

www.american-aerospace.net

NIROPS Closeout Meeting

Update on UAS in Wildland Fire Long Endurance Data Collection and Relay Mission



© 2010 American Aerospace Advisors, Inc. All Rights Reserved.



About American Aerospace

- A small business investing in the future of unmanned aviation and remote sensing
- AAAI doesn't manufacture aircraft. We combine a COTSbased, "airframe agnostic" mission driven philosophy with expertise in aircraft & systems engineering, UAS operations, training, flight safety, and remote sensing to help civil government and commercial customers costeffectively perform superior missions



Services and Mission Experience

www.american-aerospace.net

Services

Systems Engineering & Technical Analysis

(DCMA & GFR Procedures and Processes, COA & UAS Experimental Cert. Support, Mission Design, Airspace Analysis, Flight Safety...)

Training (UAS Pilot Training, Curriculum Development...)

Technology Development & Licensing (AiRWAI[™], Video Exploitation, See-And-Avoid...)

Field Support

(Personnel, Equipment Rentals, UAS Chase...)

Mission Services (Manned & Unmanned)

Mission Experience

Wildland Fire

Right-of-Way Monitoring

Precision Agriculture

RDTE & Training

Mapping

Emergency Response



Primary Demo Objective

www.american-aerospace.net

Long Endurance Data Collection and Relay Mission:

Demonstrate use of Unmanned Aircraft System (UAS) to provide Incident Commanders with long-endurance, real-time intelligence and communication.



Mission Requirements

- Perform safe, successful UAS missions in a wildland fire environment
- Increase safety and effectiveness of deployed personnel and resources
- Collect day & night burn imagery
 - Without putting pilots in harm's way
 - Visible and LWIR
- Geo-rectify imagery in near-real time and rapidly distribute actionable data products
 - Fire perimeter and active fire fronts
 - Hot spots outside lines of containment
 - Hot-spots during the mop-up phase
 - Fire fuel info
- Provide beyond line-of-sight voice & data communications
 - Improved communications with mobile field personnel
 - Incompatible radio communications
 - P25, VHF (150 175 MHz Forest Service band)



Space • Unmanned Systems • Applied Technology www.American-Aerospace.net

The Recon System 16 (RS-16[™])

© 2010 American Aerospace Advisors, Inc.

Mission ready - available for rent or purchase

Mobile Command Center

- Communication Systems
- Computers & Peripherals
- Real-Time Video Exploitation
- Power/Fuel/Crew Support

Customized T-16XL Aircraft

- 12-16 hr Endurance
- EO/IR Video, Comm Relay Payloads
- Launcher
- Ground Support Equipment, Spares



www.american-aerospace.net

Cessna 172N Aircraft (UAS Surrogate)





Stabilized EO & LWIR Video Cameras – Strut Mounted

~12 Mpx Nadir Mapping Cameras -Mounted over Belly Port





The Recon System 16 (RS-16[™]) General Specifications

Aircraft



Type: Arcturus T-16XL Wing span: 12' 11" Fuselage: 6" x 6" x 6' 10" Payload capacity:

Max Wt: 25 # + fuel Int. Volume: 6"x6"x20" Payload power: ~100 W Endurance: 12-16 Hours Cruise : 45-80 knots Service ceiling: 15K' MSL Catapult launch Belly landing



Manned aircraft rentals also available

Payloads EO/IR video gimbals RGB/Multi-spectral mapping cameras Communications relay

- EO/IR/HD video cameras Video telemetry systems Manned/unmanned compatible
- Modular design approach The engineering skills and experience needed to efficiently integrate customer payloads

Mobile Command Center Complete, mobile, selfcontained climatecontrolled work environment capable of: Command and control of unmanned aircraft

- Managing remote sensing operations with manned and unmanned aircraft
- Real-time exploitation and data product distribution Crew support
- Transport of entire mission system



Mission planning Airspace analysis and regulatory support Training curricula and programs Video exploitation and gap technologies Field equipment rentals Flight crews Flight services Our aircraft or yours Our payloads or yours

Mission Success -Beyond the Aircraft

To discover how AAAI can help you perform safe, successful and costeffective missions, please call 610-225-2604, or email dyoel@American-Aerospace.net.



