (§ 91.319(a)(2)).

g. UA markings.

(1) This UA must be marked with its U.S. registration number in accordance with part 45 or alternative marking approval issued by the FAA Production and Airworthiness Division (AIR-200).

(2) This UA must display the word *Experimental* in accordance with § 45.23(b), Display of marks, unless otherwise granted an exemption from this requirement.

h. Required documentation. Prior to conducting the Viking 100 initial flight operations, L-3 BAI Aerosystems must forward a scanned copy of the Viking 100 Program Letter, Special Airworthiness Certificate, and Operating Limitations to the following persons:

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(1) Peter Acevedo, FAA Air Traffic Representative, Eastern Service Center, System Support, 1701 Columbia Ave, College Park, GA 30337, telephone (404) 305-5598, email peter.k.acevedo@faa.gov.

(2) Richard Posey, Aviation Safety Inspector, Production and Airworthiness Division, AIR-200, 800 Independence Ave, SW, Washington, DC 20591, telephone (202) 385-6378, email, richard.posey@faa.gov.

i. Change in registrant address. Section 47.45, Change of address, requires that the FAA Aircraft Registry be notified within 30 days of any change in the aircraft registrant's address. Such notification is to be made by providing AC Form 8050-1, Aircraft Registration Application, to the FAA Aircraft Registration Branch (AFS-750) in Oklahoma City, Oklahoma.

j. Certificate display and manual availability. The airworthiness and registration certificates must be displayed, and the aircraft flight manual must be available to the pilot, as prescribed by the applicable sections of 14 CFR, or as prescribed by an exemption granted in accordance with 14 CFR part 11, General Rulemaking Procedures, to L-3 BAI Aerosystems.

2. Program Letter. The L-3 BAI Aerosystems Viking 100 Program Letter, dated 04/06/2009, will be used as a basis for determining the operating limitations prescribed in this document. All flight operations must be conducted in accordance with the provisions of this document.

3. Initial Flight Testing.

a. Requirements. Flight operations must be conducted within visual line of sight of the pilot/observer. Initial flight testing is completed upon accumulation of 25 flight hours. Following satisfactory completion of initial flight testing, the operations manager or chief pilot must certify in the records that the aircraft has been shown to comply with § 91.319(b). Compliance with § 91.319(b) must be recorded in the aircraft records with the following, or a similarly worded, statement:

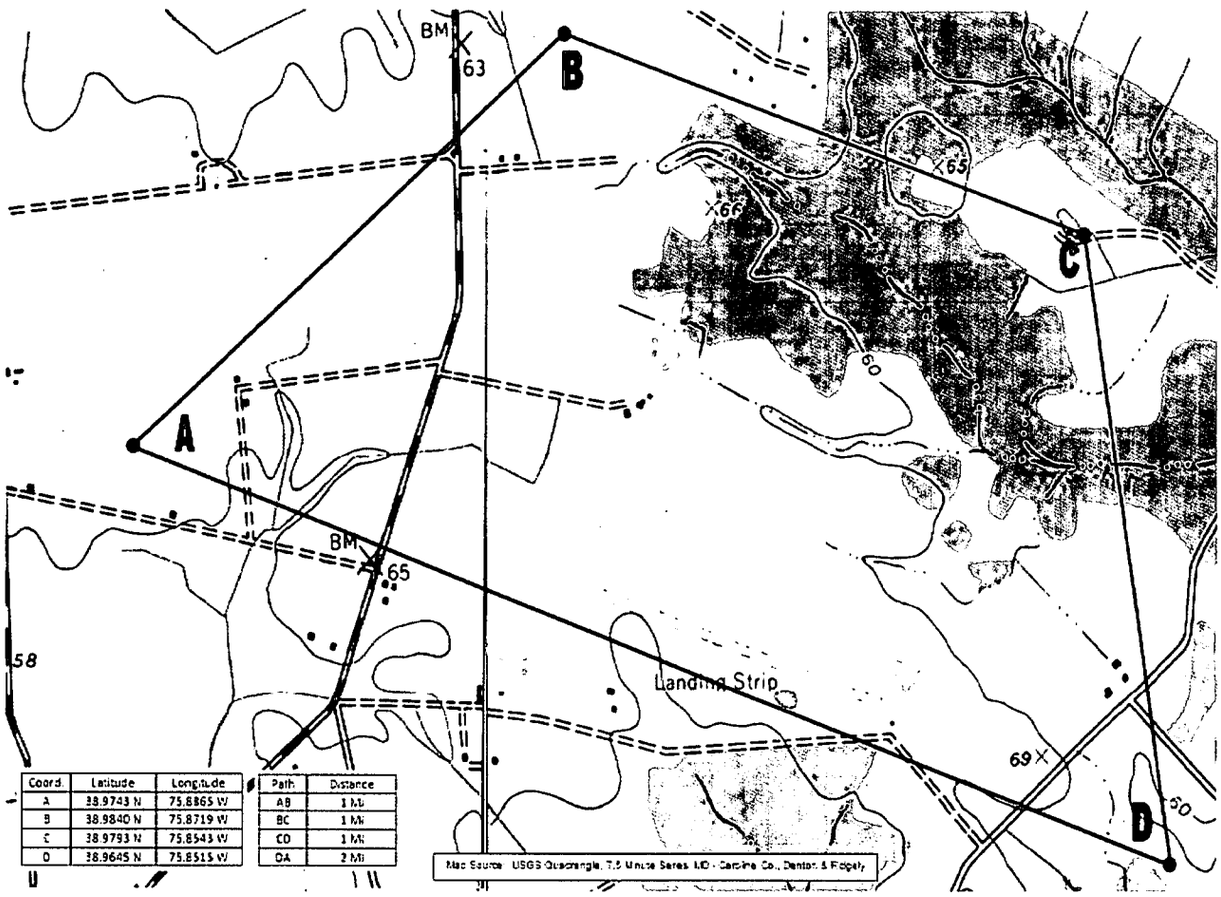
> *I certify that the prescribed flight test hours have been completed and the aircraft is controllable throughout its normal range of speeds and throughout all maneuvers to be executed, has no hazardous operating characteristics or design features, and is safe for operation. The following aircraft operating data has been demonstrated during the flight testing: speeds Vx _____, and Vy _____, and the weight _____ and CG location _____ at which they were obtained.*

b. Aircraft operations for the purpose of market surveys, sales demonstrations, and customer crew training. These operations cannot be performed until 50 flight hours have been accomplished. An entry in the maintenance records is required as evidence of compliance.

4. Authorized Flight Operations Area.

a. Description of the authorized flight operations area. The requested area of operations is Ridgley Airpark (KRJD) near Ridgley, MD.

b. Flight test area. The flight operations area authorized for the UA will be referred to as the flight test area, and is depicted graphically below. **All flights are limited to an altitude of 1000 ft AGL.**



Coord.	Latitude	Longitude
A	38.9743 N	75.8865 W
B	38.9840 N	75.8719 W
C	38.9793 N	75.8543 W
D	38.9645 N	75.8515 W

Path	Distance
AB	1 Mi
BC	1 Mi
CD	1 Mi
DA	2 Mi

c. Authorized flight times and conditions. All flight operations must be conducted during daylight hours under visual flight rules (VFR), Monday through Friday, with at least 3 miles of visibility and a 3000 ft ceiling.

d. Criteria for remaining in the flight test area. The UAS PIC must ensure all UA flight operations remain within the lateral and vertical boundaries of the flight test area. Furthermore, the UAS PIC must take into account all factors that may affect the capability of the UA to remain within the flight test area. This includes, but is not limited to, considerations for wind, gross weight, and glide distances.

e. Incident/accident reporting. Any incident/accident and any flight operation that transgresses the lateral or vertical boundaries of the flight test area or any restricted airspace must be reported to the FAA within 24 hours. This information must be reported to the Unmanned Aircraft Program Office, AIR-160. AIR-160 can be reached by telephone

at 202-385-4636 and fax at 202-385-4651. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov. Further flight operations must not be conducted until the incident is reviewed by AIR-160 and authorization to resume operations is provided to L-3 BAI Aerosystems.

5. UA Pilots and Observers.

a. UA PIC roles and responsibilities.

(1) The UA PIC must perform crew duties for only one UA at a time.

(2) All flight operations must have a designated UA PIC. The UA PIC has responsibility over each flight conducted and is accountable for the UA flight operation.

(3) The UA PIC is responsible for the safety of the UA as well as persons and property along the UA flight path. This includes, but is not limited to, collision avoidance and the safety of persons and property in the air and on the ground.

(4) The UA PIC must avoid densely populated areas (§ 91.319) and exercise increased vigilance when operating within or in the vicinity of published airway boundaries.

b. UA PIC certification and ratings requirements.

(1) The UA PIC must hold and be in possession of, at a minimum, an FAA private pilot certificate, with either an airplane, rotorcraft, or powered-lift category; and single- or multiengine class ratings, or the military equivalent, appropriate to the type of UA being operated.

(2) The UA PIC must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

c. UA PIC currency, flight review, and training.

(1) No person may act as pilot in command of an unmanned aircraft unless that person has made at least three takeoffs and three landings in manned aircraft within the preceding 90 days acting as the sole manipulator of the flight controls.

(2) The UA PIC must have a flight review in manned aircraft every 24 calendar months in accordance with § 61.56, Flight review.

(3) The UA PIC must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(4) The UA PIC must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(5) All UA PICs must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

d. Supplemental UA pilot roles and responsibilities.

(1) Any additional UA pilot(s) assigned to a crew station during UA flight operations will be considered a supplemental UA pilot.

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(2) A supplemental UA pilot assists the PIC in the operation of the UA and may do so at the same or a different control station as the PIC. The UA PIC will have operational override capability over any supplemental UA pilots, regardless of position.

(3) A supplemental UA pilot must perform crew duties for only one UA at a time.

e. Supplemental UA pilot certification and ratings requirements.

(1) The supplemental UA pilot need not be a certificated pilot, but must have successfully completed a recognized private pilot ground school program.

(2) The supplemental UA pilot must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

f. Supplemental UA pilot currency, flight review, and training.

(1) All supplemental UA pilots must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(2) All supplemental UA pilots must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(3) All supplemental UA pilots must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

g. Observer roles and responsibilities. The task of the observer is to provide the UA PIC(s) with instructions to maneuver the UA clear of any potential collision with other traffic. To satisfy these requirements:

(1) The observer must perform crew duties for only one UA at a time.

(2) At no time will the observer permit the UA to operate beyond the line-of-sight necessary to ensure maneuvering information can be reliably determined.

(3) At no time will the observer conduct his/her duties more than **1 mile laterally or 1000 ft. vertically** from the UA.

(4) An observer must maintain continuous visual contact with the UA to discern UA attitude and trajectory in relation to conflicting traffic.

(5) Observers must continually scan the airspace for other aircraft that pose a potential conflict.

(6) All flight operations conducted in the flight test area must have an observer to perform traffic avoidance and visual observation to fulfill the see-and-avoid requirement of § 91.113, Right-of-way rules: Except water operations.

h. Observer certification.

(1) All observers must either hold, at a minimum, an FAA private pilot license or military equivalent, or must have successfully completed specific observer training acceptable to the FAA. An observer does not require currency as a pilot.

(2) All observers must have in their possession a valid second-class (or higher) airman medical certificate issued under part 67.

i. Observer training.

(1) All observers must be thoroughly trained, be familiar with, and possess operational experience with the equipment being used. Such training is necessary for observation and detection of other aircraft for collision avoidance purposes as outlined in L-3 BAI Aerosystems program letter.

(2) All observers must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

6. Equipage.

a. The UAS must be equipped with an operable Mode C transponder, and two-way communications equipment allowing communications between the UA pilot, observers, all UAS control stations, and ATC.

b. The UA must be equipped with operable navigation, position, and/or strobe/anti-collision lights. Strobe/anti-collision lights must be illuminated during all operations.

7. Communications.

a. Before UA flights.

(1) Before conducting operations, the frequency spectrum used for operation and control of the UA must be approved by the Federal Communications Commission or other appropriate government oversight agency.

(2) L-3 BAI Aerosystems shall contact the Maryland State Police, Trooper 6 Heliport, and notify them of planned UAS flight operations.

b. During UA flights.

(1) Ridgley Airpark frequency must be monitored during flight operations.

(2) All UA flight crew positions must maintain two-way communications with each other during all operations. If unable to maintain two-way communication, the UA PIC will expeditiously return the UA to its base of operations and conclude the flight operation.

8. Flight Conditions.

a. Daylight operations. All flight operations must be conducted during daylight hours in visual meteorological conditions (VMC).

b. Prohibitions.

(1) The UA is prohibited from aerobatic flight, that is, an intentional maneuver involving an abrupt change in the UA's attitude, an abnormal acceleration, or other flight action not necessary for normal flight.

(2) Flight operations must not involve carrying hazardous material or the dropping of any objects or external stores.

(3) Each UA must be operated by only one control station at a time. A control station may not be used to operate multiple UAs.

c. Fuel quantity. Fuel quantity shall be limited to 2.5 U.S. gallons per flight.

d. Transponder requirements. The UA must operate an approved operational Mode C altitude encoding transponder during all flight operations.

e. Transponder failure. In the event of transponder failure, the UA must conclude all flight operations and expeditiously return to its base of operations.

f. Notice to airman. L-3 BAI Aerosystems must request the issuance of a Notice to Airman (NOTAM) through the local Automated Flight Service Station at least 24 hours before flight operation.

9. Flight Termination and Lost Link Procedures.

a. Flight termination. In accordance with L-3 BAI Aerosystems program letter, dated 04/06/2009, flight termination must be initiated at any point that safe operation of the UA cannot be maintained or if hazard to persons or property is imminent.

b. Lost link procedures. In the event of lost link, the UA must provide a means of automatic recovery that ensures airborne operations are predictable and that the UA remains within the flight test area. The observer, all other UAS controls stations, and the appropriate ATC facility will be immediately notified of the lost link condition and the expected UA response.

10. Maintenance and Inspection.

a. General requirements. The UAS must not be operated unless it is inspected and maintained in accordance with the L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009 or later accepted FAA revision. L-3 BAI Aerosystems must establish and maintain aircraft maintenance records (see paragraph 10(d) below).

b. Inspections. No person may operate this UAS unless it has had a condition inspection within the preceding 12 calendar months performed according to the FAA-accepted L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. The UAS must also have been found to be in a condition for safe operation. This inspection will be recorded in the UAS maintenance records as described in paragraph 10(d) below.

c. Authorized inspectors. Only those individuals trained and authorized by L-3 BAI Aerosystems and acceptable to the FAA may perform the inspections and maintenance required by these operating limitations.

d. Maintenance and inspection records. Maintenance and inspections of the UAS must be recorded in the UAS maintenance records. The following information must be recorded:

(1) Maintenance record entries must include a description of the work performed, the date of completion for the work, and the name and signature of the person performing the work.

(2) Inspection entries must contain the following, or a similarly worded, statement: *I certify that this UAS was inspected on (date), in accordance with the scope and detail of the (applicant name) Inspection and Maintenance Program, and was found to be in a condition for safe operation.*

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(3) UAS instruments and equipment required to be installed must be inspected and maintained in accordance with the requirements of L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. Any maintenance or inspection of this equipment must be recorded in the UAS maintenance records.

(4) No person may operate this UAS unless the altimeter system and transponder have been tested within the preceding 24 calendar months in accordance with § 91.413, ATC transponder tests and inspections. These inspections will be recorded in the UAS maintenance records.

11. Information Reporting. L-3 BAI Aerosystems shall provide the following information to Donald.E.Grampp@faa.gov and AIR-200 on a monthly basis:

a. Number of flights conducted under this certificate.

b. Pilot duty time per flight.

c. Unusual equipment malfunctions (hardware or software).

d. Deviations from ATC instructions.

e. Unintended entry into lost link flight mode that results in a course change.

12. Revisions and Other Provisions.

a. Experimental certificates, program letters, and operating limitations. The experimental certificate, FAA-accepted L-3 BAI Aerosystems program letter, and operating limitations cannot be reissued, renewed, or revised without application being made to the New Cumberland Manufacturing Inspection District Office (MIDO), in coordination with AIR-200. AIR-200 will be responsible for FAA Headquarters internal coordination with the Aircraft Certification Service, Flight Standards Service, Air Traffic Organization, Office of the Chief Council, and Office of Rulemaking.

b. Certificates of waiver or authorization. L-3 BAI Aerosystems shall immediately notify the Production and Airworthiness Division, AIR-200, and the New Cumberland MIDO, if there is any plan for requesting a Certificate of Authorization or Waiver (COA) for UAS operations during the time the experimental certificate is in effect. An entry in the aircraft logbook is required to document that the aircraft flight authority has been changed from the experimental certificate to COA. When COA operations are concluded and the aircraft resumes flying under the experimental certificate, a record entry will be made in the aircraft logbook by an appropriately rated person to document that the aircraft is in a condition for safe operation and appropriately configured.

c. Amendments and cancellations. The provisions and limitations annotated in this operational approval may be amended or cancelled at any time as deemed necessary by the FAA.

d. Reviews of revisions. All revisions to L-3 BAI Aerosystems, FAA-accepted, inspection and maintenance program must be reviewed and accepted by the Baltimore Flight Standards District Office (FSDO).

13. UAS Modifications.

a. Software and system changes. All software and system changes will be documented as part of the normal maintenance procedures and will be available for inspection. All software and system changes must be inspected and approved per L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. All software changes to the aircraft and control station are categorized as major changes, and must be provided in summary form at the time they are incorporated.

b. Major modifications. All major modifications, whether performed under the experimental certificate, COA, or other authorizations, that could potentially affect the safe operation of the system, must be documented and provided to the FAA before operating the aircraft under this certificate. Major modifications incorporated under COA or other authorization need to be provided only if the aircraft is flown under these authorizations during the effective period of the experimental certificate.

c. Submission of modifications. All information requested must be provided to AIR-200.

End of Limitations

APR 16 2009
(Amended) Date:

Henry K. Cooper
Aviation Safety Inspector
New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

I certify that I have read and understand the operating limitations and conditions that are a part of the special airworthiness certificate, FAA Form 8130-7, issued on 04/16/2009, for the purposes of [research and development, market survey, and/or crew training.

This special airworthiness certificate is issued for L-3 BAI Aerosystems Viking 100 UAS, serial number 106, registration number N721UA.

APR 16 2009
Applicant (signature) Date:

Name: Mark Ensor

Title: Vice President and General Manager

Company: L-3 BAI Aerosystems

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FAA FORM 8130-6, APPLICATION FOR U.S. AIRWORTHINESS CERTIFICATE

Form Approved
O.M.B. No. 2120-0018
Exp. date: 12/31/2010

U.S. Department of Transportation
Federal Aviation Administration

APPLICATION FOR U.S. AIRWORTHINESS CERTIFICATE

INSTRUCTIONS - Print or type. Do not write in shaded areas; these are for FAA use only. Submit original only to an authorized FAA Representative. If additional space is required, use attachment. For special flight permits complete Sections II, VI and VII as applicable.

