



# APPLICATION STORY

FLIR IBAC 2  
Mounted on Unmanned Aerial Vehicle

## UAV Integrated Sensors for CBR Threat Monitoring

FLIR offers UAV-mounted sensors for the detection, sample collection, and identification of a broad range of chemical, biological, and radiological threats.

There is a growing desire to mount chemical, biological, and radiation (CBR) detection devices into Unmanned Aerial Vehicles (UAV) for reconnaissance and emergency response missions. Existing CBR sensors generally require direct proximity to the threat and monitor small, localized areas. The integration of these point sensors with a UAV provides immediate standoff detection capability. Rather than wait for the threat to come to the sensor, the sensor can travel to the threat. This gives reconnaissance teams and HAZMAT responders a tool to quickly and safely evaluate possible contamination sources over large areas following a terrorist attack.



Figure 1. UAV-mounted Griffin X-Sorber

### FLIR PRODUCT SOLUTIONS

FLIR offers the following sensors to meet the strict size, weight, and power requirements of UAV operation, while also providing battery operation with wireless communication:

- Biological: IBAC 2
- Chemical: Griffin™ X-Sorber
- Radiation: identiFINDER® R300

The integration of FLIR CBR sensors with UAV platforms provides a unique interoperable commercial off-the-shelf (COTS) weapon of mass destruction (WMD) sampling, detection and identification solution.

### FEATURES & BENEFITS

- Affordable, commercial CBR detection sensors
- Ruggedized, low power, and small footprint
- Autonomous and continuous operation
- Real-time wireless connection to sensor data and alarm outputs
- No consumables
- Beyond line of site operation
- First-person remote viewing and navigation



The World's Sixth Sense®



Figure 2. Bio Simulant Aerosol Release

## APPROACH

Although a number of UAV platforms exist, FLIR's chemical sampler and biological threat sensors have been integrated with the Vortex™ vertical take-off and land (VTOL) UAV offered by VT Group. This solution successfully participated in a United States government sponsored operational test to investigate a suspicious smoke cloud prior to it traveling downwind to a vulnerable position (Figure 2). While a radiation solution was not part of this test, FLIR offers the capability with its identiFINDER R300 product.

## BIO-MONITORING & SAMPLE COLLECTION

The FLIR IBAC 2 is a fully automated biological agent detector that alarms in less than 60 seconds when an airborne bio-threat is present (Figure 3). Its technology reliably detects all four classes of bio-agents (spores, vegetative cells, viruses, and toxins) at concentrations below 100 ACPLA with low false alarm rates. The sensor continuously monitors the environment for the presence of bio-threats, alarms upon detection, collects and preserves samples for confirmatory analysis, and electronically transmits real-time data to command and control centers. With over 1,000 sensors deployed globally in active biological monitoring operations, the IBAC 2 is the most mature and widely used biological trigger available on the market today.

The sensor is well-suited for integration into unmanned air/ground systems and mobile platforms where extreme environmental conditions and shock/vibration are expected (cover photo). It has successfully been deployed and tested on a UAV in US government programs, including WMD Aerial Collection System (WACS) and Military Applications in Reconnaissance and Surveillance (MARS). It is also in operation in several ground based military vehicles like the Rheinmetall Survivor R CBRN combat vehicle, as well as unmanned ground vehicles (UGV).

The UAV and IBAC 2 work together to locate, detect, and identify threats. The UAV carries the IBAC 2 to the area of interest. Within seconds, it detects the biological particle and triggers an aerosol sample collection. The particle data and alarm information are wirelessly transmitted to a base station computer in real-time (Figure 4).

Specification	IBAC 2	Griffin	identiFINDER R300
Threat Class	Biological	Chemical	Radiation
Capability	Detection Sample Collection	Sample Collection	Detection Identification
Sample Introduction	Airborne Particles	Vapor Sample	Neutron or Gamma Emissions
Weight	8.0 lbs / 3.6 kg	3.0 lbs / 1.4 kg	1.0 lb / 0.5 kg
Dimensions (inches)	9.5 x 6.5 x 9.0	8.5 x 6.5 x 3.0	1.3 x 2.8 x 4.9
Battery Lifetime	3 hours	12 hours	24 hours
Comms	Serial, Ethernet, Wireless	Onboard Display	USB, Bluetooth

Table 1. FLIR CBR Sensor Specifications



Figure 3. IBAC 2 Bio-Aerosol Detector and Collector

Blue Plot  
Particle  
Counts (PLA)

Green Plot  
Biological  
Particle  
Counts (PLA)

Purple Plot  
Fluorescence  
Intensity (%)