Video Payload





Space • Unmanned Systems • Applied Technology

www.american-aerospace.net

- Wing Span: 12' 11"
- Length: 6' 10"
- P/L Capacity: 25 Lbs.
- Endurance: 12-16 Hours
- Cruise: 50 knots
- Ceiling: 15K' MSL
- Autopilot
- Magnetometer
- Mode C Transponder
- Autoland System
- Lighting System day/night ops
- Rail-launch/belly land runway independent
- Rapid deployment

Primary Fire Mission Aircraft







Video Payload





Gimbal Deployed





UAS Airborne Comm Relay Payload

- <u>Beyond line-of-sight</u> voice communications
 - Improved communications with mobile field personnel
 - Incompatible radio communications
 - P25, VHF, UHF, 150 MHz, 800 MHz, 900 MHz, and other frequencies
 - 10 mile range demonstrated in September
- Ideal solution in remote, dangerous and mountainous terrain
 - 16 hour UA enables highly effective/low cost solution
- Future Capabilities Planned
 - Multichannel voice, data and imagery relay
 - Personnel & asset tracking









Mobile Command Center





2d3 TacitView[™] Video Exploitation System

- Video Exploitation System
 - Manned/unmanned aircraft connectivity
 - Network feed compatible (STANAG 4609, MISB)
 - Reads most video file formats
- Frame Imagery Mosaicing
- Processing, Exploitation and Dissemination (PED) on COTS PC hardware
- Provides Computer Vision Enhancement Tools:
 - Stabilization, Super Resolution, Mosaicking
- Integrated database for IRL/IPL
- <u>American Aerospace and 2d3 Inc. are</u> jointly developing civil and commercial applications of TacitView Software















RS-16 Operations 2010

Location	Date	Purpose	No. Flights	Flight Hours
NASA Dryden, CA	2010 February	Aircraft Checkout EP Certification	2	3.4
Fort Pickett ANG, VA	2010 April	RS-16 System Testing	4	6
Fort Pickett ANG, VA	1020 May	RS-16 System Testing & Rehearsals	5	7
Fort Pickett ANG, VA	2010 June	Forest Service Mission	4	8
PTRC, NM	2010 September	Military Training Overflight Services	17	45
TOTAL			32	69.4





AirView Spectrum Analyzer

_ 0 <u>_ X</u>

File View Help

















www.american-aerospace.net

Weather sensor





AMERICAN AEROSPACES Space • Unmanned Systems • Applied Technology Space • Unmanned Systems • Applied Technology

- Aircraft Performance
 - Endurance
 - Launch/Landing
- Rapid Deployment
 - Equipment
 - Personnel
 - Procedures
 - Rapid Mission Planning
 - Logistics

- Crew Size
- Remote Operations
- Video Exploitation
- Mission Requirements, Mission System Development



For Further Information

www.american-aerospace.net

David Yoel, CEO 610.225.2604 dyoel@American-Aerospace.net



Nadir Mapping Payloads

- High resolution frame imagery
 - From $10 \text{ cm}(\sim 4")$ to 1 meter (3.3') resolution
 - Multispectral: Green, Blue, Near IR
 - Color (RGB)
- Image sequences are acquired then processed into large area, geo-rectified mosaics
- Nominal Collection rates:
 - 50 cm GSD ~75 nautical miles/hr
 - 30 cm GSD ~65 nautical miles/hr
 - 10 cm GSD ~60 nautical miles/hr
- Geo-rectification latency
 - Real-time vs. overnight









November 3, 2010

© 2010 American Aerospace Advisors, Inc. All Rights Reserved.