I. AIRCRAFT DESIGNATION

1. REGISTRATION MARK	2. AIRCRAFT BUILDER'S NAME (Make)	3. AIRCRAFT MODEL DESIGNATION	4. YR. MFR.	FAA CODING
N721UA	L-3 BAI AEROSYSTEMS	VIKING 100	2008	
5. AIRCRAFT SERIAL NO.	**6. ENGINE BUILDER'S NAME (Make)**	**7. ENGINE MODEL DESIGNATION**		
106	3W	157iBTF-TS		
8. NUMBER OF ENGINES	**9. PROPELLER BUILDER'S NAME (Make)**	**10. PROPELLER MODEL DESIGNATION**	**11. AIRCRAFT IS (Check if applicable)**	
ONE	BOLLY	30X10 WOODEN	IMPORT	

II. CERTIFICATION REQUESTED

APPLICATION IS HEREBY MADE FOR: (Check applicable item s)

- [ ] A 1 — STANDARD AIRWORTHINESS CERTIFICATE (Indicate Category) — NORMAL | UTILITY | ACROBATIC | TRANSPORT | COMMUTER | BALLOON | OTHER
- [x] B — SPECIAL AIRWORTHINESS CERTIFICATE (Check appropriate item s) — UNMANNED AERIAL VEHICLE
  - [ ] 7 — PRIMARY
  - [ ] 9 — LIGHT-SPORT (Indicate Class) — AIRPLANE | POWER-PARACHUTE | WEIGHT-SHIFT-CONTROL | GLIDER | LIGHTER THAN AIR
  - [ ] 2 — LIMITED
  - [ ] 5 — PROVISIONAL (Indicate Class) — 1 CLASS I; 2 CLASS II
  - [ ] 3 — RESTRICTED (Indicate operation(s) to be conducted) — 1 AGRICULTURE AND PEST CONTROL; 2 AERIAL SURVEY; 3 AERIAL ADVERTISING; 4 FOREST (Wildlife Conservation); 5 PATROLLING; 6 WEATHER CONTROL; 0 OTHER (Specify)
  - [x] 4 — EXPERIMENTAL (Indicate operation(s) to be conducted) — 1 [x] RESEARCH AND DEVELOPMENT; 2 AMATEUR BUILT; 3 EXHIBITION; 4 AIR RACING; 5 [x] CREW TRAINING; 6 [x] MARKET SURVEY; 0 TO SHOW COMPLIANCE WITH THE CFR; 7 OPERATING (Primary Category) KIT BUILT AIRCRAFT
  - [ ] 8 — OPERATING LIGHT-SPORT — 8A Existing Aircraft without an airworthiness certificate & do not meet § 103.1; 8B Operating Light-Sport Kit-Built; 8C Operating light-sport previously issued special light-sport category airworthiness certificate under § 21.190
  - [ ] 8 — SPECIAL FLIGHT PERMIT (Indicate operation(s) to be conducted, then complete Section VI or VII as applicable on reverse side) — 1 FERRY FLIGHT FOR REPAIRS, ALTERATIONS, MAINTENANCE, OR STORAGE; 2 EVACUATION FROM AREA OF IMPENDING DANGER; 3 OPERATION IN EXCESS OF MAXIMUM CERTIFICATED TAKE-OFF WEIGHT; 4 DELIVERING OR EXPORTING; 5 PRODUCTION FLIGHT TESTING; 6 CUSTOMER DEMONSTRATION FLIGHTS
- [ ] C 6 — MULTIPLE AIRWORTHINESS CERTIFICATE (check ABOVE "Restricted Operation" and "Standard" or "Limited," as applicable)

III. OWNER'S CERTIFICATION

A. REGISTERED OWNER (As shown on certificate of aircraft registration) — IF DEALER, CHECK HERE →

NAME	ADDRESS
L-3 BAI AEROSYSTEMS	9040 Glebe Park Drive, Easton, MD 21601

B. AIRCRAFT CERTIFICATION BASIS (Check applicable blocks and complete items as indicated)

AIRCRAFT SPECIFICATION OR TYPE CERTIFICATE DATA SHEET (Give No. and Revision No.)	AIRWORTHINESS DIRECTIVES (Check if all applicable ADs are complied with and give the number of the last AD SUPPLEMENT available in the biweekly series as of the date of application)
N/A	BI-WEEKLY 2009-08
AIRCRAFT LISTING (Give page number(s))	**SUPPLEMENTAL TYPE CERTIFICATE (List number of each STC incorporated)**
N/A	N/A

C. AIRCRAFT OPERATION AND MAINTENANCE RECORDS

CHECK IF RECORDS IN COMPLIANCE WITH 14 CFR Section 91.417	TOTAL AIRFRAME HOURS	3 EXPERIMENTAL ONLY (Enter hours flown since last certificate issued or renewed)
✓	20.3	0

D. CERTIFICATION - I hereby certify that I am the registered owner (or his agent) of the aircraft described above, that the aircraft is registered with the Federal Aviation Administration in accordance with Title 49 of the United States Code 44101 et seq. and applicable Federal Aviation Regulations, and that the aircraft has been inspected and is airworthy and eligible for the airworthiness certificate requested.

DATE OF APPLICATION	NAME AND TITLE (Print or type)	SIGNATURE
4/16/09	ADAM GRANT, MANAGER	

IV. INSPECTION AGENCY VERIFICATION

A. THE AIRCRAFT DESCRIBED ABOVE HAS BEEN INSPECTED AND FOUND AIRWORTHY BY: (Complete the section only if 14 CFR part 21.183(d) applies.

- [ ] 2 — 14 CFR part 121 CERTIFICATE HOLDER (Give Certificate No.)
- [ ] 3 — CERTIFICATED MECHANIC (Give Certificate No.)
- [ ] 6 — CERTIFICATED REPAIR STATION (Give Certificate No.)
- [ ] 5 — AIRCRAFT MANUFACTURER (Give name or firm)

DATE	TITLE	SIGNATURE

V. FAA REPRESENTATIVE CERTIFICATION

(Check ALL applicable block items A and B)

A. I find that the aircraft described in Section I or VII meets requirements for — 4 [x] THE CERTIFICATE REQUESTED / AMENDMENT OR MODIFICATION OF CURRENT AIRWORTHINESS CERTIFICATE

B. Inspection for a special permit under Section VII was conducted by: — FAA INSPECTOR / CERTIFICATE HOLDER UNDER — FAA DESIGNEE — 14 CFR part 65 | 14 CFR part 121 OR 135 | 14 CFR part 145

DATE	DISTRICT OFFICE	4 DESIGNEE'S SIGNATURE AND NO.	1 FAA INSPECTOR'S SIGNATURE
4/16/09	ANE MIDO-44		HENRY L. CARTER

Accepted MG Jun/08/2009

VI. PRODUCTION FLIGHT TESTING

A. MANUFACTURER

NAME	ADDRESS

B. PRODUCTION BASIS *(Check applicable item.)*

- ☐ PRODUCTION CERTIFICATE *(Give production certificate number)* ⟶
- ☐ TYPE CERTIFICATE ONLY
- ☐ APPROVED PRODUCTION INSPECTION SYSTEM

C. GIVE QUANTITY OF CERTIFICATES REQUIRED FOR OPERATING NEEDS

DATE OF APPLICATION	NAME AND TITLE *(Print or Type)*	SIGNATURE

VII. SPECIAL FLIGHT PERMIT PURPOSES OTHER THAN PRODUCTION FLIGHT TEST

A. DESCRIPTION OF AIRCRAFT

REGISTERED OWNER	ADDRESS
BUILDER *(Make)*	MODEL
SERIAL NUMBER	REGISTRATION MARK

B. DESCRIPTION OF FLIGHT — CUSTOMER DEMONSTRATION FLIGHTS ☐ *(Check if applicable)*

FROM	TO	
VIA	DEPARTURE DATE	DURATION

C. CREW REQUIRED TO OPERATE THE AIRCRAFT AND ITS EQUIPMENT

☐ PILOT ☐ CO-PILOT ☐ FLIGHT ENGINEER ☐ OTHER *(Specify)*

D. THE AIRCRAFT DOES NOT MEET THE APPLICABLE AIRWORTHINESS REQUIREMENTS AS FOLLOWS:

E. THE FOLLOWING RESTRICTIONS ARE CONSIDERED NECESSARY FOR SAFE OPERATION: *(Use attachment if necessary)*

F. CERTIFICATION – I hereby certify that I am the registered owner (or his agent) of the aircraft described above; that the aircraft is registered with the Federal Aviation Administration in accordance with Title 49 of the United States Code 44101 et seq. and applicable Federal Aviation Regulations; and that the aircraft has been inspected and is safe for the flight described.

DATE	NAME AND TITLE *(Print or Type)*	SIGNATURE

VIII. AIRWORTHINESS DOCUMENTATION (FAA/DESIGNEE use only)

X	A. Operating Limitations and Markings in Compliance with 14 CFR Section 91.9, as applicable.		G. Statement of Conformity, FAA Form 8130-9 *(Attach when required)*
X	B. Current Operating Limitations Attached		H. Foreign Airworthiness Certification for Import Aircraft *(Attach when required)*
X	C. Data, Drawings, Photographs, etc. *(Attach when required)*	X	I. Previous Airworthiness Certificate Issued in Accordance with 14 CFR Section 21.191a,c,f CAR _____ (Original Attached)
X	D. Current Weight and Balance information Available in Aircraft		
	E. Major Repair and Alteration, FAA Form 337 *(Attach when required)*	X	J. Current Airworthiness Certificate Issued in Accordance with 14 CFR Section 21.191a,c,f (Copy Attached)
X	F. This inspection Recorded in Aircraft Records		K. Light-Sport Aircraft Statement of Compliance, FAA Form 8130-15 *(Attach when required)*

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

SPECIAL AIRWORTHINESS CERTIFICATE

A	CATEGORY/DESIGNATION	EXPERIMENTAL (UNMANNED AIRCRAFT)	
	PURPOSE	Research & Development, Market Survey, Crew Tng.	
B	MANU-FACTURER	NAME	N/A
		ADDRESS	N/A
C	FLIGHT	FROM	N/A
		TO	N/A
D	N-721UA		SERIAL NO. 106
	BUILDER L-3 BAI Aerosystems		MODEL Viking 100
E	DATE OF ISSUANCE (A) April 16, 2009		EXPIRY April 15, 2010
	OPERATING LIMITATIONS DATED 4/16/09		ARE PART OF THIS CERTIFICATE
	SIGNATURE OF FAA REPRESENTATIVE Henry K. Cooper		DESIGNATION OR OFFICE NO. ANE-MIDO-44

COPY

Any alteration, reproduction or misuse of this certificate may be punishable by a fine not exceeding $1,000 or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE TITLE 14, CODE OF FEDERAL REGULATIONS (CFR).

FAA FORM 8130-7 (07/04) *SEE REVERSE SIDE* *NSN: 0052-00-693-4000*

A	This airworthiness certificate is issued under the authority of Public Law 104-6, 49 United States Code (USC) 44704 and Title 14 Code of Federal Regulations (CFR).
B	The airworthiness certificate authorizes the manufacturer named on the reverse side to conduct production flight tests, and only production flight tests, of aircraft registered in his name. No person may conduct production flight tests under this certificate: (1) Carrying persons or property for compensation or hire: and/or (2) Carrying persons not essential to the purpose of the flight.
C	This airworthiness certificate authorizes the flight specified on the reverse side for the purpose shown in Block A.
D	This airworthiness certificate certifies that as of the date of issuance, the aircraft to which issued has been inspected and found to meet the requirements of the applicable CFR. The aircraft does not meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention On International Civil Aviation. No person may operate the aircraft described on the reverse side: (1) except in accordance with the applicable CFR and in accordance with conditions and limitations which may be prescribed by the Administrator as part of this certificate; (2) over any foreign country without the special permission of that country.
E	Unless sooner surrendered, suspended, or revoked, this airworthiness certificate is effective for the duration and under the conditions prescribed in 14 CFR, Part 21, Section 21.181 or 21.217.

4/16/2009

New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

Operating Limitations
Experimental: Research and Development, Market Survey, and/or Crew Training

(Amended)

COPY

Registered Owner Name: L-3 BAI Aerosystems **Registered Owner Address:** 9040 Glebe Park Drive Easton, MD 21601 **Aircraft Description:** Viking 100 Unmanned Aerial System **Aircraft Registration:** N721UA	**Aircraft Builder:** L-3 BAI Aerosystems **Year Manufactured:** 2008 **Aircraft Serial Number:** #106 **Aircraft Model Designation:** Viking 100 UAS **Engine Model:** 3W Modellmotoren 3W157iBTF-TS

The following conditions and limitations apply to all unmanned aircraft system (UAS) flight operations for the Viking 100 UAS while operating in the National Airspace System (NAS).

1. General Information.

a. Integrated system. For the purposes of this special airworthiness certificate and operating limitations, the Viking 100 UAS operated by L-3 BAI Aerosystems is considered to be an integrated system. The system is composed of the following:

(1) Viking 100 UA, serial number 106.

(2) UAS control station(s), that is, fixed, mobile, or ground-based.

(3) Telemetry, launch, and recovery equipment.

(4) Communications and navigation equipment, including ground and/or air equipment used for command and control of the Viking 100.

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(5) Equipment on the ground and in the air used for communication with other members of the flight crew, observers, air traffic control (ATC), and other users of the NAS.

b. Compliance with 14 CFR part 61 (Certification: Pilots, Flight Instructors, and Ground Instructors) and part 91 (General Operating and Flight Rules). Unless otherwise specified in this document, the UA pilot-in-command (PIC) and L-3 BAI Aerosystems must comply with all applicable sections and parts of 14 CFR including, but not limited to, parts 61 and 91.

COPY

c. Operational requirements.

(1) No person may operate this UAS for other than the purpose of research and development, market survey, and/or crew training, to accomplish the flight operation outlined in L-3 BAI Aerosystems program letter dated 04/06/2009, which describes compliance with § 21.193(d), Experimental certificates: General, and has been made available to the UA PIC.

(2) This UAS must be operated in accordance with applicable air traffic and general operating rules of part 91 and all additional limitations herein prescribed under the provisions of § 91.319(i), Aircraft having experimental certificates: Operating limitations.

(3) L-3 BAI Aerosystems must accumulate at least 50 flight hours under its experimental airworthiness certificate before customer crew training is permitted, in accordance with § 21.195(d), Experimental certificates: Aircraft to be used for market surveys, sales demonstrations, and customer crew training.

d. UA condition. The UA PIC must determine that the UA is in a condition for safe operation, and in a configuration appropriate for the purpose of the intended flight.

e. Multiple-purpose operations. When changing between operating purposes of a multiple purpose certificate, the operator must determine that the aircraft is in a condition for safe operation and appropriate for the purpose intended. A record entry will be made by an appropriately rated person (that is, an individual authorized by the applicant and acceptable to the FAA) to document that finding in the maintenance records.

f. Operation exceptions. No person may operate this UA to carry property for compensation or hire (§ 91.319(a)(2)).

g. UA markings.

(1) This UA must be marked with its U.S. registration number in accordance with part 45 or alternative marking approval issued by the FAA Production and Airworthiness Division (AIR-200).

(2) This UA must display the word *Experimental* in accordance with § 45.23(b), Display of marks, unless otherwise granted an exemption from this requirement.

h. Required documentation. Prior to conducting the Viking 100 initial flight operations, L-3 BAI Aerosystems must forward a scanned copy of the Viking 100 Program Letter, Special Airworthiness Certificate, and Operating Limitations to the following persons:

(1) Peter Acevedo, FAA Air Traffic Representative, Eastern Service Center, System Support, 1701 Columbia Ave, College Park, GA 30337, telephone (404) 305-5598, email peter.k.acevedo@faa.gov.

(2) Richard Posey, Aviation Safety Inspector, Production and Airworthiness Division, AIR-200, 800 Independence Ave, SW, Washington, DC 20591, telephone (202) 385-6378, email, richard.posey@faa.gov.

i. Change in registrant address. Section 47.45, Change of address, requires that the FAA Aircraft Registry be notified within 30 days of any change in the aircraft registrant's address. Such notification is to be made by providing AC Form 8050-1, Aircraft Registration Application, to the FAA Aircraft Registration Branch (AFS-750) in Oklahoma City, Oklahoma.

j. Certificate display and manual availability. The airworthiness and registration certificates must be displayed, and the aircraft flight manual must be available to the pilot, as prescribed by the applicable sections of 14 CFR, or as prescribed by an exemption granted in accordance with 14 CFR part 11, General Rulemaking Procedures, to L-3 BAI Aerosystems.

2. Program Letter. The L-3 BAI Aerosystems Viking 100 Program Letter, dated 04/06/2009, will be used as a basis for determining the operating limitations prescribed in this document. All flight operations must be conducted in accordance with the provisions of this document.

3. Initial Flight Testing.

a. Requirements. Flight operations must be conducted within visual line of sight of the pilot/observer. Initial flight testing is completed upon accumulation of 25 flight hours. Following satisfactory completion of initial flight testing, the operations manager or chief pilot must certify in the records that the aircraft has been shown to comply with § 91.319(b). Compliance with § 91.319(b) must be recorded in the aircraft records with the following, or a similarly worded, statement:

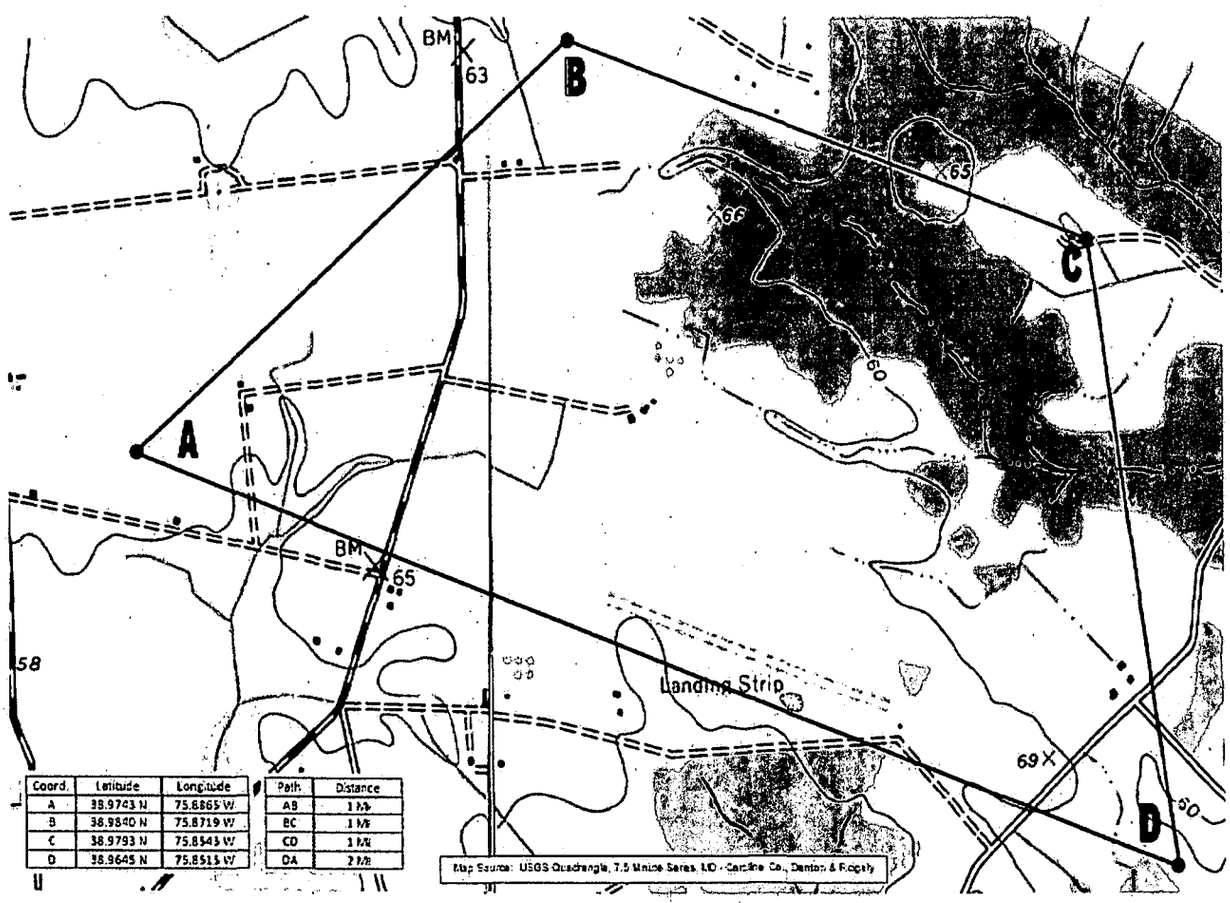
> *I certify that the prescribed flight test hours have been completed and the aircraft is controllable throughout its normal range of speeds and throughout all maneuvers to be executed, has no hazardous operating characteristics or design features, and is safe for operation. The following aircraft operating data has been demonstrated during the flight testing: speeds Vx _____, and Vy _____, and the weight _____ and CG location _____ at which they were obtained.*

b. Aircraft operations for the purpose of market surveys, sales demonstrations, and customer crew training. These operations cannot be performed until 50 flight hours have been accomplished. An entry in the maintenance records is required as evidence of compliance.

