VBAD 3600

Multi-Threat Vehicle System

Complete mobile monitoring from detection to identification

Features

- Fully MILSPEC qualified
- Designed for installation in vans, trucks, or other suitable vehicles (vehicle not included)
- SASS 4200 technology pre-concentrates outdoor aerosols
- Fully automated detection, collection, and testing
- Protects operator from contact with potential threats
- Tests for 10 pathogens simultaneously
- Machine vision analysis of assay tickets assures accurate test results
- Optional upgrades for CWA, TIC, and flammable gas detection, gas-tight enclosure box, ethernet connectivity

Application Areas

- Public health
- Military
- Agriculture
- Environmental
- Homeland security

Figure 1. VBAD 3600 artist's rendering. The system is compatible with a wide range of vehicle interior spaces Vehicle not included.

The VBAD 3600 is an integrated vehicle-based system for monitoring biological aerosols and optionally, chemical gases and vapors. The system is compatible with a wide range of vehicle interior spaces and is highly automated in operation. All key features are constantly monitored by software residing on a laptop computer within the vehicle. In a typical scenario, a multistep protocol involving detection, alarm, sample collection and biological identification are automatically performed, and the results are reported on the attached computer with no human intervention. From the computer, the information can be easily transferred to a headquarters location using any customer-defined communication link.

Exterior air is sampled at the very high rate of 4000 liters/minute to maximize sensitivity. An IMS chemical detector and an optional 6-channel electrochemical detector connected to the inlet side of this sampling circuit monitor for chemical warfare agents and toxic industrial chemicals (TICs), respectively. An optional sensor integrated with the electrochemical sensors scans for flammable gases. Sampled air then passes into a patented aerosol concentrator. This device extracts particulates down to 0.5 microns in size and puts them into a 300 liter/minute secondary aerosol concentrate flow that is delivered to an ultraviolet-based bioaerosol fluorescence trigger and a liquid sample preparation device (See Figure 2).

The equipment for concentrating and collecting liquid aerosol samples is currently being used in NATO bio-monitoring vehicles in Europe, and the bioaerosol trigger is based on the TacBio trigger developed by

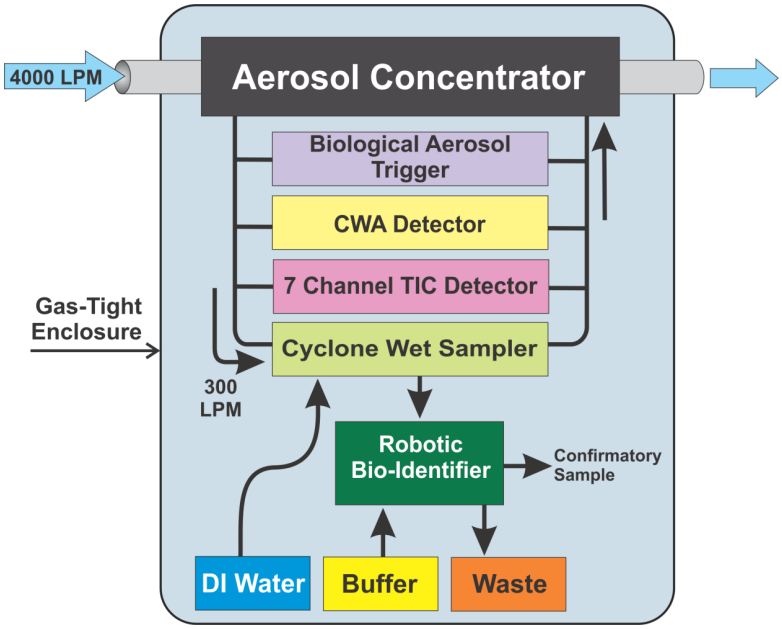

Figure 2. VBAD 3600 system connectivity.

the U.S. Army and marketed worldwide by Research International. The liquid sample preparation device is the same wetted wall cyclone used in the United States APDS bioaerosol monitoring system. If ambient air is below freezing, the operator can alternatively set the system to perform a dry collection protocol where the aerosol sample is collected onto a high-efficiency electret filter media.

Under normal circumstances if an unusual biological aerosol event is detected by the trigger, a wet biosample is sent to an automated multichannel bioanalyzer and optionally, one or more confirmatory samples are prepared in parallel for independent analysis. The analyzer is a robotic lateral flow immunoassay system that uses "tickets" similar to those used for determining pregnancy. These bioassay tickets are very popular and available for a great many pathogens. The system can process single-pathogen tickets or ticket arrays that provide simultaneous detection of up to 10 pathogens. Up to 24 such tickets can be loaded and stored for use in the system over a 24 hour period. Detection of pathogens is done using machine vision procedures. This automated approach is less prone to human error, and it has been shown in some cases to improve ticket detection limits by a factor of 5X to 10X. Most pathogen types can be identified, including toxins, viruses, bacteria, spores, or micro-organisms. Identification is not restricted to pathogens having DNA, as is the case with PCR-based systems.

All VBAD 3600 components can optionally be housed in a gas-tight box. Access and transfer ports are provided to service equipment and to introduce and remove samples.

U.S. Patent Nos.: 10197558, 10690660.

