Wildfire Intelligence

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AERIAL IMAGING MAPPING DATA
## Comparison and Technical descriptions

<table>
<thead>
<tr>
<th>Description</th>
<th>SkyFusion Pak Wildfire 2000</th>
<th>Wildfire 2000+Microwave</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gyro stable 360° gimbal</td>
<td>Tase 200 Operated in the Air</td>
<td>Tase Operated both Air &amp; Ground</td>
</tr>
<tr>
<td>Interface</td>
<td>Touch/mouse/keys/joysticks</td>
<td>Interface easier on ground</td>
</tr>
<tr>
<td>IR 640x480 10/5° fov</td>
<td>Tau 2 with Wildfire Isotherm</td>
<td>Tau 2 with Wildfire Isotherm</td>
</tr>
<tr>
<td>Visible super zoom 56-2° fov</td>
<td>Color NTSC video</td>
<td>Both Air &amp; Ground</td>
</tr>
<tr>
<td>Display</td>
<td>Cockpit Split Video-Map</td>
<td>Both Air &amp; Ground (more flexible)</td>
</tr>
<tr>
<td>Lock-on auto track</td>
<td>Moving Object, Scene, Map Point</td>
<td>Both Air &amp; ground (easier) control</td>
</tr>
<tr>
<td>Auto-track Fire &amp; Dozer line</td>
<td>GIS must be loaded</td>
<td>Air &amp; Ground, easier on ground</td>
</tr>
<tr>
<td>Moving Map, base map</td>
<td>Topo, Aerial, Team GIS</td>
<td>Both, Air &amp; Ground has more choices</td>
</tr>
<tr>
<td>Air Attack Mode</td>
<td>Instant Situational Awareness</td>
<td>Used mostly in the Air</td>
</tr>
<tr>
<td>Live Video</td>
<td>Recorded and 3G Transmitted</td>
<td>Better and more accessible</td>
</tr>
<tr>
<td>Photos sent by Satellite</td>
<td>1 button – JPG, or 1 button - Earth</td>
<td>Same, but faster &amp; better on ground</td>
</tr>
<tr>
<td>Internet Hotspot</td>
<td>Wi-Fi in cockpit when 3G</td>
<td>Used in the Air</td>
</tr>
<tr>
<td>Retardant drop ID</td>
<td>COT or send SnapShot/KMZ</td>
<td>Easier to send to other aircraft</td>
</tr>
<tr>
<td>Microwave, ~30 miles to IC</td>
<td></td>
<td>~30 miles from each tower</td>
</tr>
</tbody>
</table>
| Upgradeable                          | Yes, 100%-
| Persistent Surveillance optional     | Orthophotos, 3D Models, NDVI                         | Orthophotos, 3D Models, NDVI                |
IR, Super Zoom EO, Live Video & photos to ground

Works at 200+ Kts

360° Stabilized IR (5/10 ° FOV)
28X video continuous zoom (58->2 ° FOV)

Plug’n Play simple for regular workers, (not elite IR operators)
Microwave (unlicensed) duplicates control to the Ground

- Internet
- HotSpot
- Airborne Wifi
- Microwave, 3G
- Satellite

Live Video & Snapshots
To firefighters

Operate in the Air

Operate on the Ground

Air the same as the Ground

Operate from either Air or Ground or Both. Continuous video record both ground and air
One Aircraft supports Ground Crews, Incident Command, HQ & Itself
Operate Gimbal: IR 5/10° & Super Zoom Visible 2-56°
- Touch (like an iPad)
- Buttons/Joy stick (not needed, matches touch commands)
- Keyboard (not needed, Key-caps are labeled)
- Mouse (same as touch, but more precise than fat fingers)
- Ground: Microwave link upgrade allows for operator anywhere in the world - not in aircraft
A Few Intuitive Commands

- **Do Nothing.** Just passively watch
- **Send live video:** Always-on automatic when 3G present (request a COW*)
- **Lock-on:** Touch Screen or Button
- **Go to Point on Map:** double tap map
- **Look Around:** Touch or swipe video, Right Joystick
- **Zoom:** Left Joystick or onscreen slider or keyboard PgUp/PgDn
- **Air Attack Mode:** Touch or Button
- **Photo to iPhone transmit:** Touch Screen or Button
- **Earth Photo of Tanker drop:** Touch Screen or Button
- **Change Camera IR->Visible:** Touch Screen or Button or “C”