4. Authorized Flight Operations Area.

a. Description of the authorized flight operations area. The requested area of operations is Ridgley Airpark (KRJD) near Ridgley, MD.

b. Flight test area. The flight operations area authorized for the UA will be referred to as the flight test area, and is depicted graphically below. **All flights are limited to an altitude of 1000 ft AGL.**



Coord.	Latitude	Longitude
A	38.9743 N	75.8865 W
B	38.9840 N	75.8719 W
C	38.9793 N	75.8543 W
D	38.9645 N	75.8513 W

Path	Distance
AB	1 Mi
BC	1 Mi
CD	1 Mi
DA	2 Mi

c. Authorized flight times and conditions. All flight operations must be conducted during daylight hours under visual flight rules (VFR), Monday through Friday, with at least 3 miles of visibility and a 3000 ft ceiling.

d. Criteria for remaining in the flight test area. The UAS PIC must ensure all UA flight operations remain within the lateral and vertical boundaries of the flight test area. Furthermore, the UAS PIC must take into account all factors that may affect the capability of the UA to remain within the flight test area. This includes, but is not limited to, considerations for wind, gross weight, and glide distances.

e. Incident/accident reporting. Any incident/accident and any flight operation that transgresses the lateral or vertical boundaries of the flight test area or any restricted airspace must be reported to the FAA within 24 hours. This information must be reported to the Unmanned Aircraft Program Office, AIR-160. AIR-160 can be reached by telephone

at 202-385-4636 and fax at 202-385-4651. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov. Further flight operations must not be conducted until the incident is reviewed by AIR-160 and authorization to resume operations is provided to L-3 BAI Aerosystems.

5. UA Pilots and Observers.

a. UA PIC roles and responsibilities.

(1) The UA PIC must perform crew duties for only one UA at a time.

(2) All flight operations must have a designated UA PIC. The UA PIC has responsibility over each flight conducted and is accountable for the UA flight operation.

(3) The UA PIC is responsible for the safety of the UA as well as persons and property along the UA flight path. This includes, but is not limited to, collision avoidance and the safety of persons and property in the air and on the ground.

(4) The UA PIC must avoid densely populated areas (§ 91.319) and exercise increased vigilance when operating within or in the vicinity of published airway boundaries.

b. UA PIC certification and ratings requirements.

(1) The UA PIC must hold and be in possession of, at a minimum, an FAA private pilot certificate, with either an airplane, rotorcraft, or powered-lift category; and single- or multiengine class ratings, or the military equivalent, appropriate to the type of UA being operated.

(2) The UA PIC must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

c. UA PIC currency, flight review, and training.

(1) No person may act as pilot in command of an unmanned aircraft unless that person has made at least three takeoffs and three landings in manned aircraft within the preceding 90 days acting as the sole manipulator of the flight controls.

(2) The UA PIC must have a flight review in manned aircraft every 24 calendar months in accordance with § 61.56, Flight review.

(3) The UA PIC must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(4) The UA PIC must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(5) All UA PICs must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

d. Supplemental UA pilot roles and responsibilities.

(1) Any additional UA pilot(s) assigned to a crew station during UA flight operations will be considered a supplemental UA pilot.

(2) A supplemental UA pilot assists the PIC in the operation of the UA and may do so at the same or a different control station as the PIC. The UA PIC will have operational override capability over any supplemental UA pilots, regardless of position.

(3) A supplemental UA pilot must perform crew duties for only one UA at a time.

e. Supplemental UA pilot certification and ratings requirements.

(1) The supplemental UA pilot need not be a certificated pilot, but must have successfully completed a recognized private pilot ground school program.

(2) The supplemental UA pilot must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

f. Supplemental UA pilot currency, flight review, and training.

(1) All supplemental UA pilots must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(2) All supplemental UA pilots must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(3) All supplemental UA pilots must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

g. Observer roles and responsibilities. The task of the observer is to provide the UA PIC(s) with instructions to maneuver the UA clear of any potential collision with other traffic. To satisfy these requirements:

(1) The observer must perform crew duties for only one UA at a time.

(2) At no time will the observer permit the UA to operate beyond the line-of-sight necessary to ensure maneuvering information can be reliably determined.

(3) At no time will the observer conduct his/her duties more than **1 mile laterally or 1000 ft. vertically** from the UA.

(4) An observer must maintain continuous visual contact with the UA to discern UA attitude and trajectory in relation to conflicting traffic.

(5) Observers must continually scan the airspace for other aircraft that pose a potential conflict.

(6) All flight operations conducted in the flight test area must have an observer to perform traffic avoidance and visual observation to fulfill the see-and-avoid requirement of § 91.113, Right-of-way rules: Except water operations.

h. Observer certification.

(1) All observers must either hold, at a minimum, an FAA private pilot license or military equivalent, or must have successfully completed specific observer training acceptable to the FAA. An observer does not require currency as a pilot.

(2) All observers must have in their possession a valid second-class (or higher) airman medical certificate issued under part 67.

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i. Observer training.

(1) All observers must be thoroughly trained, be familiar with, and possess operational experience with the equipment being used. Such training is necessary for observation and detection of other aircraft for collision avoidance purposes as outlined in L-3 BAI Aerosystems program letter.

(2) All observers must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

6. Equipage.

a. The UAS must be equipped with an operable Mode C transponder, and two-way communications equipment allowing communications between the UA pilot, observers, all UAS control stations, and ATC.

b. The UA must be equipped with operable navigation, position, and/or strobe/anti-collision lights. Strobe/anti-collision lights must be illuminated during all operations.

7. Communications.

a. Before UA flights.

(1) Before conducting operations, the frequency spectrum used for operation and control of the UA must be approved by the Federal Communications Commission or other appropriate government oversight agency.

(2) L-3 BAI Aerosystems shall contact the Maryland State Police, Trooper 6 Heliport, and notify them of planned UAS flight operations.

b. During UA flights.

(1) Ridgley Airpark frequency must be monitored during flight operations.

(2) All UA flight crew positions must maintain two-way communications with each other during all operations. If unable to maintain two-way communication, the UA PIC will expeditiously return the UA to its base of operations and conclude the flight operation.

8. Flight Conditions.

a. Daylight operations. All flight operations must be conducted during daylight hours in visual meteorological conditions (VMC).

b. Prohibitions.

(1) The UA is prohibited from aerobatic flight, that is, an intentional maneuver involving an abrupt change in the UA's attitude, an abnormal acceleration, or other flight action not necessary for normal flight.

(2) Flight operations must not involve carrying hazardous material or the dropping of any objects or external stores.

(3) Each UA must be operated by only one control station at a time. A control station may not be used to operate multiple UAs.

c. Fuel quantity. Fuel quantity shall be limited to 2.5 U.S. gallons per flight.

COPY 4/16/2009

d. Transponder requirements. The UA must operate an approved operational Mode C altitude encoding transponder during all flight operations.

e. Transponder failure. In the event of transponder failure, the UA must conclude all flight operations and expeditiously return to its base of operations.

f. Notice to airman. L-3 BAI Aerosystems must request the issuance of a Notice to Airman (NOTAM) through the local Automated Flight Service Station at least 24 hours before flight operation.

9. Flight Termination and Lost Link Procedures.

a. Flight termination. In accordance with L-3 BAI Aerosystems program letter, dated 04/06/2009, flight termination must be initiated at any point that safe operation of the UA cannot be maintained or if hazard to persons or property is imminent.

b. Lost link procedures. In the event of lost link, the UA must provide a means of automatic recovery that ensures airborne operations are predictable and that the UA remains within the flight test area. The observer, all other UAS controls stations, and the appropriate ATC facility will be immediately notified of the lost link condition and the expected UA response.

10. Maintenance and Inspection.

a. General requirements. The UAS must not be operated unless it is inspected and maintained in accordance with the L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009 or later accepted FAA revision. L-3 BAI Aerosystems must establish and maintain aircraft maintenance records (see paragraph 10(d) below).

b. Inspections. No person may operate this UAS unless it has had a condition inspection within the preceding 12 calendar months performed according to the FAA-accepted L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. The UAS must also have been found to be in a condition for safe operation. This inspection will be recorded in the UAS maintenance records as described in paragraph 10(d) below.

c. Authorized inspectors. Only those individuals trained and authorized by L-3 BAI Aerosystems and acceptable to the FAA may perform the inspections and maintenance required by these operating limitations.

d. Maintenance and inspection records. Maintenance and inspections of the UAS must be recorded in the UAS maintenance records. The following information must be recorded:

(1) Maintenance record entries must include a description of the work performed, the date of completion for the work, and the name and signature of the person performing the work.

(2) Inspection entries must contain the following, or a similarly worded, statement: *I certify that this UAS was inspected on (date), in accordance with the scope and detail of the (applicant name) Inspection and Maintenance Program, and was found to be in a condition for safe operation.*

COPY 4/16/2009

(3) UAS instruments and equipment required to be installed must be inspected and maintained in accordance with the requirements of L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. Any maintenance or inspection of this equipment must be recorded in the UAS maintenance records.

(4) No person may operate this UAS unless the altimeter system and transponder have been tested within the preceding 24 calendar months in accordance with § 91.413, ATC transponder tests and inspections. These inspections will be recorded in the UAS maintenance records.

11. Information Reporting. L-3 BAI Aerosystems shall provide the following information to Donald.E.Grampp@faa.gov and AIR-200 on a monthly basis:

a. Number of flights conducted under this certificate.

b. Pilot duty time per flight.

c. Unusual equipment malfunctions (hardware or software).

d. Deviations from ATC instructions.

e. Unintended entry into lost link flight mode that results in a course change.

12. Revisions and Other Provisions.

a. Experimental certificates, program letters, and operating limitations. The experimental certificate, FAA-accepted L-3 BAI Aerosystems program letter, and operating limitations cannot be reissued, renewed, or revised without application being made to the New Cumberland Manufacturing Inspection District Office (MIDO), in coordination with AIR-200. AIR-200 will be responsible for FAA Headquarters internal coordination with the Aircraft Certification Service, Flight Standards Service, Air Traffic Organization, Office of the Chief Council, and Office of Rulemaking.

b. Certificates of waiver or authorization. L-3 BAI Aerosystems shall immediately notify the Production and Airworthiness Division, AIR-200, and the New Cumberland MIDO, if there is any plan for requesting a Certificate of Authorization or Waiver (COA) for UAS operations during the time the experimental certificate is in effect. An entry in the aircraft logbook is required to document that the aircraft flight authority has been changed from the experimental certificate to COA. When COA operations are concluded and the aircraft resumes flying under the experimental certificate, a record entry will be made in the aircraft logbook by an appropriately rated person to document that the aircraft is in a condition for safe operation and appropriately configured.

c. Amendments and cancellations. The provisions and limitations annotated in this operational approval may be amended or cancelled at any time as deemed necessary by the FAA.

d. Reviews of revisions. All revisions to L-3 BAI Aerosystems, FAA-accepted, inspection and maintenance program must be reviewed and accepted by the Baltimore Flight Standards District Office (FSDO).

13. UAS Modifications.

a. Software and system changes. All software and system changes will be documented as part of the normal maintenance procedures and will be available for inspection. All software and system changes must be inspected and approved per L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. All software changes to the aircraft and control station are categorized as major changes, and must be provided in summary form at the time they are incorporated.

b. Major modifications. All major modifications, whether performed under the experimental certificate, COA, or other authorizations, that could potentially affect the safe operation of the system, must be documented and provided to the FAA before operating the aircraft under this certificate. Major modifications incorporated under COA or other authorization need to be provided only if the aircraft is flown under these authorizations during the effective period of the experimental certificate.

c. Submission of modifications. All information requested must be provided to AIR-200.

End of Limitations

APR 16 2009
(Amended) Date:

Henry K. Cooper
Aviation Safety Inspector
New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

I certify that I have read and understand the operating limitations and conditions that are a part of the special airworthiness certificate, FAA Form 8130-7, issued on 04/16/2009, for the purposes of [research and development, market survey, and/or crew training.

This special airworthiness certificate is issued for L-3 BAI Aerosystems Viking 100 UAS, serial number 106, registration number N721UA.

APR 16 2009
Date:

Applicant (signature)

Name: Mark Ensor

Title: Vice President and General Manager

Company: L-3 BAI Aerosystems

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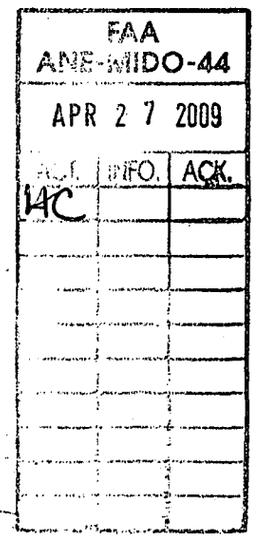
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ACT.
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14C

LOG BOOK ENTRY
L-3 BAI Aerosystems Viking 100 N721UA
S/N 106

I find this Unmanned Aircraft meets the requirements for the certification requested, and have issued a special airworthiness certificate (amended) dated April 16, 2009. The operation of this Unmanned Aircraft System is contingent upon L-3 BAI Aerosystems compliance with L-3 BAI Aerosystems Program Letter dated April 6, 2009, Document 001-1243, Version 4.0, and the operating limitations of this amended airworthiness certificate. A new condition inspection is required prior to the issuance of another Special Airworthiness Certificate.

Henry K. Cooper ANE-MIDO-44
Date Amended: April 16, 2009

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

CANCELLED
APR 16 2009

SPECIAL AIRWORTHINESS CERTIFICATE

A	CATEGORY/DESIGNATION	EXPERIMENTAL (UNMANNED AIRCRAFT)	
	PURPOSE	Research & Development, Market Survey, Crew Tng.	
B	MANU-FACTURER	NAME	N/A
		ADDRESS	N/A
C	FLIGHT	FROM	N/A
		TO	N/A
D	N- 721UA		SERIAL NO. 106
	BUILDER L-3 BAI Aerosystems		MODEL Viking 100
E	DATE OF ISSUANCE February 18, 2009		EXPIRY February 17, 2010
	OPERATING LIMITATIONS DATED 02-18-09		ARE PART OF THIS CERTIFICATE
	SIGNATURE OF FAA REPRESENTATIVE Henry K. Cooper		DESIGNATION OR OFFICE NO. ANE-MIDO-44

Any alteration, reproduction or misuse of this certificate may be punishable by a fine not exceeding $1,000 or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE TITLE 14, CODE OF FEDERAL REGULATIONS (CFR).

FAA Form 8130-7 (07/04) SEE REVERSE SIDE NSN: 0052-00-693-4000

A	This airworthiness certificate is issued under the authority of Public Law 104-6, 49 United States Code (USC) 44704 and Title 14 Code of Federal Regulations (CFR).
B	The airworthiness certificate authorizes the manufacturer named on the reverse side to conduct production fight tests, and only production flight tests, of aircraft registered in his name. No person may conduct production flight tests under this certificate: (1) Carrying persons or property for compensation or hire: and/or (2) Carrying persons not essential to the purpose of the flight.
C	This airworthiness certificate authorizes the flight specified on the reverse side for the purpose shown in Block A.
D	This airworthiness certificate certifies that as of the date of issuance, the aircraft to which issued has been inspected and found to meet the requirements of the applicable CFR. The aircraft does not meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention On International Civil Aviation. No person may operate the aircraft described on the reverse side: (1) except in accordance with the applicable CFR and in accordance with conditions and limitations which may be prescribed by the Administrator as part of this certificate; (2) over any foreign country without the special permission of that country.
E	Unless sooner surrendered, suspended, or revoked, this airworthiness certificate is effective for the duration and under the conditions prescribed in 14 CFR, Part 21, Section 21.181 or 21.217.

2/18/2009

New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

CANCELLED
APR 16 2009

Operating Limitations
Experimental: Research and Development, Market Survey, and/or Crew Training

Registered Owner Name: L-3 BAI Aerosystems **Registered Owner Address:** 9040 Glebe Park Drive Easton, MD 21601 **Aircraft Description:** Viking 100 Unmanned Aerial System **Aircraft Registration:** N721UA	**Aircraft Builder:** L-3 BAI Aerosystems **Year Manufactured:** 2008 **Aircraft Serial Number:** #106 **Aircraft Model Designation:** Viking 100 UAS **Engine Model:** 3W Modellmotoren 3W157iBTF-TS

The following conditions and limitations apply to all unmanned aircraft system (UAS) flight operations for the Viking 100 UAS while operating in the National Airspace System (NAS).

1. General Information.

a. Integrated system. For the purposes of this special airworthiness certificate and operating limitations, the Viking 100 UAS operated by L-3 BAI Aerosystems is considered to be an integrated system. The system is composed of the following:

(1) Viking 100 UA, serial number 106.

(2) UAS control station(s), that is, fixed, mobile, or ground-based.

(3) Telemetry, launch, and recovery equipment.

(4) Communications and navigation equipment, including ground and/or air equipment used for command and control of the Viking 100.

(5) Equipment on the ground and in the air used for communication with other members of the flight crew, observers, air traffic control (ATC), and other users of the NAS.

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b. Compliance with 14 CFR part 61 (Certification: Pilots, Flight Instructors, and Ground Instructors) and part 91 (General Operating and Flight Rules). Unless otherwise specified in this document, the UA pilot-in-command (PIC) and L-3 BAI Aerosystems must comply with all applicable sections and parts of 14 CFR including, but not limited to, parts 61 and 91.

c. Operational requirements.

(1) No person may operate this UAS for other than the purpose of research and development, market survey, and/or crew training, to accomplish the flight operation outlined in L-3 BAI Aerosystems program letter dated 02/18/2009, which describes compliance with § 21.193(d), Experimental certificates: General, and has been made available to the UA PIC.

(2) This UAS must be operated in accordance with applicable air traffic and general operating rules of part 91 and all additional limitations herein prescribed under the provisions of § 91.319(i), Aircraft having experimental certificates: Operating limitations.

(3) L-3 BAI Aerosystems must accumulate at least 50 flight hours under its experimental airworthiness certificate before customer crew training is permitted, in accordance with § 21.195(d), Experimental certificates: Aircraft to be used for market surveys, sales demonstrations, and customer crew training.

d. UA condition. The UA PIC must determine that the UA is in a condition for safe operation, and in a configuration appropriate for the purpose of the intended flight.

e. Multiple-purpose operations. When changing between operating purposes of a multiple purpose certificate, the operator must determine that the aircraft is in a condition for safe operation and appropriate for the purpose intended. A record entry will be made by an appropriately rated person (that is, an individual authorized by the applicant and acceptable to the FAA) to document that finding in the maintenance records.

f. Operation exceptions. No person may operate this UA to carry property for compensation or hire (§ 91.319(a)(2)).

g. UA markings.