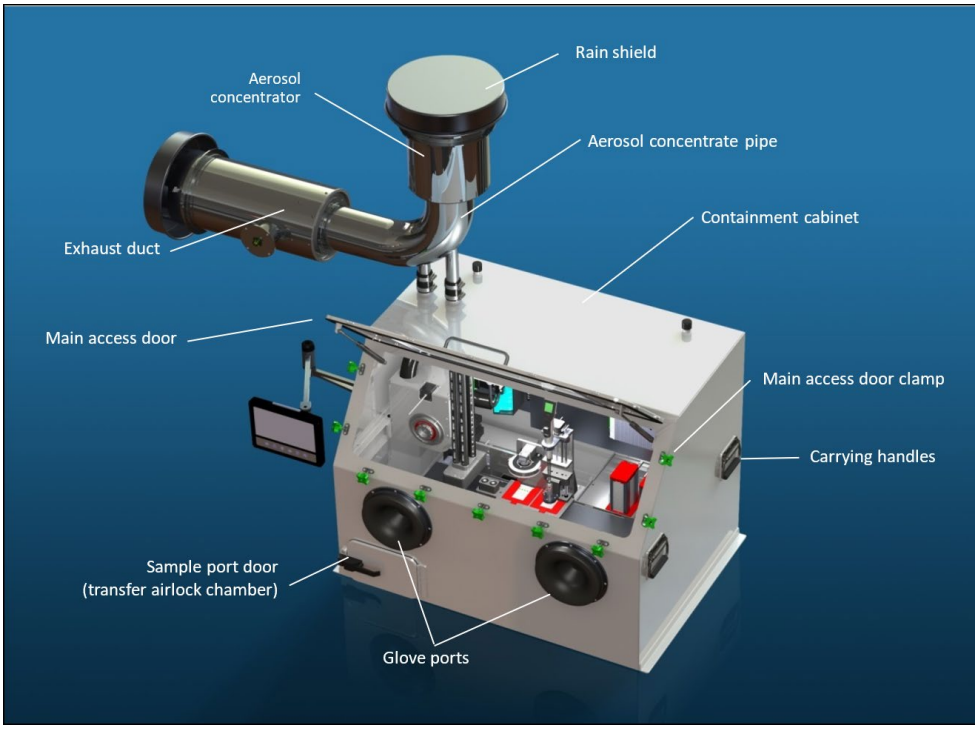

Figure 3. VBAD 3600 system features.

Typical Specifications for the VBAD 3600 Multi-Threat Vehicle System

Instrument Specifications

Aerosol preconcentrator	Yes; SASS 4200 based technology
Exterior air sampling rate	4000 liters/min. Weather-proof inlet and outlet penetrations.
Biological and chemical sample transfer loop	Secondary air flows from 40-360 liters/min acceptable. Selectable wet or dry sampling based on temperature or other conditional.
Aerosol biodetector-trigger for sampling process	UV bio-fluorescence detector. Average time-to-alarm is 30 secs. Will detect 20 ACPLA bioaerosol levels with 90% or better probability at a background alarm rate of 1 per month.
Air sampling rate for biological aerosol detector	1.2 liters/min
Biological sample preparation after trigger signal	Liquid sample: wetted wall cyclone; Dry sample: 44mm dia. electret filter
Confirmatory assay sample preparation after trigger signal	2 each, 4.5 ml samples automatically provided in self-sealing sterile vials. Vials will survive 2m drop onto common hard surfaces. Sample transfer door provided at front of gas-tight enclosure.
Bioassay method	Automatic robotic lateral flow immunoassay. Minimum and maximum times-to-detect are 5 and 15 minutes, respectively. Overall time 20 minutes or less.
Number of simultaneously identifiable biological agents	Three ticket storage magazines provide the ability to use up to two of the three stored ticket types per testing protocol.
Bioassay procedures performed before system needs to be serviced	Up to 24 tickets may be loaded in each magazine. Assay robot selects tickets from those stored, as specified by user.
Bioassay consumables life	18 months, typical. Single-use product.
Consumables	1) Bulk distilled water; 2) PBS buffer; and 3) Liquid disinfectant in refillable container. Containers hold enough for 24 assays.
Expandable to nuclear detection	Yes

Physical Specifications

Containment vessel	Gas-tight box and piping operate at negative pressure. Large viewing window. Internal solid state lighting.
Containment vessel humidity control	Relative humidity sensor and solid state computer-controlled dehumidifier
Equipment access	Glove ports; tilt-up front window, removable rear back plate
Process control details	Industrial PC-based control/protocol software. Touch screen control. Fully automated and integrated sampling, sample preparation, bioassay and cleaning protocols. Immediate operator alert upon any detected fault.
Output upon positive result	Immediate light and sound alarms, signal provided for remote alarm
Ethernet connectivity	Two-wavelength fiber optic link to exterior monitoring system
Operating temperature range	-20°C to 50°C
Environmental standards, shock, and vibration	Appropriate sections of MIL-STD-810
Power	• 150W @ 115-240 VAC, 50-60 Hz, single phase for glove box • 170W @ 24VDC, for aerosol concentrator • 10W at 24-36 volts, for touch panel display
Internal UPS	300 watt-hour; auto shut-down of PC at 10% capacity
Physical footprint (cm); weight	87H x 107W x 76D (cm, gas-tight box); 150 kg, approx. total
Exterior Noise level	Less than 70 dB-a
Exterior air sampling rate	4000 liters/min. Weather-proof inlet and outlet penetrations.
Weight	120 kg, approx.

Research International reserves the right to change specifications without prior notice.

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