* Cellular on Wheels (COW) are available if the ATGS requests it (ATT or Verizon)
AutoTrack Fire/Dozer Lines

- Import NIFC .SHPs: Dozer, Hand-cut, Fire Fronts, Escape Routes
- Path Tracker will Auto-track Hands-off, and Record
- Change Zoom and IR/EO without losing track
- Locking on (stopping the Gimbal) is ok at any time
  - Tracking will restart by touching Track
- Photos and Video will transmit as normal
Air Attack Mode
Hands Off, Eyes Outside

- Instant Situational Awareness
- Identify Map Names
- Oriented to Intuitive line-of-sight
- At Night and in Smoke
  - See Mountains & Terrain
  - Discover Spot Fires
  - Fire Perimeter & Slop-overs
  - People
Wildfire Isotherm

• Specially developed WildFire sensitivity for IR
• Distinguish sun baked ground from fire
• Makes IR functional on **Hot Afternoons**
• Fix-mounted IR and Gimbal IR are the same
Persistent Surveillance
3D Models, Orthomosaic, Vegetation density, NDVI Health

In development: Multispectral Images from Automatic Intervalometer on Belly or Wing

- Capture can be Incidental to Normal flight
- Processed Overnight
- Pixel size 1-6 inches
- Relative Biomass Assessment & Vegetation Health
- Allometric measurements
- Automated Tree Classification
- Crown Canopy Coalescence and Density

Georectified Orthophoto

3D Biomass & Vegetation Mapping

Normalized Difference Vegetation Index (NDVI)

Export to Many File Formats
Live Video to SmartPhones, Pads or PCs
Always on when 3G is present

• One time setup on iOS, Android & PCs
• 2 fps, auto, Auto-reconnects. Request a COW*
• Lat-Long on all Images
• Aircraft’s Live GPS Moving-map on a Ground PC

* Cellular on Wheels (COW) are available if the ATGS requests it (ATT or Verizon)
Aircraft’s GPS moving-map on the ground

- 2 sec updates real-time when 3G is present (request a COW*)
- Very slick for seeing where the transmitted video is being captured
- Works worldwide. Unlimited clients. Google Earth or DeLorme
- 1st time Setup, and requires additional paid for Apps
- Easiest is to provide pre-installed laptop

* Cellular on Wheels (COW) are available if the ATGS requests it (ATT or Verizon)
SnapShots to SmartPhones or PCs

Worldwide: Transmits by Email

• Only 1 per ~minute over GlobalStar Satellite
• Unlimited on 3G or Microwave
• Press Button or Tablet
• Email Group: Changed in Air, Ground or Both
Ground Overlaid Photos in Email
Google Earth KMZ SnapShots
1/min Low-cost Satellite, Unlimited by 3G

Normal Google Earth

KMZ Auto-transmitted to Email

Click/Touch Ground Overlay Displays Normal Photo

Infrared Coverage Level
Coverage Levels of Retardant Drops
Water or Retardants on the Ground can be Seen in IR

- Confirm Coverage
  - See Gaps and Thin Spots
  - Colorless Retardants
- Email to Ground Crews and IC
- Press button to Map Drops
  - or Post Flight
- Identify New Target Drop Sites
- Review Post Fire and BAER

Click to see on YouTube
Internet Hotspot airborne

- WiFi throughout aircraft
- Internet when 3G available
- DataLink antennas 2-3x better than 3G phones
- Gimbal video is available throughout aircraft cabin (iOS, Android, Windows or Mac devices)
Microwave & Mesh Network Option
High Speed

~30 miles

IR see through Smoke & Dark - Improves Safety
Quick Deploy – 1 hour
Helicopters, Fixed-wing, Aerostats, Drones

- Quick Deploy for Oils Spills
  - Standard overnight shipping
  - 1 hour after arrival

- STCs (FAA Supplemental Type Certificate), Part 91/135.
  - Belly and Strut: Cessna 152, 172, 182, 206
    - Cessna OEMs-Factory direct
  - Cirrus

- PMA (FAA Parts Material Approval)

- 337s & Public Use – Quick based on STC

- Pilot Serviceable- 20 min on/off, no signoff
Services Before & During Emergencies

• 1-on-1 training
• Group Classes
• Custom Integration
• STC/337 completion
• On-site Airborne Operator
• Ground Implementation
  – Setup user devices: Snaps, live Video, KMZs, Aircraft moving-map
  – Group distribution
  – GIS input
  – inReach ground resource tracking
  – Comm towers setup
Thank-you

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