(1) This UA must be marked with its U.S. registration number in accordance with part 45 or alternative marking approval issued by the FAA Production and Airworthiness Division (AIR-200).

(2) This UA must display the word *Experimental* in accordance with § 45.23(b), Display of marks, unless otherwise granted an exemption from this requirement.

h. Required documentation. Prior to conducting the Viking 100 initial flight operations, L-3 BAI Aerosystems must forward a scanned copy of the Viking 100 Program Letter, Special Airworthiness Certificate, and Operating Limitations to the following persons:

(1) Peter Acevedo, FAA Air Traffic Representative, Eastern Service Center, System Support, 1701 Columbia Ave, College Park, GA 30337, telephone (404) 305-5598, email peter.k.acevedo@faa.gov.

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(2) Richard Posey, Aviation Safety Inspector, Production and Airworthiness Division, AIR-200, 800 Independence Ave, SW, Washington, DC 20591, telephone (202) 385-6378, email, richard.posey@faa.gov.

i. Change in registrant address. Section 47.45, Change of address, requires that the FAA Aircraft Registry be notified within 30 days of any change in the aircraft registrant's address. Such notification is to be made by providing AC Form 8050-1, Aircraft Registration Application, to the FAA Aircraft Registration Branch (AFS-750) in Oklahoma City, Oklahoma.

j. Certificate display and manual availability. The airworthiness and registration certificates must be displayed, and the aircraft flight manual must be available to the pilot, as prescribed by the applicable sections of 14 CFR, or as prescribed by an exemption granted in accordance with 14 CFR part 11, General Rulemaking Procedures, to L-3 BAI Aerosystems.

2. Program Letter. The L-3 BAI Aerosystems Viking 100 Program Letter, dated 02/18/2009, will be used as a basis for determining the operating limitations prescribed in this document. All flight operations must be conducted in accordance with the provisions of this document.

3. Initial Flight Testing.

a. Requirements. Flight operations must be conducted within visual line of sight of the pilot/observer. Initial flight testing is completed upon accumulation of 25 flight hours. Following satisfactory completion of initial flight testing, the operations manager or chief pilot must certify in the records that the aircraft has been shown to comply with § 91.319(b). Compliance with § 91.319(b) must be recorded in the aircraft records with the following, or a similarly worded, statement:

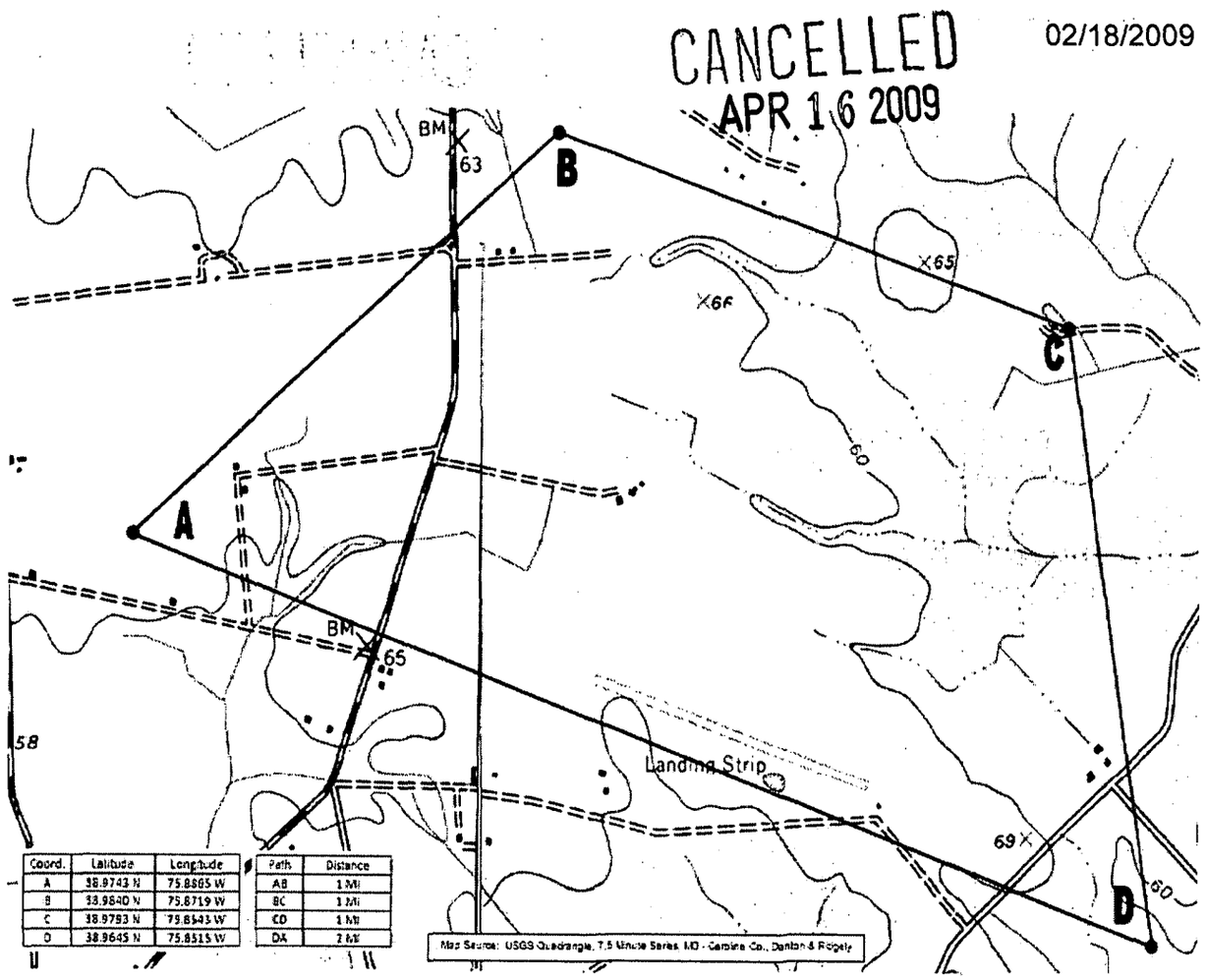
> *I certify that the prescribed flight test hours have been completed and the aircraft is controllable throughout its normal range of speeds and throughout all maneuvers to be executed, has no hazardous operating characteristics or design features, and is safe for operation. The following aircraft operating data has been demonstrated during the flight testing: speeds Vx _____, and Vy _____, and the weight _____ and CG location _____ at which they were obtained.*

b. Aircraft operations for the purpose of market surveys, sales demonstrations, and customer crew training. These operations cannot be performed until 50 flight hours have been accomplished. An entry in the maintenance records is required as evidence of compliance.

4. Authorized Flight Operations Area.

a. Description of the authorized flight operations area. The requested area of operations is Ridgley Airpark (KRJD) near Ridgley, MD.

b. Flight test area. The flight operations area authorized for the UA will be referred to as the flight test area, and is depicted graphically below. **All flights are limited to an altitude of 1000 ft AGL.**



c. Authorized flight times and conditions. All flight operations must be conducted during daylight hours under visual flight rules (VFR), Monday through Friday, with at least 3 miles of visibility and a 3000 ft ceiling.

d. Criteria for remaining in the flight test area. The UAS PIC must ensure all UA flight operations remain within the lateral and vertical boundaries of the flight test area. Furthermore, the UAS PIC must take into account all factors that may affect the capability of the UA to remain within the flight test area. This includes, but is not limited to, considerations for wind, gross weight, and glide distances.

e. Incident/accident reporting. Any incident/accident and any flight operation that transgresses the lateral or vertical boundaries of the flight test area or any restricted airspace must be reported to the FAA within 24 hours. This information must be reported to the Unmanned Aircraft Program Office, AIR-160. AIR-160 can be reached by telephone at 202-385-4636 and fax at 202-385-4651. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov. Further flight operations must not be conducted until the incident is reviewed by AIR-160 and authorization to resume operations is provided to L-3 BAI Aerosystems.

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5. UA Pilots and Observers.

a. UA PIC roles and responsibilities.

(1) The UA PIC must perform crew duties for only one UA at a time.

(2) All flight operations must have a designated UA PIC. The UA PIC has responsibility over each flight conducted and is accountable for the UA flight operation.

(3) The UA PIC is responsible for the safety of the UA as well as persons and property along the UA flight path. This includes, but is not limited to, collision avoidance and the safety of persons and property in the air and on the ground.

(4) The UA PIC must avoid densely populated areas (§ 91.319) and exercise increased vigilance when operating within or in the vicinity of published airway boundaries.

b. UA PIC certification and ratings requirements.

(1) The UA PIC must hold and be in possession of, at a minimum, an FAA private pilot certificate, with either an airplane, rotorcraft, or powered-lift category; and single- or multiengine class ratings, or the military equivalent, appropriate to the type of UA being operated.

(2) The UA PIC must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

c. UA PIC currency, flight review, and training.

(1) No person may act as pilot in command of an unmanned aircraft unless that person has made at least three takeoffs and three landings in manned aircraft within the preceding 90 days acting as the sole manipulator of the flight controls.

(2) The UA PIC must have a flight review in manned aircraft every 24 calendar months in accordance with § 61.56, Flight review.

(3) The UA PIC must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(4) The UA PIC must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(5) All UA PICs must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

d. Supplemental UA pilot roles and responsibilities.

(1) Any additional UA pilot(s) assigned to a crew station during UA flight operations will be considered a supplemental UA pilot.

(2) A supplemental UA pilot assists the PIC in the operation of the UA and may do so at the same or a different control station as the PIC. The UA PIC will have operational override capability over any supplemental UA pilots, regardless of position.

(3) A supplemental UA pilot must perform crew duties for only one UA at a time.

e. Supplemental UA pilot certification and ratings requirements.

(1) The supplemental UA pilot need not be a certificated pilot, but must have successfully completed a recognized private pilot ground school program.

(2) The supplemental UA pilot must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

f. Supplemental UA pilot currency, flight review, and training.

(1) All supplemental UA pilots must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(2) All supplemental UA pilots must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(3) All supplemental UA pilots must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

g. Observer roles and responsibilities. The task of the observer is to provide the UA PIC(s) with instructions to maneuver the UA clear of any potential collision with other traffic. To satisfy these requirements:

(1) The observer must perform crew duties for only one UA at a time.

(2) At no time will the observer permit the UA to operate beyond the line-of-sight necessary to ensure maneuvering information can be reliably determined.

(3) At no time will the observer conduct his/her duties more than **1 mile laterally or 1000 ft. vertically** from the UA.

(4) An observer must maintain continuous visual contact with the UA to discern UA attitude and trajectory in relation to conflicting traffic.

(5) Observers must continually scan the airspace for other aircraft that pose a potential conflict.

(6) All flight operations conducted in the flight test area must have an observer to perform traffic avoidance and visual observation to fulfill the see-and-avoid requirement of § 91.113, Right-of-way rules: Except water operations.

h. Observer certification.

(1) All observers must either hold, at a minimum, an FAA private pilot license or military equivalent, or must have successfully completed specific observer training acceptable to the FAA. An observer does not require currency as a pilot.

(2) All observers must have in their possession a valid second-class (or higher) airman medical certificate issued under part 67.

i. Observer training.

(1) All observers must be thoroughly trained, be familiar with, and possess operational experience with the equipment being used. Such training is necessary for observation and detection of other aircraft for collision avoidance purposes as outlined in L-3 BAI Aerosystems program letter.

(2) All observers must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

6. Equipage.

a. The UAS must be equipped with an operable Mode C transponder, and two-way communications equipment allowing communications between the UA pilot, observers, all UAS control stations, and ATC.

b. The UA must be equipped with operable navigation, position, and/or strobe/anti-collision lights. Strobe/anti-collision lights must be illuminated during all operations.

7. Communications.

a. Before UA flights.

(1) Before conducting operations, the frequency spectrum used for operation and control of the UA must be approved by the Federal Communications Commission or other appropriate government oversight agency.

(2) L-3 BAI Aerosystems shall contact the Maryland State Police, Trooper 6 Heliport, and notify them of planned UAS flight operations.

b. During UA flights.

(1) Ridgley Airpark frequency must be monitored during flight operations.

(2) All UA flight crew positions must maintain two-way communications with each other during all operations. If unable to maintain two-way communication, the UA PIC will expeditiously return the UA to its base of operations and conclude the flight operation.

8. Flight Conditions.

a. Daylight operations. All flight operations must be conducted during daylight hours in visual meteorological conditions (VMC).

b. Prohibitions.

(1) The UA is prohibited from aerobatic flight, that is, an intentional maneuver involving an abrupt change in the UA's attitude, an abnormal acceleration, or other flight action not necessary for normal flight.

(2) Flight operations must not involve carrying hazardous material or the dropping of any objects or external stores.

(3) Each UA must be operated by only one control station at a time. A control station may not be used to operate multiple UAs.

c. Fuel quantity. Fuel quantity shall be limited to 2.5 U.S. gallons per flight.

d. Transponder requirements. The UA must operate an approved operational Mode C altitude encoding transponder during all flight operations.

e. Transponder failure. In the event of transponder failure, the UA must conclude all flight operations and expeditiously return to its base of operations.

f. Notice to airman. L-3 BAI Aerosystems must request the issuance of a Notice to Airman (NOTAM) through the local Automated Flight Service Station at least 24 hours before flight operation.

9. Flight Termination and Lost Link Procedures.

a. Flight termination. In accordance with L-3 BAI Aerosystems program letter, dated 02/18/2009, flight termination must be initiated at any point that safe operation of the UA cannot be maintained or if hazard to persons or property is imminent.

b. Lost link procedures. In the event of lost link, the UA must provide a means of automatic recovery that ensures airborne operations are predictable and that the UA remains within the flight test area. The observer, all other UAS controls stations, and the appropriate ATC facility will be immediately notified of the lost link condition and the expected UA response.

10. Maintenance and Inspection.

a. General requirements. The UAS must not be operated unless it is inspected and maintained in accordance with the L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009 or later accepted FAA revision. L-3 BAI Aerosystems must establish and maintain aircraft maintenance records (see paragraph 10(d) below).

b. Inspections. No person may operate this UAS unless it has had a condition inspection within the preceding 12 calendar months performed according to the FAA-accepted L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. The UAS must also have been found to be in a condition for safe operation. This inspection will be recorded in the UAS maintenance records as described in paragraph 10(d) below.

c. Authorized inspectors. Only those individuals trained and authorized by L-3 BAI Aerosystems and acceptable to the FAA may perform the inspections and maintenance required by these operating limitations.

d. Maintenance and inspection records. Maintenance and inspections of the UAS must be recorded in the UAS maintenance records. The following information must be recorded:

(1) Maintenance record entries must include a description of the work performed, the date of completion for the work, and the name and signature of the person performing the work.

(2) Inspection entries must contain the following, or a similarly worded, statement: *I certify that this UAS was inspected on (date), in accordance with the scope and detail of the (applicant name) Inspection and Maintenance Program, and was found to be in a condition for safe operation.*

(3) UAS instruments and equipment required to be installed must be inspected and maintained in accordance with the requirements of L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. Any maintenance or inspection of this equipment must be recorded in the UAS maintenance records.

(4) No person may operate this UAS unless the altimeter system and transponder have been tested within the preceding 24 calendar months in accordance with § 91.413, ATC transponder tests and inspections. These inspections will be recorded in the UAS maintenance records.

11. Information Reporting. L-3 BAI Aerosystems shall provide the following information to Donald.E.Grampp@faa.gov and AIR-200 on a monthly basis:

a. Number of flights conducted under this certificate.

b. Pilot duty time per flight.

c. Unusual equipment malfunctions (hardware or software).

d. Deviations from ATC instructions.

e. Unintended entry into lost link flight mode that results in a course change.

12. Revisions and Other Provisions.

a. Experimental certificates, program letters, and operating limitations. The experimental certificate, FAA-accepted L-3 BAI Aerosystems program letter, and operating limitations cannot be reissued, renewed, or revised without application being made to the New Cumberland Manufacturing Inspection District Office (MIDO), in coordination with AIR-200. AIR-200 will be responsible for FAA Headquarters internal coordination with the Aircraft Certification Service, Flight Standards Service, Air Traffic Organization, Office of the Chief Council, and Office of Rulemaking.

b. Certificates of waiver or authorization. L-3 BAI Aerosystems shall immediately notify the Production and Airworthiness Division, AIR-200, and the New Cumberland MIDO, if there is any plan for requesting a Certificate of Authorization or Waiver (COA) for UAS operations during the time the experimental certificate is in effect. An entry in the aircraft logbook is required to document that the aircraft flight authority has been changed from the experimental certificate to COA. When COA operations are concluded and the aircraft resumes flying under the experimental certificate, a record entry will be made in the aircraft logbook by an appropriately rated person to document that the aircraft is in a condition for safe operation and appropriately configured.

c. Amendments and cancellations. The provisions and limitations annotated in this operational approval may be amended or cancelled at any time as deemed necessary by the FAA.

d. Reviews of revisions. All revisions to L-3 BAI Aerosystems, FAA-accepted, inspection and maintenance program must be reviewed and accepted by the Baltimore Flight Standards District Office (FSDO).

13. UAS Modifications.

a. Software and system changes. All software and system changes will be documented as part of the normal maintenance procedures and will be available for inspection. All software and system changes must be inspected and approved per L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. All software changes to the aircraft and control station are categorized as major changes, and must be provided in summary form at the time they are incorporated.

b. Major modifications. All major modifications, whether performed under the experimental certificate, COA, or other authorizations, that could potentially affect the safe operation of the system, must be documented and provided to the FAA before operating the aircraft under this certificate. Major modifications incorporated under COA or other authorization need to be provided only if the aircraft is flown under these authorizations during the effective period of the experimental certificate.

c. Submission of modifications. All information requested must be provided to AIR-200.

End of Limitations

Henry K. Cooper
Aviation Safety Inspector
New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

Date: 2/18/09

I certify that I have read and understand the operating limitations and conditions that are a part of the special airworthiness certificate, FAA Form 8130-7, issued on 02/18/2009, for the purposes of [research and development, market survey, and/or crew training.

This special airworthiness certificate is issued for L-3 BAI Aerosystems Viking 100 UAS, serial number 106, registration number N721UA.

Applicant (signature)

Date: 2/18/09

Name: Mark Ensor

Title: Vice President and General Manager

Company: L-3 BAI Aerosystems

CANCELLED
APR 16 2009

FAA FORM 8130-6, APPLICATION FOR U.S. AIRWORTHINESS CERTIFICATE

Form Approved O.M.B. No. 2120-0018
12/31/2010

U.S. Department of Transportation
Federal Aviation Administration

APPLICATION FOR U.S. AIRWORTHINESS CERTIFICATE

INSTRUCTIONS - Print or type. Do not write in shaded areas; these are for FAA use only. Submit original only to an authorized FAA Representative. If additional space is required, use attachment. For special flight permits complete Sections II, VI and VII as applicable.