Red Plot  
Bio-Alarm  
Signal

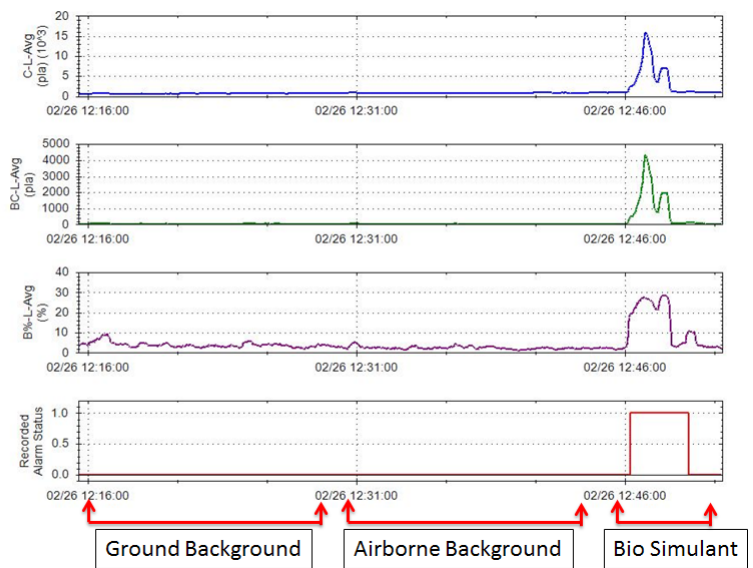


Figure 4. Biological Particle and Alarm Data

## CHEMICAL SAMPLE COLLECTION & ID

Chemical sample collection is satisfied through the X-Sorber portable air sampling accessory, which has successfully been deployed and tested on a UAV (Figure 1). This is a fully enclosed, intrinsically safe accessory intended for use in downrange applications where the terrain proves too difficult for navigation with a vehicle or impossible to reach on foot when transporting heavier equipment.

The UAV carries the X-Sorber sampler to the area of interest. Programmable sample collection methods include time-based (i.e. sample for specified amount of time with option for time delayed start) or volume-based (i.e. collect specific sample volume and auto shut-off). After sample collection, the UAV returns to a designated landing zone where the X-Sorber is retrieved and docked to the Griffin G460 Gas Chromatograph Mass Spectrometer (GC/MS) (Figure 6). The Griffin G460 is equipped with a rugged, internal shock isolation system that is tested to rigorous MIL-STD-810G standards. It is built to operate in mobile labs, reconnaissance vehicles, deployable lab containers, and other portable platforms.

No tools are required when docking the X-Sorber with the Griffin G460. Gas, electrical, and communication ports are automatically connected upon docking. The X-Sorber provides a dual-tube sample collection system, where one tube can be archived as evidence, while the other is analyzed via GC/MS. Chain of custody is supported through the use of the integrated GPS receiver, the time/date stamp feature, and unique tube IDs. After data download, the X-Sorber is conditioned for re-use and upon method completion is ready for sampling again. The simplified user interface allows operators to analyze and identify Chemical Warfare Agents (CWAs) and other chemical of interest in less than 15 minutes. No mass spectral data interpretation is needed.

## SUMMARY

Throughout the years, the CBR community has sought after mobile and inexpensive standoff detection solutions. The ability to autonomously bring CBR point sensors to the threat is a significant improvement in threat monitoring concept of operations (CONOPS). Using the IBAC 2, Griffin G460 and identiFINDER R300 from FLIR, UAV-mounted CBR solutions are now a reality. Unmanned aircraft systems enable reconnaissance teams and first responders to survey an area of interest, collect samples, and remotely report findings. This capability provides enhanced situational awareness and actionable intelligence.



Figure 6. Griffin X-Sorber docked with Griffin G460 GC/MS for rapid sample identification

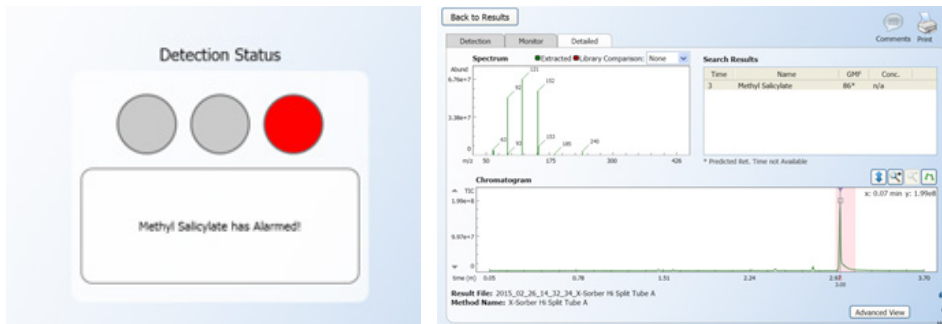


Figure 7. Chemical Alarm and Identification

For more information about chemical, biological, radiological, and explosives detection solutions, or about this specific application, please visit:

[www.flir.com/detection](http://www.flir.com/detection)