

PUMA-AE SYSTEM DESCRIPTION

1. Introduction

The All Environment Capable Variant (AECV) Unmanned Aircraft System (SUAS) Puma All Environment (AE) is an all-environment, hand-launched reconnaissance and surveillance tool. The system transmits live airborne video images and location information to the Ground Control Station (GCS). This capability enables operators to navigate, search for targets, recognize terrain, and record all information for analysis. The Puma-AE provides operational capability in the following areas:

- remote reconnaissance and surveillance
- force protection
- convoy security
- target acquisition
- battle damage assessment

This manual provides technical information and guidance for assembly, operation, and maintenance of the Puma-AE system.

2. System Specifications

The Puma-AE Air Vehicle can be launched and recovered in minutes without special equipment on unprepared terrain, including water, mud, snow, and dirt. The system employs a self-stabilizing Air Vehicle configuration with stability augmentation avionics, and provides ease of control and steady video imagery. Air and ground components are lightweight and easily configured for transport. The Puma-AE Air Vehicle is battery-powered and has low visual, acoustic, and thermal signatures. The Puma-AE Air Vehicle flies for 120 minutes on rechargeable Lithium Ion (Li-ion) battery pack.

The GCS provides Air Vehicle and payload control and receipt of payload transmission up to 20 km line-of-sight (LOS) from the Air Vehicle. The GCS is powered by rechargeable batteries or AC/DC power sources. The GCS also provides an automated logbook and tracking of system components.

The payload is gimballed and gyro-stabilized, and includes a five megapixel EO camera, a long-wave infrared (LWIR) camera, and an infrared (IR) illuminator in a single payload. The Puma-AE system is typically operated by a two-person team consisting of a Vehicle Operator (VO) and a Mission Operator (MO).

3. System Limitations

Puma-AE System Limitations

Parameter	Characteristic
Launch Altitude	Minimum: No restrictions Maximum: 10,500 ft. MSL
Landing Altitude	Minimum: No restrictions

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Parameter	Characteristic
	Maximum: 10,500 ft. MSL
Flight Altitude	Minimum: No restrictions Maximum: 10,500 ft. MSL
Blowing Sand and Dust	Maximum: 25 kts
Wind Speed	Minimum: No restrictions Maximum: 25 kts
Rain	0.25 in. per hour
Immersion	Up to 2 meters for up to 2 hours inside "dry bag" protective packaging
Temperature	Air Vehicle and Payload: -20° - 120° F GCS and UBC: 0° - 120° F

4. Air Vehicle

The Puma-AE Air Vehicle is shown and the Air Vehicle's characteristics are listed below.



Puma-AE Air Vehicle

Air Vehicle Characteristics

Parameter	Characteristic
Wingspan	110 in.
Length	56 in.
Structure	modular, Kevlar™ composite
Weight (with payload)	12.8 lb.
Modular Battery Capacity	3.7 lb.
Airspeed Range	20-45 knots
Range, Omni	10 km (LOS)
Range, Directional	20 km (LOS)
Motor	Direct drive electric
Nominal Endurance	120 minutes above 32° F 60 minutes below 32° F
Launch	Hand launch
Landing	Deep Stall Autoland

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Parameter	Characteristic
Navigation	P(y)-code Global Positioning System/ Selective Availability Anti-Spoofing Module (GPS/SAASM) (WGS84) and electronic compass
Flight Control	Manual or autonomous
Strobe	Visible/IR

5. Operating Frequencies

The Puma-AE Air Vehicle is equipped with eight channels to allow multiple systems to operate in proximity (though it is recommended that systems operate no closer than 400 m to one another; see for more information on operating multiple systems in close proximity). Local spectrum allocation should always be coordinated prior to using any of the operational frequencies. Generally, channels 1-4 are for use in CONUS locations, while channels 5-8 are intended for use OCONUS.

Channel	Uplink Frequency MHz	Downlink Frequency MHz	Filter Configuration
1	395.000	1787.5	By-pass
2	395.050	1810.0	By-pass
3	395.100	1840.0	By-pass
4	394.950	1760.0	By-pass
5	371.750	1717.5	In-line
6	372.950	1737.5	In-line
7	378.150	1752.5	In-line
8	384.750	1777.5	In-line

6. Cameras

6.1 EO Camera

The EO camera has four zoom levels: 34.8, 26.4, 17.8, and 8.9 degrees horizontal field of view (HFOV). It provides 30-fps NTSC formatted video downlink. The camera also performs frame-to-frame digital stabilization.

6.2 IR Camera

The IR camera has two zoom levels: 25 and 12.5 degrees HFOV. The 320 x 240 video is scaled to NTSC format and transmitted over the downlink at 30 fps. It provides a 2x digital zoom using pixel interpolation.

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Gimbaled EO / IR / Illuminator Payload

6.3 IR Laser Illuminator

The payload includes an IR laser to illuminate objects of interest with the aid of night vision devices.

WARNING
Do not look directly into the beam. Do not look into the beam through any magnifier. When verifying laser function, point the beam straight down at a non-reflective surface. Never direct the laser upward, at a reflective surface, or toward any personnel during this check. Make sure the laser is turned off at the end of Pre-flight Check. When approaching the Air Vehicle landing site, treat the laser as if it were on and take appropriate precautions until the Air Vehicle battery has been removed. Failure to comply may result in eye and/or skin injury.