I. AIRCRAFT DESIGNATION

1. REGISTRATION MARK	2. AIRCRAFT BUILDER'S NAME (Make)	3. AIRCRAFT MODEL DESIGNATION	4. YR. MFR.	FAA CODING
N721UA	L-3 BAI Aerosystems	Viking 100	2008	
5. AIRCRAFT SERIAL NO.	**6. ENGINE BUILDER'S NAME (Make)**	**7. ENGINE MODEL DESIGNATION**		
106	3W	157iBTF-TS		
8. NUMBER OF ENGINES	**9. PROPELLER BUILDER'S NAME (Make)**	**10. PROPELLER MODEL DESIGNATION**	**11. AIRCRAFT IS (Check if applicable)**	
One	Bolly	30 x 10 (WOODEN)	IMPORT	

II. CERTIFICATION REQUESTED

APPLICATION IS HEREBY MADE FOR: (Check applicable items)

A	1		STANDARD AIRWORTHINESS CERTIFICATE (Indicate Category) NORMAL ☐ UTILITY ☐ ACROBATIC ☐ TRANSPORT ☐ COMMUTER ☐ BALLOON ☐ OTHER ☐
B		X	SPECIAL AIRWORTHINESS CERTIFICATE (Check appropriate items) UNMANNED AIRCRAFT
	7	☐	PRIMARY
	9	☐	LIGHT-SPORT (Indicate Class) AIRPLANE ☐ POWER-PARACHUTE ☐ WEIGHT-SHIFT-CONTROL ☐ GLIDER ☐ LIGHTER THAN AIR ☐
	2	☐	LIMITED
	5	☐	PROVISIONAL (Indicate Class) 1 ☐ CLASS I; 2 ☐ CLASS II
	3	☐	RESTRICTED (Indicate operation(s) to be conducted) 1 ☐ AGRICULTURE AND PEST CONTROL; 2 ☐ AERIAL SURVEY; 3 ☐ AERIAL ADVERTISING; 4 ☐ FOREST (Wildlife Conservation); 5 ☐ PATROLLING; 6 ☐ WEATHER CONTROL; 0 ☐ OTHER (Specify)
	4	X	EXPERIMENTAL (Indicate operation(s) to be conducted) 1 X RESEARCH AND DEVELOPMENT; 2 ☐ AMATEUR BUILT; 3 ☐ EXHIBITION; 4 ☐ AIR RACING; 5 X CREW TRAINING; 6 X MARKET SURVEY; 0 ☐ TO SHOW COMPLIANCE WITH THE CFR; 7 ☐ OPERATING (Primary Category) KIT BUILT AIRCRAFT; 8 ☐ OPERATING LIGHT-SPORT: 8A ☐ Existing Aircraft without an airworthiness certificate & do not meet § 103.1; 8B ☐ Operating Light-Sport Kit-Built; 8C ☐ Operating light-sport previously issued special light-sport category airworthiness certificate under § 21.190
	8	☐	SPECIAL FLIGHT PERMIT (Indicate operation(s) to be conducted, then complete Section VI or VII as applicable on reverse side) 1 ☐ FERRY FLIGHT FOR REPAIRS, ALTERATIONS, MAINTENANCE, OR STORAGE; 2 ☐ EVACUATION FROM AREA OF IMPENDING DANGER; 3 ☐ OPERATION IN EXCESS OF MAXIMUM CERTIFICATED TAKE-OFF WEIGHT; 4 ☐ DELIVERING OR EXPORTING; 5 ☐ PRODUCTION FLIGHT TESTING; 6 ☐ CUSTOMER DEMONSTRATION FLIGHTS
C	6	☐	MULTIPLE AIRWORTHINESS CERTIFICATE (check ABOVE "Restricted Operation" and "Standard" or "Limited" as applicable)

III. OWNER'S CERTIFICATION

A. REGISTERED OWNER (As shown on certificate of aircraft registration) — IF DEALER, CHECK HERE ☐

NAME	ADDRESS
L-3 BAI Aerosystems	9040 Glebe Park Drive, Easton MD 21601

B. AIRCRAFT CERTIFICATION BASIS (Check applicable blocks and complete items as indicated)

☐	AIRCRAFT SPECIFICATION OR TYPE CERTIFICATE DATA SHEET (Give No. and Revision No.) N/A	X	AIRWORTHINESS DIRECTIVES (Check if all applicable AD's are compiled with and give the number of the last AD SUPPLEMENT available in the biweekly series as of the date of application) Bi-Weekly 2009-04
☐	AIRCRAFT LISTING (Give page number(s)) N/A	☐	SUPPLEMENTAL TYPE CERTIFICATE (List number of each STC incorporated) N/A

C. AIRCRAFT OPERATION AND MAINTENANCE RECORDS

X	CHECK IF RECORDS IN COMPLIANCE WITH 14 CFR Section 91.417	TOTAL AIRFRAME HOURS 20.3	3 EXPERIMENTAL ONLY (Enter hours flown since last certificate issued or renewed) 0

D. CERTIFICATION - I hereby certify that I am the registered owner (or his agent) of the aircraft described above, that the aircraft is registered with the Federal Aviation Administration in accordance with Title 49 of the United States Code 44101 et seq. and applicable Federal Aviation Regulations, and that the aircraft has been inspected and is airworthy and eligible for the airworthiness certificate requested.

DATE OF APPLICATION	NAME AND TITLE (Print or type)	SIGNATURE
18 FEB 2009	ADAM GRANT, CONTRACTS	

IV. INSPECTION AGENCY VERIFICATION

A. THE AIRCRAFT DESCRIBED ABOVE HAS BEEN INSPECTED AND FOUND AIRWORTHY BY: (Complete the section only if 14 CFR part 21.183(d) applies.

2	☐ 14 CFR part 121 CERTIFICATE HOLDER (Give Certificate No.)	3	☐ CERTIFICATED MECHANIC (Give Certificate No.)	6	☐ CERTIFICATED REPAIR STATION (Give Certificate No.)
5	☐ AIRCRAFT MANUFACTURER (Give name or firm)				

DATE	TITLE	SIGNATURE

V. FAA REPRESENTATIVE CERTIFICATION

(Check ALL applicable block items A and B)

A. I find that the aircraft described in Section I or VII meets requirements for — X THE CERTIFICATE REQUESTED; 4 ☐ AMENDMENT OR MODIFICATION OF CURRENT AIRWORTHINESS CERTIFICATE

B. Inspection for a special permit under Section VII was conducted by: ☐ FAA INSPECTOR; ☐ CERTIFICATE HOLDER UNDER; ☐ FAA DESIGNEE; ☐ 14 CFR part 65; ☐ 14 CFR part 121 OR 135; ☐ 14 CFR part 145

DATE	MIDO/FSDO Office	4	DESIGNEE'S SIGNATURE AND NO.	1	FAA INSPECTOR'S SIGNATURE
2/18/09	ANE-MIDO-44				HENRY K. COOPER

Accepted JS May/14/2009

VI. PRODUCTION FLIGHT TESTING

A. MANUFACTURER

NAME | ADDRESS

B. PRODUCTION BASIS *(Check applicable item)*

- ☐ PRODUCTION CERTIFICATE *(Give production certificate number)* →
- ☐ TYPE CERTIFICATE ONLY
- ☐ APPROVED PRODUCTION INSPECTION SYSTEM

C. GIVE QUANTITY OF CERTIFICATES REQUIRED FOR OPERATING NEEDS

DATE OF APPLICATION | NAME AND TITLE *(Print or Type)* | SIGNATURE

VII. SPECIAL FLIGHT PERMIT PURPOSES OTHER THAN PRODUCTION FLIGHT TEST

A. DESCRIPTION OF AIRCRAFT

REGISTERED OWNER | ADDRESS

BUILDER *(Make)* | MODEL

SERIAL NUMBER | REGISTRATION MARK

B. DESCRIPTION OF FLIGHT — CUSTOMER DEMONSTRATION FLIGHTS ☐ *(Check if applicable)*

FROM | TO

VIA | DEPARTURE DATE | DURATION

C. CREW REQUIRED TO OPERATE THE AIRCRAFT AND ITS EQUIPMENT

☐ PILOT ☐ CO-PILOT ☐ FLIGHT ENGINEER ☐ OTHER *(Specify)*

D. THE AIRCRAFT DOES NOT MEET THE APPLICABLE AIRWORTHINESS REQUIREMENTS AS FOLLOWS:

E. THE FOLLOWING RESTRICTIONS ARE CONSIDERED NECESSARY FOR SAFE OPERATION: *(Use attachment if necessary)*

F. CERTIFICATION – I hereby certify that I am the registered owner (or his agent) of the aircraft described above; that the aircraft is registered with the Federal Aviation Administration in accordance with Title 49 of the United States Code 44101 et seq. and applicable Federal Aviation Regulations; and that the aircraft has been inspected and is safe for the flight described.

DATE | NAME AND TITLE *(Print or Type)* | SIGNATURE

VIII. AIRWORTHINESS DOCUMENTATION (FAA/DESIGNEE use only)

X	A. Operating Limitations and Markings in Compliance with 14 CFR Section 91.9, as applicable.		G. Statement of Conformity, FAA Form 8130-9 *(Attach when required)*
X	B. Current Operating Limitations Attached		H. Foreign Airworthiness Certification for Import Aircraft *(Attach when required)*
X	C. Data, Drawings, Photographs, etc. *(Attach when required)*		I. Previous Airworthiness Certificate Issued in Accordance with 14 CFR Section _____ CAR _____ (Original Attached)
X	D. Current Weight and Balance information Available in Aircraft		
	E. Major Repair and Alteration, FAA Form 337 *(Attach when required)*	X	J. Current Airworthiness Certificate Issued in Accordance with 14 CFR Section 21.191 a, c, f (Copy Attached)
X	F. This inspection Recorded in Aircraft Records		K. Light-Sport Aircraft Statement of Compliance, FAA Form 8130-15 *(Attach when required)*

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

SPECIAL AIRWORTHINESS CERTIFICATE

A	CATEGORY/DESIGNATION	EXPERIMENTAL (UNMANNED AIRCRAFT)	
	PURPOSE	Research & Development, Market Survey, Crew Tng.	
B	MANU-FACTURER	NAME	N/A
		ADDRESS	N/A
C	FLIGHT	FROM	N/A
		TO	N/A
D	N- 721UA		SERIAL NO. 106
	BUILDER L-3 BAI Aerosystems		MODEL Viking 100
E	DATE OF ISSUANCE February 18, 2009		EXPIRY February 17, 2010
	OPERATING LIMITATIONS DATED 02/18/09		ARE PART OF THIS CERTIFICATE
	SIGNATURE OF FAA REPRESENTATIVE		DESIGNATION OR OFFICE NO.
	Henry K. Cooper		ANE-MIDO-44

Any alteration, reproduction or misuse of this certificate may be punishable by a fine not exceeding $1,000 or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE TITLE 14, CODE OF FEDERAL REGULATIONS (CFR).

FAA Form 8130-7 (07/04) SEE REVERSE SIDE NSN: 0052-00-693-4000

COPY

A	This airworthiness certificate is issued under the authority of Public Law 104-6, 49 United States Code (USC) 44704 and Title 14 Code of Federal Regulations (CFR).
B	The airworthiness certificate authorizes the manufacturer named on the reverse side to conduct production fight tests, and only production flight tests, of aircraft registered in his name. No person may conduct production flight tests under this certificate: (1) Carrying persons or property for compensation or hire: and/or (2) Carrying persons not essential to the purpose of the flight.
C	This airworthiness certificate authorizes the flight specified on the reverse side for the purpose shown in Block A.
D	This airworthiness certificate certifies that as of the date of issuance, the aircraft to which issued has been inspected and found to meet the requirements of the applicable CFR. The aircraft does not meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention On International Civil Aviation. No person may operate the aircraft described on the reverse side: (1) except in accordance with the applicable CFR and in accordance with conditions and limitations which may be prescribed by the Administrator as part of this certificate; (2) over any foreign country without the special permission of that country.
E	Unless sooner surrendered, suspended, or revoked, this airworthiness certificate is effective for the duration and under the conditions prescribed in 14 CFR, Part 21, Section 21.181 or 21.217.

2/18/2009

New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

COPY

Operating Limitations
Experimental: Research and Development, Market Survey, and/or Crew Training

Registered Owner Name: L-3 BAI Aerosystems **Registered Owner Address:** 9040 Glebe Park Drive Easton, MD 21601 **Aircraft Description:** Viking 100 Unmanned Aerial System **Aircraft Registration:** N721UA	**Aircraft Builder:** L-3 BAI Aerosystems **Year Manufactured:** 2008 **Aircraft Serial Number:** #106 **Aircraft Model Designation:** Viking 100 UAS **Engine Model:** 3W Modellmotoren 3W157iBTF-TS

The following conditions and limitations apply to all unmanned aircraft system (UAS) flight operations for the Viking 100 UAS while operating in the National Airspace System (NAS).

1. General Information.

a. Integrated system. For the purposes of this special airworthiness certificate and operating limitations, the Viking 100 UAS operated by L-3 BAI Aerosystems is considered to be an integrated system. The system is composed of the following:

(1) Viking 100 UA, serial number 106.

(2) UAS control station(s), that is, fixed, mobile, or ground-based.

(3) Telemetry, launch, and recovery equipment.

(4) Communications and navigation equipment, including ground and/or air equipment used for command and control of the Viking 100.

(5) Equipment on the ground and in the air used for communication with other members of the flight crew, observers, air traffic control (ATC), and other users of the NAS.

b. Compliance with 14 CFR part 61 (Certification: Pilots, Flight Instructors, and Ground Instructors) and part 91 (General Operating and Flight Rules). Unless otherwise specified in this document, the UA pilot-in-command (PIC) and L-3 BAI Aerosystems must comply with all applicable sections and parts of 14 CFR including, but not limited to, parts 61 and 91.

c. Operational requirements.

(1) No person may operate this UAS for other than the purpose of research and development, market survey, and/or crew training, to accomplish the flight operation outlined in L-3 BAI Aerosystems program letter dated 02/18/2009, which describes compliance with § 21.193(d), Experimental certificates: General, and has been made available to the UA PIC.

(2) This UAS must be operated in accordance with applicable air traffic and general operating rules of part 91 and all additional limitations herein prescribed under the provisions of § 91.319(i), Aircraft having experimental certificates: Operating limitations.

(3) L-3 BAI Aerosystems must accumulate at least 50 flight hours under its experimental airworthiness certificate before customer crew training is permitted, in accordance with § 21.195(d), Experimental certificates: Aircraft to be used for market surveys, sales demonstrations, and customer crew training.

d. UA condition. The UA PIC must determine that the UA is in a condition for safe operation, and in a configuration appropriate for the purpose of the intended flight.

e. Multiple-purpose operations. When changing between operating purposes of a multiple purpose certificate, the operator must determine that the aircraft is in a condition for safe operation and appropriate for the purpose intended. A record entry will be made by an appropriately rated person (that is, an individual authorized by the applicant and acceptable to the FAA) to document that finding in the maintenance records.

f. Operation exceptions. No person may operate this UA to carry property for compensation or hire (§ 91.319(a)(2)).

g. UA markings.

(1) This UA must be marked with its U.S. registration number in accordance with part 45 or alternative marking approval issued by the FAA Production and Airworthiness Division (AIR-200).

(2) This UA must display the word *Experimental* in accordance with § 45.23(b), Display of marks, unless otherwise granted an exemption from this requirement.

h. Required documentation. Prior to conducting the Viking 100 initial flight operations, L-3 BAI Aerosystems must forward a scanned copy of the Viking 100 Program Letter, Special Airworthiness Certificate, and Operating Limitations to the following persons:

(1) Peter Acevedo, FAA Air Traffic Representative, Eastern Service Center, System Support, 1701 Columbia Ave, College Park, GA 30337, telephone (404) 305-5598, email peter.k.acevedo@faa.gov.

COPY

(2) Richard Posey, Aviation Safety Inspector, Production and Airworthiness Division, AIR-200, 800 Independence Ave, SW, Washington, DC 20591, telephone (202) 385-6378, email, richard.posey@faa.gov.

i. Change in registrant address. Section 47.45, Change of address, requires that the FAA Aircraft Registry be notified within 30 days of any change in the aircraft registrant's address. Such notification is to be made by providing AC Form 8050-1, Aircraft Registration Application, to the FAA Aircraft Registration Branch (AFS-750) in Oklahoma City, Oklahoma.

j. Certificate display and manual availability. The airworthiness and registration certificates must be displayed, and the aircraft flight manual must be available to the pilot, as prescribed by the applicable sections of 14 CFR, or as prescribed by an exemption granted in accordance with 14 CFR part 11, General Rulemaking Procedures, to L-3 BAI Aerosystems.

2. Program Letter. The L-3 BAI Aerosystems Viking 100 Program Letter, dated 02/18/2009, will be used as a basis for determining the operating limitations prescribed in this document. All flight operations must be conducted in accordance with the provisions of this document.

3. Initial Flight Testing.

a. Requirements. Flight operations must be conducted within visual line of sight of the pilot/observer. Initial flight testing is completed upon accumulation of 25 flight hours. Following satisfactory completion of initial flight testing, the operations manager or chief pilot must certify in the records that the aircraft has been shown to comply with § 91.319(b). Compliance with § 91.319(b) must be recorded in the aircraft records with the following, or a similarly worded, statement:

> *I certify that the prescribed flight test hours have been completed and the aircraft is controllable throughout its normal range of speeds and throughout all maneuvers to be executed, has no hazardous operating characteristics or design features, and is safe for operation. The following aircraft operating data has been demonstrated during the flight testing: speeds Vx _____, and Vy _____, and the weight _____ and CG location _____ at which they were obtained.*

b. Aircraft operations for the purpose of market surveys, sales demonstrations, and customer crew training. These operations cannot be performed until 50 flight hours have been accomplished. An entry in the maintenance records is required as evidence of compliance.

4. Authorized Flight Operations Area.

a. Description of the authorized flight operations area. The requested area of operations is Ridgley Airpark (KRJD) near Ridgley, MD.

b. Flight test area. The flight operations area authorized for the UA will be referred to as the flight test area, and is depicted graphically below. **All flights are limited to an altitude of 1000 ft AGL.**

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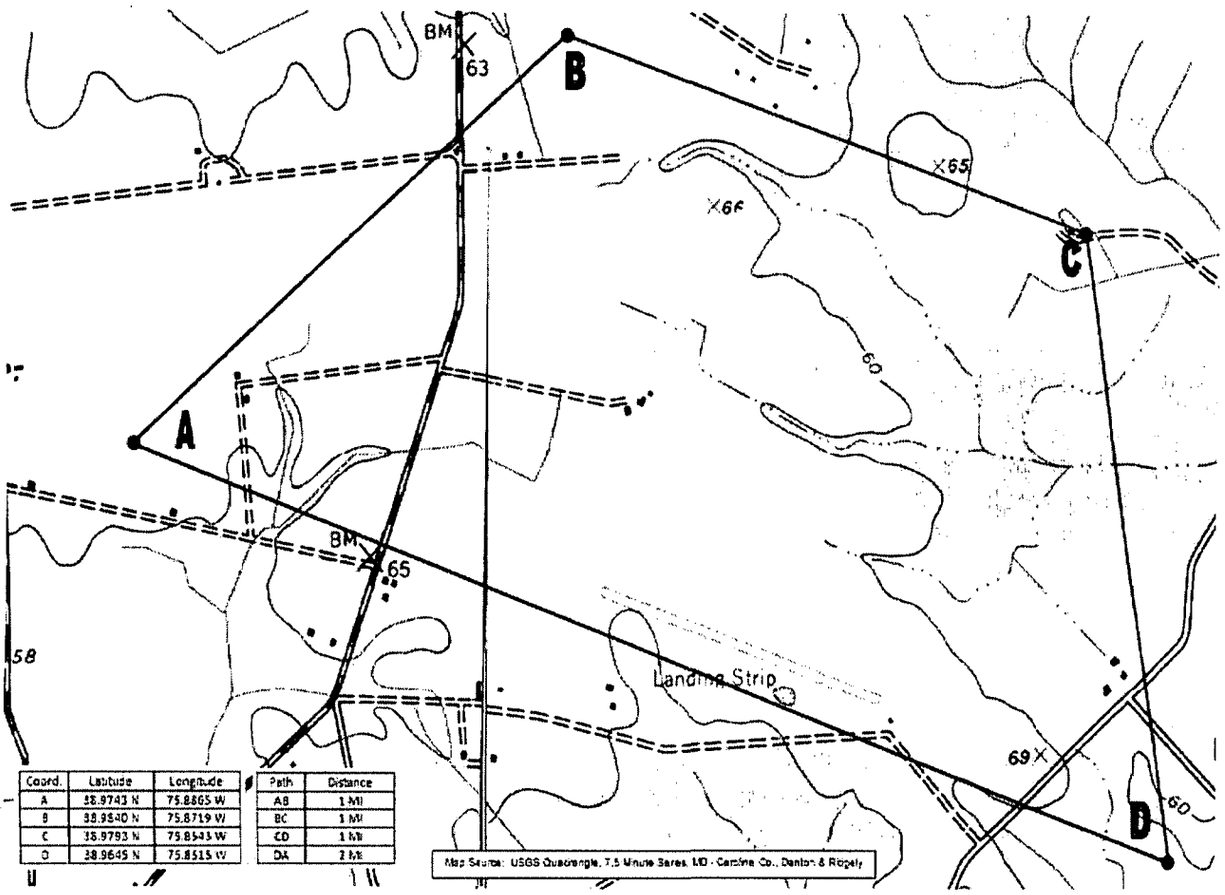

c. Authorized flight times and conditions. All flight operations must be conducted during daylight hours under visual flight rules (VFR), Monday through Friday, with at least 3 miles of visibility and a 3000 ft ceiling.

d. Criteria for remaining in the flight test area. The UAS PIC must ensure all UA flight operations remain within the lateral and vertical boundaries of the flight test area. Furthermore, the UAS PIC must take into account all factors that may affect the capability of the UA to remain within the flight test area. This includes, but is not limited to, considerations for wind, gross weight, and glide distances.

e. Incident/accident reporting. Any incident/accident and any flight operation that transgresses the lateral or vertical boundaries of the flight test area or any restricted airspace must be reported to the FAA within 24 hours. This information must be reported to the Unmanned Aircraft Program Office, AIR-160. AIR-160 can be reached by telephone at 202-385-4636 and fax at 202-385-4651. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov. Further flight operations must not be conducted until the incident is reviewed by AIR-160 and authorization to resume operations is provided to L-3 BAI Aerosystems.

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5. UA Pilots and Observers.

a. UA PIC roles and responsibilities.

(1) The UA PIC must perform crew duties for only one UA at a time.

(2) All flight operations must have a designated UA PIC. The UA PIC has responsibility over each flight conducted and is accountable for the UA flight operation.

(3) The UA PIC is responsible for the safety of the UA as well as persons and property along the UA flight path. This includes, but is not limited to, collision avoidance and the safety of persons and property in the air and on the ground.

(4) The UA PIC must avoid densely populated areas (§ 91.319) and exercise increased vigilance when operating within or in the vicinity of published airway boundaries.

b. UA PIC certification and ratings requirements.

(1) The UA PIC must hold and be in possession of, at a minimum, an FAA private pilot certificate, with either an airplane, rotorcraft, or powered-lift category; and single- or multiengine class ratings, or the military equivalent, appropriate to the type of UA being operated.

(2) The UA PIC must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

c. UA PIC currency, flight review, and training.

(1) No person may act as pilot in command of an unmanned aircraft unless that person has made at least three takeoffs and three landings in manned aircraft within the preceding 90 days acting as the sole manipulator of the flight controls.

(2) The UA PIC must have a flight review in manned aircraft every 24 calendar months in accordance with § 61.56, Flight review.

(3) The UA PIC must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(4) The UA PIC must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(5) All UA PICs must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

d. Supplemental UA pilot roles and responsibilities.

(1) Any additional UA pilot(s) assigned to a crew station during UA flight operations will be considered a supplemental UA pilot.

(2) A supplemental UA pilot assists the PIC in the operation of the UA and may do so at the same or a different control station as the PIC. The UA PIC will have operational override capability over any supplemental UA pilots, regardless of position.

(3) A supplemental UA pilot must perform crew duties for only one UA at a time.

e. Supplemental UA pilot certification and ratings requirements.

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(1) The supplemental UA pilot need not be a certificated pilot, but must have successfully completed a recognized private pilot ground school program.

(2) The supplemental UA pilot must have and be in possession of a valid second-class (or higher) airman medical certificate issued under 14 CFR part 67, Medical Standards and Certification.

f. Supplemental UA pilot currency, flight review, and training.

(1) All supplemental UA pilots must maintain currency in unmanned aircraft in accordance with L-3 BAI Aerosystems company procedures.

(2) All supplemental UA pilots must have a flight review in unmanned aircraft every 24 calendar months in accordance with L-3 BAI Aerosystems procedures.

(3) All supplemental UA pilots must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

g. Observer roles and responsibilities. The task of the observer is to provide the UA PIC(s) with instructions to maneuver the UA clear of any potential collision with other traffic. To satisfy these requirements:

(1) The observer must perform crew duties for only one UA at a time.

(2) At no time will the observer permit the UA to operate beyond the line-of-sight necessary to ensure maneuvering information can be reliably determined.

(3) At no time will the observer conduct his/her duties more than **1 mile laterally or 1000 ft. vertically** from the UA.

(4) An observer must maintain continuous visual contact with the UA to discern UA attitude and trajectory in relation to conflicting traffic.

(5) Observers must continually scan the airspace for other aircraft that pose a potential conflict.

(6) All flight operations conducted in the flight test area must have an observer to perform traffic avoidance and visual observation to fulfill the see-and-avoid requirement of § 91.113, Right-of-way rules: Except water operations.

h. Observer certification.

(1) All observers must either hold, at a minimum, an FAA private pilot license or military equivalent, or must have successfully completed specific observer training acceptable to the FAA. An observer does not require currency as a pilot.

(2) All observers must have in their possession a valid second-class (or higher) airman medical certificate issued under part 67.

i. Observer training.

(1) All observers must be thoroughly trained, be familiar with, and possess operational experience with the equipment being used. Such training is necessary for observation and detection of other aircraft for collision avoidance purposes as outlined in L-3 BAI Aerosystems program letter.

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(2) All observers must have successfully completed applicable L-3 BAI Aerosystems training for the UAS.

6. Equipage.

a. The UAS must be equipped with an operable Mode C transponder, and two-way communications equipment allowing communications between the UA pilot, observers, all UAS control stations, and ATC.

b. The UA must be equipped with operable navigation, position, and/or strobe/anti-collision lights. Strobe/anti-collision lights must be illuminated during all operations.

7. Communications.

a. Before UA flights.

(1) Before conducting operations, the frequency spectrum used for operation and control of the UA must be approved by the Federal Communications Commission or other appropriate government oversight agency.

(2) L-3 BAI Aerosystems shall contact the Maryland State Police, Trooper 6 Heliport, and notify them of planned UAS flight operations.

b. During UA flights.

(1) Ridgley Airpark frequency must be monitored during flight operations.

(2) All UA flight crew positions must maintain two-way communications with each other during all operations. If unable to maintain two-way communication, the UA PIC will expeditiously return the UA to its base of operations and conclude the flight operation.

8. Flight Conditions.

a. Daylight operations. All flight operations must be conducted during daylight hours in visual meteorological conditions (VMC).

b. Prohibitions.

(1) The UA is prohibited from aerobatic flight, that is, an intentional maneuver involving an abrupt change in the UA's attitude, an abnormal acceleration, or other flight action not necessary for normal flight.

(2) Flight operations must not involve carrying hazardous material or the dropping of any objects or external stores.

(3) Each UA must be operated by only one control station at a time. A control station may not be used to operate multiple UAs.

c. Fuel quantity. Fuel quantity shall be limited to 2.5 U.S. gallons per flight.

d. Transponder requirements. The UA must operate an approved operational Mode C altitude encoding transponder during all flight operations.

e. Transponder failure. In the event of transponder failure, the UA must conclude all flight operations and expeditiously return to its base of operations.

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f. Notice to airman. L-3 BAI Aerosystems must request the issuance of a Notice to Airman (NOTAM) through the local Automated Flight Service Station at least 24 hours before flight operation.

9. Flight Termination and Lost Link Procedures.

a. Flight termination. In accordance with L-3 BAI Aerosystems program letter, dated 02/18/2009, flight termination must be initiated at any point that safe operation of the UA cannot be maintained or if hazard to persons or property is imminent.

b. Lost link procedures. In the event of lost link, the UA must provide a means of automatic recovery that ensures airborne operations are predictable and that the UA remains within the flight test area. The observer, all other UAS controls stations, and the appropriate ATC facility will be immediately notified of the lost link condition and the expected UA response.

10. Maintenance and Inspection.

a. General requirements. The UAS must not be operated unless it is inspected and maintained in accordance with the L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009 or later accepted FAA revision. L-3 BAI Aerosystems must establish and maintain aircraft maintenance records (see paragraph 10(d) below).

b. Inspections. No person may operate this UAS unless it has had a condition inspection within the preceding 12 calendar months performed according to the FAA-accepted L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. The UAS must also have been found to be in a condition for safe operation. This inspection will be recorded in the UAS maintenance records as described in paragraph 10(d) below.

c. Authorized inspectors. Only those individuals trained and authorized by L-3 BAI Aerosystems and acceptable to the FAA may perform the inspections and maintenance required by these operating limitations.

d. Maintenance and inspection records. Maintenance and inspections of the UAS must be recorded in the UAS maintenance records. The following information must be recorded:

(1) Maintenance record entries must include a description of the work performed, the date of completion for the work, and the name and signature of the person performing the work.

(2) Inspection entries must contain the following, or a similarly worded, statement: *I certify that this UAS was inspected on (date), in accordance with the scope and detail of the (applicant name) Inspection and Maintenance Program, and was found to be in a condition for safe operation.*

(3) UAS instruments and equipment required to be installed must be inspected and maintained in accordance with the requirements of L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. Any maintenance or inspection of this equipment must be recorded in the UAS maintenance records.

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(4) No person may operate this UAS unless the altimeter system and transponder have been tested within the preceding 24 calendar months in accordance with § 91.413, ATC transponder tests and inspections. These inspections will be recorded in the UAS maintenance records.

11. Information Reporting. L-3 BAI Aerosystems shall provide the following information to Donald.E.Grampp@faa.gov and AIR-200 on a monthly basis:

a. Number of flights conducted under this certificate.

b. Pilot duty time per flight.

c. Unusual equipment malfunctions (hardware or software).

d. Deviations from ATC instructions.

e. Unintended entry into lost link flight mode that results in a course change.

12. Revisions and Other Provisions.

a. Experimental certificates, program letters, and operating limitations. The experimental certificate, FAA-accepted L-3 BAI Aerosystems program letter, and operating limitations cannot be reissued, renewed, or revised without application being made to the New Cumberland Manufacturing Inspection District Office (MIDO), in coordination with AIR-200. AIR-200 will be responsible for FAA Headquarters internal coordination with the Aircraft Certification Service, Flight Standards Service, Air Traffic Organization, Office of the Chief Council, and Office of Rulemaking.

b. Certificates of waiver or authorization. L-3 BAI Aerosystems shall immediately notify the Production and Airworthiness Division, AIR-200, and the New Cumberland MIDO, if there is any plan for requesting a Certificate of Authorization or Waiver (COA) for UAS operations during the time the experimental certificate is in effect. An entry in the aircraft logbook is required to document that the aircraft flight authority has been changed from the experimental certificate to COA. When COA operations are concluded and the aircraft resumes flying under the experimental certificate, a record entry will be made in the aircraft logbook by an appropriately rated person to document that the aircraft is in a condition for safe operation and appropriately configured.

c. Amendments and cancellations. The provisions and limitations annotated in this operational approval may be amended or cancelled at any time as deemed necessary by the FAA.

d. Reviews of revisions. All revisions to L-3 BAI Aerosystems, FAA-accepted, inspection and maintenance program must be reviewed and accepted by the Baltimore Flight Standards District Office (FSDO).

13. UAS Modifications.

a. Software and system changes. All software and system changes will be documented as part of the normal maintenance procedures and will be available for inspection. All software and system changes must be inspected and approved per L-3 BAI Aerosystems Maintenance Program document ID 999-1022, dated 02/18/2009. All software changes to the aircraft and control station are categorized as major changes, and must be provided in summary form at the time they are incorporated.

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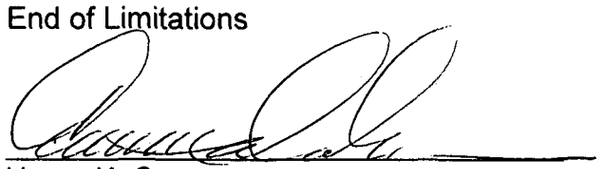
b. Major modifications. All major modifications, whether performed under the experimental certificate, COA, or other authorizations, that could potentially affect the safe operation of the system, must be documented and provided to the FAA before operating the aircraft under this certificate. Major modifications incorporated under COA or other authorization need to be provided only if the aircraft is flown under these authorizations during the effective period of the experimental certificate.

c. Submission of modifications. All information requested must be provided to AIR-200.

End of Limitations



Henry K. Cooper
Aviation Safety Inspector
New Cumberland Manufacturing Inspection District Office
Bldg. 201, Room 102, 400 Airport Drive
New Cumberland, PA 17070-3419

Date: 2/18/09

I certify that I have read and understand the operating limitations and conditions that are a part of the special airworthiness certificate, FAA Form 8130-7, issued on 02/18/2009, for the purposes of [research and development, market survey, and/or crew training.

This special airworthiness certificate is issued for L-3 BAI Aerosystems Viking 100 UAS, serial number 106, registration number N721UA.

Applicant (signature)

Date: 2/18/09

Name: Mark Ensor

Title: Vice President and General Manager

Company: L-3 BAI Aerosystems

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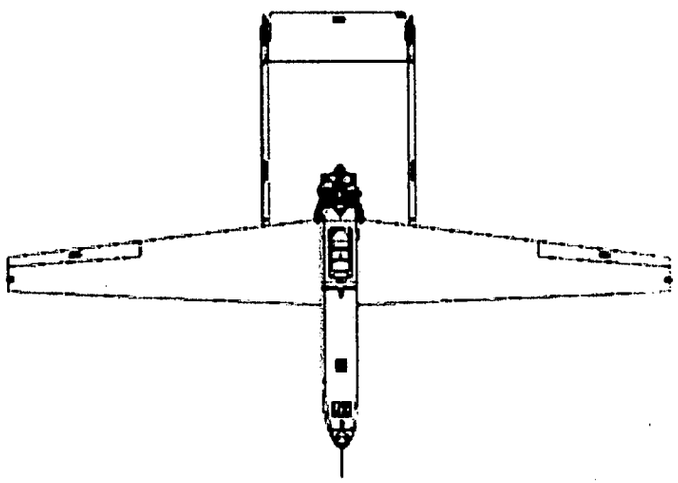
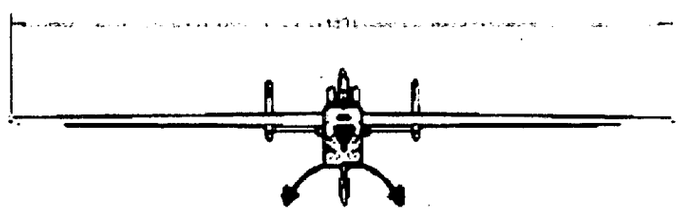
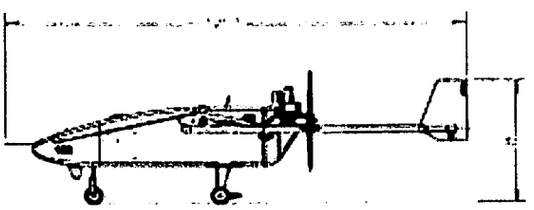
1 Section 1: General

3-View



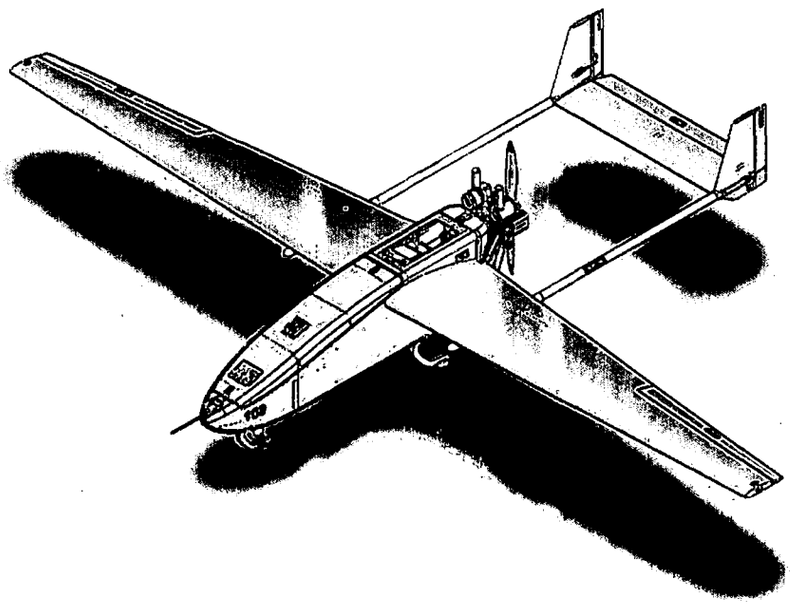




Note: Dimensions are in inches

Note: Wheeled Version Shown. Skid landing gear optional

communications
BAI Aerosystems



PROGRAM LETTER

for the

Viking 100 UAS

Document 001-1243
Version 4.0 (20090406)

Prepared by:
L-3 BAI Aerosystems
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Easton, Maryland USA 21601
Voice: 410.820.7500
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E-Mail: BAI.Sales@L-3Com.com

Copyright 2009: L-3 BAI Aerosystems

REGISTERED OWNER NAME: L3 BAI AEROSYSTEMS POC: MARK ENSOR, TIEN-SENG CHIU **REGISTERED OWNER ADDRESS:** 9040 GLEBE PARK DR. EASTON, MD 21601 PHONE: 410-820-7500 **AIRCRAFT DESCRIPTION:** VIKING 100 UNMANNED AERIAL SYSTEM (UAS) **AIRCRAFT REGISTRATION:** N721UA	**AIRCRAFT BUILDER:** L3 BAI AEROSYSTEMS **YEAR MANUFACTURED:** 2008 **AIRCRAFT SERIAL NUMBER:** VIKING 100 #106 **AIRCRAFT MODEL DESIGNATION:** VIKING 100 UAS **ENGINE MODEL:** 3W Modellmotoren 3W157iBTF-TS **PROPELLER MODEL:** BOLLY 30x10 Or BIELA BLACP22910

1 Overview of Project

L3 BAI Aerosystems (L3 BAI), a division of L3 Communications, has been providing customers with Unmanned Aerial System (UAS) solutions since 1985. Evolutionary product development has created the Viking Series UAS. The Viking 100 UAS, with a 15 foot wingspan and a gross takeoff weight of 154 lbs, is the smallest of the Viking family.

Like most UAS, the primary mission of the Viking 100 is to perform Intelligence, Surveillance, and Reconnaissance (ISR) and provide a real time downlink of information from sensors and payloads. Typically imagery data is provided. Other specialized payloads include signals intelligence (SIGINT), precision dispensing systems, and airborne communications relays.

For many years, L3 BAI operated at a private airfield at altitudes less than 1000 ft AGL and within visual range of the aircraft, similar to the limitations expressed within AC 91-57, the authorization for operation of recreational model aircraft. The convenience of a local operations site to L3 BAI's facility strongly supported L3 BAI business activities including research and development, marketing demonstrations, flight acceptance testing, crew training and proficiency.

The ability to operate at a site closer to the L3 BAI facility is a strong motive to pursue the airworthiness certificate. L3 BAI has not operated UAS within the National Airspace (NAS) since December of 2006, recognizing the requirement for authorization as stated in FAA docket FAA-2006-25714. L3 BAI currently operates UAS, including the Viking 100, in restricted airspace at Aberdeen Proving Grounds in Maryland.

An experimental certificate will support the ability to conduct research and development in regards to improvements of the capabilities of the system. The ability to conduct flight demonstrations and support market surveys with the Viking 100 promotes business opportunities. Maintaining crew proficiency and training will be facilitated by the ability to operate at a local site. Issuance of an experimental airworthiness certificate will corroborate the suitability of the Viking 100 UAS to meet customer requirements.

1.a Definition of Experimental Purpose

In accordance with 14CFR § 21.191, the operation of the Viking 100 UAS in the NAS is sought to pursue experimental purposes defined in paragraphs (a) Research and development, (c) Crew training, and (f) Market surveys.

1.b Description of the purpose/scope of the experimental program

Research and Development

Flight performance characteristics of the aircraft will be assessed and maintenance / life cycle cost data for the UAS system including the engine and alternator subsystem will be collected. Launch and recovery techniques, including emergency parachute and parafoil recovery, launcher assisted takeoff will be pursued. Integration and testing of varying payloads and sensor systems, and flight qualification of minor hardware and software upgrades can be anticipated as part of the research and development program.

Showing compliance with regulations

Successful and safe flight operations within the National Airspace will allow L-3 BAI to verify and validate its maintenance and training plans.

Crew training

UAS operators are required to meet criteria demonstrating flight qualification and proficiency as part of L3 BAI's pilot certification program. The application will provide staff operators the opportunity to maintain and improve their skills and familiarity with the Viking 100 UAS.

Market surveys

L-3 BAI will perform market surveys for potential customers by:

Demonstrating the flight characteristics of the Viking 100 UAS

Demonstrating the flight operations of the Viking 100 UAS

Demonstrating the payload capabilities of the Viking 100 UAS

2 Definition of Flight Areas

2.a Describe the areas over which the flights are to be conducted and address of base operation (14 CFR § 21.193(d)(3)).

The requested Area of Operations is Ridgley Airpark This area is remote and surrounded by water minimizing risk to persons and property.

2.b *Identify all proposed flight areas using latitude and longitude on aeronautical maps.*

The requested flight authorizations are described below. Requested hours of operation are sunrise through sunset, 7 days a week.

Ridgely Airpark (KRJD)

A map is provided in Appendix 1 and the area is physically described below:

The airspace extending upward to but not including 1000 ft AGL within an area bounded by a line beginning at lat. 38° 58' 27" N long. 75° 53' 11" W, to lat. 38° 59' 2" N long. 75° 52' 19" W, to lat. 38° 58' 45" N long. 75° 51' 15" W, to lat. 38° 57' 52" N long. 75° 51' 5" W, and back to the beginning point is requested for UAS operations.

2.c *Include information on airspeed, altitude, number of flight hours, number of flights and program duration for each test flight area.*

Operations to 1000 ft AGL are requested within the AO. Airspeed of the Viking 100 is 65 KIAS cruise, 75 KIAS max. The Viking 100 endurance is currently approximately 12 hours. All flights will be recovered with a minimum of 45 minutes fuel reserve.

In regards to 14 CFR § 21.193 ((d)(2),(d)(3),(d)(4)) -The schedule of flight authorization is requested for Monday thru Friday, sunrise through sunset, with flights unlimited within the requested schedule and area of operations. Requested flight authorizations for the area of operations (AO) are discussed in Section 3a of this letter. It is emphasized that all operations are to be VFR and within 0.82 NM of the pilot/operator with observers as required. A detailed flight schedule in regards to anticipated experimental purposes is currently not available.

2.d *What class of airspace will be used?*

Class G Airspace.

2.e *Will minimum fuel requirements of 14 CFR § 91.151 be met?*

Yes. All flights will be recovered with a minimum of 45 minute fuel reserve.

2.f *Will flight-testing include payload testing?*

Yes.

2.g *Considerations that need to be taken with regard to payloads.*

Payload considerations include the following:

Compatibility of the payload to the UAS airborne environment. This includes effects from ambient airflow, vibration, ambient temperatures, and the separation of payload components while in flight.

This is considered a payload manufacturer's responsibility. L3-BAI can provide a power-spectral density plot from a similar airplane as a baseline vibration environment. Prior to pre-flight, the payload is installed in the UAS and the entire system is operated, including operation of the engine. Both the UAS and the payload must demonstrate proper operation prior to the UAS/payload configuration release for a pre-flight check.

The payload will be inspected by L-3 BAI to assess structural integrity and ensure that no part of the payload or UA will separate while in-flight. L-3 BAI has no intent to deliberately dispense objects from the Viking 100, but if it becomes necessary, this will occur in accordance with 14 CFR 91.15.

Compatibility of the payload to UAS weight and balance limits.

The location of the center of gravity is verified during pre-flight to ensure that the CG is within stated limits.

Compatibility of the payload to the UAS electrical system environment. This includes quiescent power consumption, maximum power consumption, voltage compatibility, ability of payload to be in a low-power mode during taxi, takeoff and landing, sensitivity of the payload to on-board electrical noise present in the power supplied, and the amount of electrical noise generated by the payload that is conducted into the power system.

A power analysis is conducted to ensure adequate power margin. Generally, payloads that have high power consumption are outfitted with a L3-BAI controlled power switch so that, in the event of an in-flight alternator or engine failure, L3-BAI may disconnect electrical power to the payload in order to maximize the amount of electrical power available to safely land the aircraft.

Compatibility of the payload to the UAS Electro-Magnetic Environment.

This includes susceptibility of the payload to the Radio Frequency equipment that is intentionally transmitting on the UAS (such as the datalinks), susceptibility of the payload to equipment that unintentionally radiates (such as the spark ignition system), amount of signal transmitted by the payload in bands used by the UAS for either command and control, or for navigation, and the amount of signal generated by the payload that has indirect, unexpected effects on the control system (for example, disruption of the servos).

Prior to pre-flight, several checks are performed to ensure Electro-Magnetic compatibility between the UAS and the payload. First, a spectral "sweep" is conducted of the payload in its various operating modes. Particular attention is paid to those frequency bands that are used by the UAS. However, a wide-band sweep is also conducted to determine if the payload is generating signals in any other band. Next, the payload is energized while the UAS is also energized and radiating with all datalink transmitters operating. Proper UAS operation and payload operations are verified. Finally, the UAS engine is started and operated at moderate power settings to expose the payload to a vibration environment, engine spark ignition system electrical noise, and alternator-generated electrical signals. Proper operation of the UAS systems and payload is verified prior to the aircraft being released for pre-flight.

Compatibility of the payload to the aerodynamic envelope of the UAS. This includes assessment of the impact of the payload to the outer mold line of the UAS.

Prior to payload integration, the payload will be assessed for aerodynamic effects on the UAS. Primarily, this is focused on increased drag due to payload protuberances, cooling air requirements, sampling probes and the like. The possibility of increased turbulence and vortex generation is also assessed. These events occur prior to payload integration. Generally, a payload mock-up will be test flown prior to an actual flight with the payload on board.

2.h *Will the aircraft perform any aerobatic maneuvers?*

There will be no intentional aerobatic maneuvers conducted.

2.i *Flight Conditions (e.g., VFR, IFR, VMS, etc.)*

All flight operations will be under Visual Flight Rules only.

3 Aircraft Configuration.

3.1 Viking 100 Unmanned Aerial System Diagrams

The following photographs show the aircraft configuration as requested in 14 CFR § 21.193(b)(4).

Figure 1 shows the Viking 100 Unmanned Air Vehicle (UAV) Figure 2 is the Generation IV Ground Control Station (GCS)

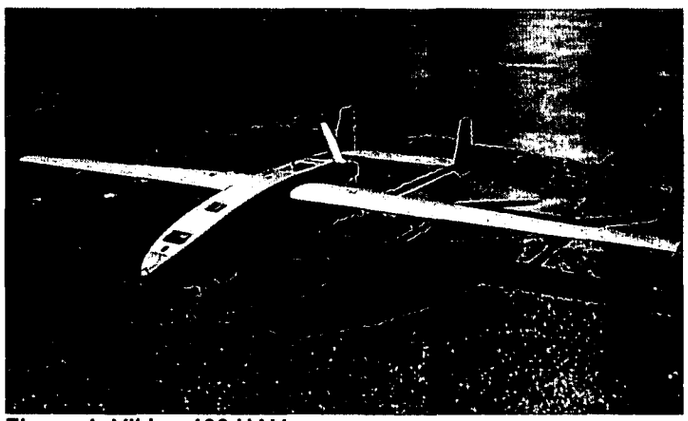


Figure 1: Viking 100 UAV

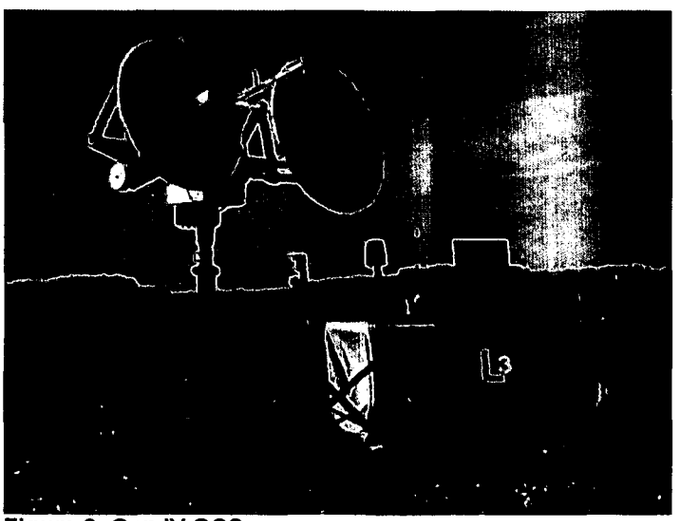


Figure 2: Gen IV GCS

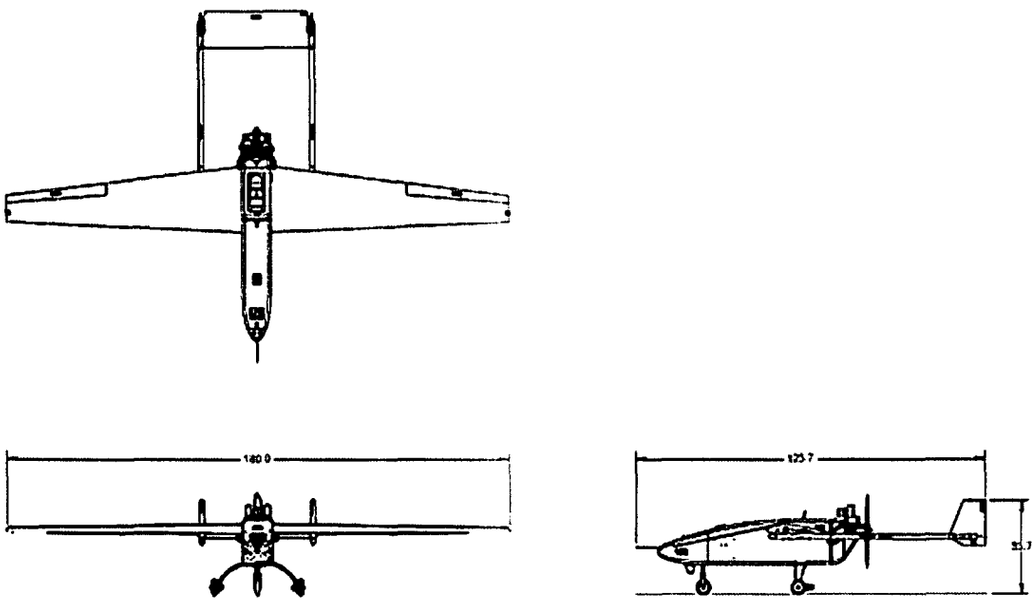


Figure 3: 3 View Drawing of Viking 100 UAV

3.2 Specifications:

Wing span	180 Inches
Length	127 Inches
Powerplant	Two stroke, 157cc, twin cylinder, internal combustion engine, electronic ignition
Max gross take off weight	154lbs
Fuel capacity	50:1 Gas / Oil Mixture, capacity 8 gallons(US)
Payload capacity	20 lbs
Max altitude	12,000 ft MSL
Endurance	12 Hours
Max airspeed	75 Knots (Max at Sea Level)
Control/data frequencies	902-928 MHz bidirectional spread spectrum modem datalink. 1350-1390 MHz bidirectional spread spectrum modem datalink 1710-1859 MHz broadband analog downlink, agile to 1 MHz increments, 20 MHz bandwidth
Guidance and navigation control	Piccolo II Flight Control System. GPS navigation, magnetometer backup

4 Inspection and Maintenance (14 CFR Part 91 Subpart E).

4.a Describe the inspection and maintenance program that will be used to maintain the aircraft and related systems (includes ground stations and/or other support systems).

Maintenance

Maintenance consists of "upon discovery" events, flight-hour events, and calendar time events. A log of operation and maintenance data is maintained for the UA and the GCS and major UAS subsystems.

Inspections

Aircraft inspections are performed both during pre-flight, as well as post-flight. As this aircraft is not permanently based at the flight operations area, the UA, the GCS, and all flight support equipment must be disassembled and stowed for transit. During assembly and disassembly, examinations are performed on all of the system components, and generating "upon discovery" maintenance items. These items are repaired or replaced prior to the next flight operation, and an entry made in the appropriate logbook(s).

Those items that have inspection or replacement intervals specified by operating hours (for example, spark plugs) are inspected at the appropriate interval and replaced as required, and an entry made in the appropriate logbook(s).

Calendar-time based maintenance items are performed as required. If a calendar-time inspection has been missed due to the aircraft or GCS being in storage, all open inspections or maintenance must be completed prior to the aircraft being released for flight operations, and an entry made in the appropriate logbook(s).

4.b Provide copy of flight manual, if applicable, current weight and balance report, equipment list.

See attached "Viking 100 Pilot Information Manual".

5 Pilot Qualification(14 CFR §§ 61.3, 61.5).

5.a Describe the qualifications for each pilot.

UA Pilot in Command (Kane): Private Pilot certificate, Single Engine, Land, with Instrument-Airplane rating, and holds a Second Class medical certificate. 10 hours operating the Viking 100 UAS, and has over 600 hours of operation with the Tigershark and Mako UAS, which are very similar to the Viking UAS.

UA Internal Pilot (Lister): Private Pilot certificate, Single Engine, Land, and holds a Second Class medical certificate. 1000 hours in with the Mako and Tigershark UAS.

UA Observer (Stevens): Over 900 hours flying the Mako in theatre, and has flown model aerobatic competitions for the past 10 years. Also flown acceptance test flights for over 50 Tigershark UAS and has served as external pilot for 25 hours of flight for the Viking 100 UAS and nearly 70 hours with the Viking 300 UAS. Second Class medical certificate. Completed FAA Knowledge Exam - Private Airman Course.

5.b *Pilots must be qualified / certificated in the appropriate type of aircraft, i.e., rotorcraft, powered lift, fixed wing, etc.*

Single engine, land.

5.c *Describe internal training program to qualify pilots.*

External Pilots

All candidates are screened for Private Pilot certificate, Airplane, Single Engine Land (or higher) and basic R/C skills, then receive training for:

- Operations with aircraft with wing and power loadings similar to the Viking 100.
- Autopilot functional modes and capabilities
- Viking 100 UAS Familiarity to include
    - System Unpack and assembly
    - Preflight checks
    - Postflight checks
    - System disassembly and pack up
- Viking 100 systems to include
    - Electrical Power
    - Command and Control
    - Navigation
    - Propulsion and Fuel
    - Structure and Landing Gear
- Intercom System Procedure and keywords
- Radio procedure and keywords
- Emergency Procedures – GCS
- Emergency Procedures - UA

Internal Pilots

All candidates are screened for Private Pilot certificate, Airplane, Single Engine, Land (or higher) and basic computer skills, then receive training for:

Viking 100 UAS Familiarity to include

- System Unpack and assembly
- Preflight checks
- Postflight checks

- System disassembly and pack up
- Setup and checkout of the Gen IV GCS
- Setup and operation of the Piccolo Operator's Interface to include
    - Configuration of the software
    - Mission Planning
    - Mission Execution
    - Mission Modification
- Viking 100 systems to include
    - Electrical Power
    - Command and Control
    - Navigation
    - Propulsion and Fuel
    - Structure and Landing Gear
- Intercom System Procedure and keywords
- Radio procedure and keywords
- Emergency Procedures – GCS
- Emergency Procedures - UA

5.d Describe the qualifications and training of observers.

Observers are required to hold a FAA Second Class medical certificate.

Observer training includes:

- Intercom System Procedure and keywords
- Radio procedure and keywords
- Visual scanning techniques
- Flight operations at non-towered airports
- Operating zone and determining aircraft position within that zone.

6 Aircraft Marking (14 CFR Part 45). All Unmanned Aerial System (UAS) are required to be registered and identified with the registration number. Aircraft must be marked in accordance with 14 CFR Part 45.

The Viking 100 will be marked IAW 14 CFR Part 45. IAW Section 45.29, paragraph 1(iii). Markings will be placed on the fuselage, IAW 14 CFR 45.25, paragraph a. Registration number N721UA has been allocated for this aircraft.

7 ATC Transponder and Altitude Reporting System Equipment and Use(14 CFR § 91.215). Describe the aircraft altitude reporting system.

The Viking 100 is equipped with a Micro Air T2000UAV-S UAV Transponder and an AKC Technologies A-30 Mod 4 blind altitude encoder. This device is based upon the FAA certified T2000SFL transponder and has Mode A and Mode C capabilities.

8 Method for See and Avoid (14 CFR § 91.113a).

See and avoid will be achieved visually by using ground observers to keep observation for other air traffic. Additionally, an aviation-band transceiver will be used to monitor and communicate with air traffic in the area.

9 Safety Risk management

In accordance with 8130.34, Appendix C is completed and provided with all application requirements. Please consult the submitted checklist for safety risk management information (L3 BAI Ref Doc 001-1242).

10 System configuration. Provide a description of aircraft system configuration and all on-board and ground-based equipment.

10.1 Air Vehicle

Note: The following text in this section is excerpted from the "Viking 100 Pilot Information Manual" and is incorporated here for reference only. The PIM should be referenced for up-to-date information.

10.1.1 Airframe

The airplane is an all-composite, single-engine airplane equipped with tricycle, or skid landing gear and is designed for general utility and surveillance purposes. The basic design is a pusher configuration with twin tail-booms that are cantilevered from the wings. Each tail-boom is equipped with a vertical stabilizer and control surface. A horizontal stabilizer is mounted between the two vertical stabilizers.

The airframe is built out of modular components, which include wings (2), horizontal stabilizer, vertical stabilizers (2), tail booms (2), fuselage, spar tube, anti-rotation tube, and various hatches. Any of these components may be replaced in the field while not affecting flight characteristics. It may be necessary to surface calibrate the autopilot to new servos.

10.1.2 Flight Controls

The airplane uses conventional airplane control surfaces (aileron, elevator, rudder, and throttle) for flight control. Each of these surfaces is actuated with an electromechanical actuator, called a servo. The servos translate electrical signals from the flight control system into mechanical motion to move the flight control surfaces.

There are eight servos in the airplane: one each for the ailerons (two total), one each for the rudders (two total), one each on the main wheels (two total), one for the elevator, and one for the throttle.

To prevent damage to the servos, it is important to avoid back-driving the servos by manually moving the control surfaces with the servos attached. While some movement is unavoidable, it should be minimized.

10.1.3 Landing Gear

The landing gear is of a tricycle configuration, with a steerable nose gear. The main and nose gear struts are made of aluminum. The nose gear features a spring suspension system to provide some shock absorption. The nose gear is directly connected to the nose-wheel steering servo. Each of the main tires is equipped with a servo-driven, mechanical brake that activates by applying a pressure pad to the wheel. Both brakes activate with the same control; there is no differential braking. All steering is affected through nose-wheel steering.

10.1.4 Hatches

The removable composite hatches are attached to the airplane by the use of quarter-turn fasteners (Southco). These hatches and covers shall be securely fastened prior to attempting flight.

10.1.5 Engine

The engine is an air-cooled, horizontally-opposed twin cylinder, two-stroke type that directly drives the propeller and is rated to generate 15 HP at 6500 RPM.

10.1.6 Engine Controls

Engine power is controlled by the throttle servo. There is no mixture control, although the carburetor has high and low-speed needle valves that may need to be adjusted.

10.1.7 Engine Instruments

The engine is equipped with two tachometer sensors. One of the sensors is used by the ignition system to set spark timing. The other sensor provides the signal to drive the display in the Ground Control Station. These sensors are independent, and a failure of one will not affect the other, but these sensors do not provide redundancy. The failure of the ignition timing sensor will cause the engine to stop operating. However, it is critical that the sensors are connected properly. The engine will not operate if these sensors are cross-connected. The sensors have unique connectors that make it difficult to cross-connect.

The magnetic pickup signal is amplified through the "tach-deadman" unit. This unit converts the relatively low voltage signal (800 mV p-p) from the tachometer sensor into a digital 5V square wave so the autopilot can process this signal correctly. The tach-deadman unit also contains an electronic power switch that controls the ignition module. Through activation of this switch, the flight control system, as well as the pilot, has the ability to shut down the engine at any time during flight. This is the method that the flight control system will use to self-terminate the flight if certain pre-selected parameters have been met.

10.1.8 Engine Break In

All engines are "broken in" at the factory. A field-replaced engine may be used to fly a mission right "out of the box."

10.1.9 Ignition System

The engine uses a capacitive-discharge ignition system. The power system in the airplane provides 6V DC power to the ignition module. The ignition module converts the 6V DC power to the 35 kV spark pulse in order to fire the spark plugs. The ignition tachometer sensor is used to set the proper spark timing. There are two ignition modules for better engine performance and to provide some redundancy.

10.1.10 Air Induction System

The engine uses a butterfly-valve carburetor with an integral diaphragm fuel pump and automatic pressure compensation. Fuel metering is achieved through a number of fixed jets. There are two adjustable needle valves, one for high-speed operation, and one for low-speed operation. These needle valves are spring-loaded to prevent inadvertent movement and may need to be adjusted to match local environmental conditions.

A pressure sensing hose is attached between the air filter assembly and the carburetor. It is important that this hose remains undamaged and connected for proper operation.

The carburetor is equipped with an air filter to prevent sand and debris from being ingested by the engine. This air filter is a depth-type element that may be cleaned and returned to service.

The carburetor-to-engine interface has a reed-style valve that permits the engine to move the fuel-air mixture into the cylinders.

It is important that there are no air leaks in the induction system as this would result in a non-optimal mixture which will adversely affect engine performance. Leaks can occur between the carburetor and the reed-valve assembly, and between the reed-valve assembly and the engine crankcase.

10.1.11 Exhaust System

The exhaust system is composed of two separate expansion-type mufflers, one for each cylinder. These mufflers are directly mounted to the cylinder.

10.1.12 Propeller

The propeller is a composite, fixed-pitch type made of carbon fiber. The propeller is attached to the engine with six socket-head screws which also hold the starter 'dog' to the engine / propeller combination. A back plate resides between the engine and the propeller. This plate is essential to prevent the engine heat from softening the epoxy in the propeller. The manufacturer may be either Bolly or Biella.

10.1.13 Fuel System

There is a single fuel tank with integral fuel baffles. This fuel tank is located in the fuselage and is centered about the center of gravity. There are no pitch changes as the fuel is used.

The tank is made of a composite material and features a tank filling line, vent line, fuel outlet line, fuel sump, and a level gauge. The tank holds approximately 5.0 U.S. gallons.

The fuel filling line is connected to a receptacle located in the side of the fuselage and is used to fill the tank with up to 5.0 U.S. gallons of gas-oil mixture. It is imperative that the fuel contain no less than 2% (50:1) oil for adequate lubrication of the engine. Without oil in the fuel, the engine will rapidly overheat and eventually stop operating.

10.1.14 Fuel Indicating

The fuel-level indicator is mounted in the fuel tank. It is a capacitance gauge that has been calibrated for fuel level in a level, stationary environment. During normal operations there may be some fuel movement within the tank that will disturb the fuel reading from the correct value. It is important to monitor the amount of time flown since takeoff to help estimate the amount of fuel actually burned.

10.1.15 Fuel Venting

There is a vent line attached to the fuel tank. The purpose of this vent is to allow air into the tank as the fuel is depleted. If the fuel vent becomes blocked, the engine will eventually stop as it will be unable to pull fuel from the tank.

10.1.16 Electrical Power System

10.1.16.1 General

There is a single electrical "bus" in the airplane. All circuitry is attached to this electrical bus. There is no circuitry protection (e.g. fuses, circuit breakers) in this bus since the pilot will not have access to any of these devices during flight operations.

10.1.16.2 Power Source

The primary source of power is a LiSO2 battery. See below for more information.

10.1.16.3 Battery

There are six (6) LiSO2 batteries aboard the aircraft providing a total of 72 ampere-hour, at 12 V of power each for all electrical systems on the aircraft. During normal operation, the batteries will last for 10 hours of flight time.

10.1.16.4 Power Distribution

The primary 12V DC is distributed to the various components through the switches (see Switches). There are a number of voltage regulators to convert the 12V DC power into the power required by the devices. Specifically, the servos operate on 6V DC, and the ignition module operates on 6V DC. Each of the regulators is a separate circuit to isolate failures to that particular component.

All of the regulators are "buck" style (voltage step-down), switching DC-DC power converter that has a minimum efficiency of 80%.

10.1.16.5 Switches

There are a total of 6 switches required to power the airplane: Battery, Master, Video, Transponder, and two Ignition switches.

The Battery switch connects the battery to the electrical system. This is the first switch to be closed, as the functionality of all of the remaining switches depends on this switch.

The Master switch connects power to the flight control system, including the servo and ignition voltage regulators, auxiliary uplink receiver, the payload connector, side and forward navigation video cameras, and the video switch. Once the Master switch is closed, the flight control system begins its power-on sequencing and it is possible for the airplane to be operated and flown. Closure of this switch will cause about 2A of load to be placed on the battery.

The Video switch connects power to the video transmitter. Closure of this switch causes about another 3A of load to be placed on the battery.

The Transponder switch connects power to the Mode-C transponder. The closure of this switch merely enables transponder operation. The transponder itself has a power / mode select switch that must be in the proper position for use.

The Ignition switches are used to independently power each ignition module. Each switch is equipped with an LED indicator to show when power is available for each ignition module. The Ignition switches are the only switches that are not over-center locking for safety reasons. It is imperative that when first turning on aircraft power that these switches are in the OFF position. If the switches are in the ON position during airplane power-up (Battery and Master switches), it is possible for the engine to unexpectedly fire, potentially causing injury or death to personnel.

10.1.17 Flight Control System

***Note**: Conventional UAS terminology often describes the flight control system as an "autopilot". This is not to be confused with the term "autopilot" as is used in General Aviation; the "autopilot" in a UAS provides a conduit for all flight control, regardless of whether "autopilot" functions (altitude hold, course following) are activated. Generally, what is referred to as an "autopilot" is the digital control portion of the flight control system, and may or may not include navigation equipment (GPS receivers, vertical gyros), but will always contain the information and data processing equipment.*

The proposed Viking 100 configuration uses a combination of a handheld, R/C style manual control device and a computer autopilot system called a Piccolo manufactured by Cloudcap technologies. The operator can switch between manual control and autopilot at the Ground Control Station.

10.1.18 Datalink System

The airplane uses 3 different datalink systems: The built-in datalink in the autopilot, an auxiliary uplink system, and the downlink / video system. The multiple systems provide control redundancies and the ability to downlink flight data and video data from the air vehicle.

10.1.19 Lighting System

The airplane has a blinking red "beacon" light on the vertical tail, a red position indicator lamp on the left wing tip, a green position indicator lamp on the right wing tip, and a white nose position indicator lamp. All of these lamps are high-intensity Light Emitting Diodes and have a service life of over 20,000 hours.

The lights are controlled by the pilot from the Ground Control Station. On board the airplane, the autopilot interprets the pilot's commands and activates circuitry to turn power on and off to the lights.

The lights must be turned on at all times, since the anti-collision light is only activated when the rest of the lights are illuminated.

10.1.20 Pitot-Static System

The airplane uses a conventional pitot-static system. The autopilot has sensors for both airspeed and barometric altimeter. The altimeter can be used as a sensitive altimeter.

The airspeed readings in the Ground Control Station are INDICATED readings. No compensation for location error or instrument calibration is provided, however, true airspeed compensation based on outside air temperature is provided.

10.1.21 Transponder

The Viking 100 is equipped with a Bendix King KT 76A Transponder and an AKC Technologies A 30 Mod 4 blind altitude encoder. This device supports Mode A and Mode C capabilities. The Bendix King transponder does not support remote control of the 12 bit code and "Ident" functions.

End excerpt from "Viking 100 Pilot Information Manual

10.2 Generation IV Ground Control Station

The Generation IV Ground Control Station consists of two primary components and a number of accessory devices. The primary components are: The Ground Control Station Module, and the Antenna Rotator Assembly. Additional components are the Futaba Pilot Console, the Universal Payload Controller, the Laptop Computer, the Video Recorder, and the cables necessary to interconnect all of the devices.

10.2.1 Ground Control Station Module

The Ground Control Station Module contains the power supplies and most of the computing-data processing equipment necessary to communicate through the datalinks with the Piccolo flight control system. Within the Ground Control Station Module, a slide-out rack houses a 15-inch Liquid Crystal Display monitor that is used to view the video being received by the Ground Control Station. Another microprocessor communicates with the Piccolo Ground Control Station element and the UA to determine the elevation and azimuth between the Gen IV Ground Control Station and the UA. It then can use power switches to drive motors within the Antenna Rotator Assembly to make the directional antennas point directly at the UA for maximum signal reception. Feedback is through a magnetometer mounted on the Antenna Rotator Assembly.

10.2.2 Antenna Rotator Assembly

The Antenna Rotator Assembly houses some of the Radio Frequency communications equipment (datalinks); most of the antennas required for communications with the Viking 100 UA; and the elevation-azimuth gimbal used to move the directional antennas. The Antenna Rotator Assembly contains slip-rings and an RF rotary joint so that the Antenna Rotator Assembly can traverse 360 degrees of continuous azimuth without encountering cable limitations.

10.2.3 Futaba Pilot Console

The Futaba Pilot Console is used by the external pilot to control the flight control surfaces when in manual mode, and select between manual and autonomous flight modes. The Pilot Console is a modified Futaba 9Z or 9C radio control unit.

10.2.4 Universal Payload Controller

The Universal Payload Controller performs a similar function as the Futaba Pilot Console, but is used to control the gimbaled optical payloads usually flown with the Viking 100 UAS. The Universal Payload Controller communicates with the Piccolo Ground Control Station by a serial data cord.

10.2.5 Laptop Computer

The Laptop Computer runs the Piccolo Operator Interface, which is specialized software used as the Human-Machine Interface with the Piccolo Flight Control System. From the Operator Interface (OI), the internal pilot monitors ongoing missions, may select waypoints, cause the UA to fly to a different waypoint or plan new missions. Also from the OI, the internal pilot can set all of the programmable contingency elements, such as maximum lost link time, loss of GPS time.

10.2.6 Video Recorder

The Video Recorder is used to record the real-time video and telemetry from the UA for future exploitation or playback.

11 System Safety, Flight Termination and Lost Link.

The Viking 100 UAS provides automatic responses to some flight emergencies and has the flexibility for the operator to program in the response parameters. Specific detail on the automatic responses is provided in the Safety Checklist

.

12 Command and Control. Provide a brief description of the system and/or procedures for command and control of the UAS.

The pilot in command (PIC) is responsible for verifying all preflight mission planning and checklists are complete.

Typical flight operations use the manual mode for takeoff and recovery by an external pilot. The external pilot then activates the autonomous flight mode and transfers control to an internal pilot who monitors the software interface as the vehicle navigates the preplanned mission route. The internal pilot will then modify the mission as needed to coordinate the aircraft motion with a payload operator to optimize the ISR mission. The external pilot maintains visual line of sight with the aircraft and retains the Pilot In Command authority to ensure safe conduct of the flight operations.

Once the mission portion of the flight has been concluded, the internal pilot maneuvers the vehicle to a suitable altitude and position for the external pilot to take control of the air vehicle for a manually controlled landing.

13 CONTROL STATIONS. Provide a brief description of the ground/airborne stations used to control the UAS.

There is no intention to use an airborne control station to control the UA.

The Gen 4 Ground Control Station is shown in Figure 2.. The main chassis contains the RF and data communication equipment. At the core of the GCS is the Piccolo II Flight Control System, which provides the main interface to the laptop internal pilot/operator interface, the external pilot vehicle controller, the payload controller, and to program and command interfaces.

There is a switch on the vehicle controller and at any time, the pilot can take control of the aircraft in manual mode or return to autonomous mode. In manual mode, the pilot has full authority of the flight control surfaces. In the autonomous mode, the vehicle dynamics are not allowed to exceed preset limits as measured by the gyros, accelerometers, and air sensor data. There are other semi-autonomous modes in which the pilot can override the autonomous mission using the vehicle controller to steer or change the elevation of the vehicle.

The antenna array consists of omni antennas on the three frequency bands used. All flight operations are intended to be well within the useful range of these antennas. The directional antennas can be used for increased gain by using a switch on the main chassis. These directional antennas are mounted on a two-axis rotator, which uses the position information from the aircraft and GCS to steer the rotator.

14 Control Frequencies. Provide a description/listing of the frequencies used to control the UAS.

14.1 Command and Control

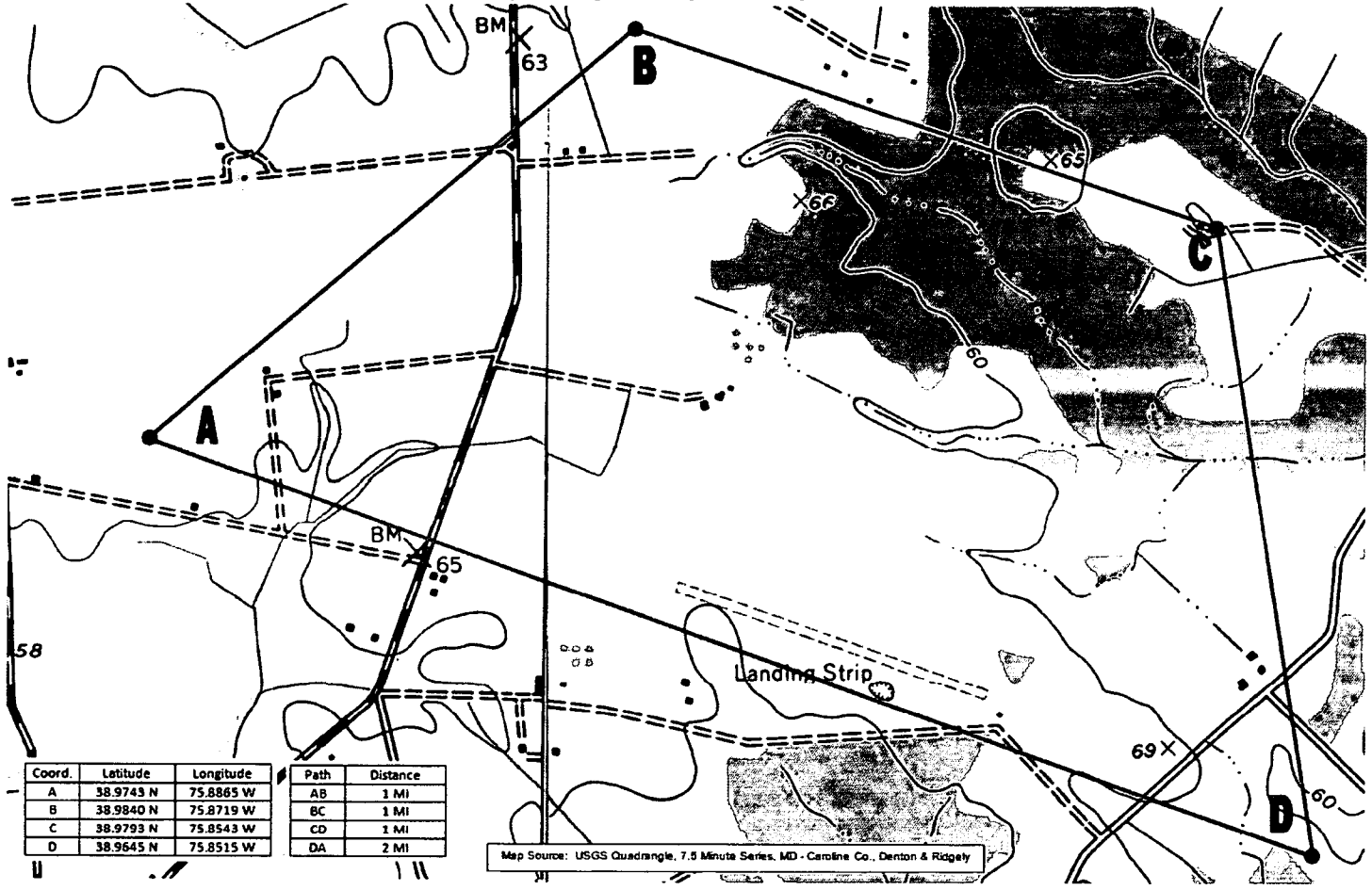
A 902-928 MHz bidirectional spread spectrum modem datalink with up to 1 watt of RF power is used for primary command and control of the UA, and provides a telemetry stream to the GCS from the UA.

A 1350-1390 MHz bidirectional spread spectrum modem datalink with up to 5W of RF power is used as an alternate command and control link.

14.2 *Video*

A 1710-1859 MHz broadband analog downlink, tunable in 1 MHz steps, occupies 20 MHz of bandwidth and operates at 10 watts of transmitted RF power and transmits analog video imagery. Telemetry data is transmitted on a subcarrier providing an additional telemetry stream to the GCS.

APPENDIX 1 Map of Ridgley Airpark (KRJD)



Coord.	Latitude	Longitude
A	38.9743 N	75.8865 W
B	38.9840 N	75.8719 W
C	38.9793 N	75.8543 W
D	38.9645 N	75.8515 W

Path	Distance
AB	1 MI
BC	1 MI
CD	1 MI
DA	2 MI