

Advancements in modular wearable computing solutions for the dismounted warfighter



By Justin Dyster

Dismounted warfighters have precise missions to perform in often dangerous conditions and rapidly evolving situations. While military commanders may have access to a common operating picture of their command post and mounted elements, they have minimal visibility and digital command and control of dismounted squads and platoons. Dismounted forces also have limited digital situational awareness (SA) of the friendly forces or threats in their immediate vicinity.

While Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) software and associated technology to close these basic capability gaps has been tested with overall operational success, the lack of integration of the technology into the dismounted warfighter's common equipment load-out has been an obstacle, resulting in surplus gear (and associated weight and battery complexity), inefficiencies in combat zones, and compromised safety. These problems multiply for warfighters performing specialized missions.

As militaries worldwide move toward soldier modernization programs, computer technology has taken a leading role in military ground operations. Wearable systems have emerged as a critical investment to improve situational awareness, protect friendly forces and exert precision lethal force.

Black Diamond Advanced Technology is redefining the future of combat computer hardware by developing the Modular Tactical System (MTS) -- a lightweight, wearable, rugged computer system that treats the warfighter as a system and integrates into the user's common equipment load-out, regardless of the mission.

The average ground soldier carries between 63 and 130 pounds (29-59 kg) of gear, depending on the mission. That's a significant load to carry for an extended period during the best of times and can result in musculoskeletal injuries, slowed speed and response times, decreased range of motion, and increased

fatigue, all of which yield in decreased morale.

In combat situations, where the ability to move quickly and agilely is critical, every extra ounce of weight added to the warfighter's load is to be considered carefully, as it could mean the difference between life and death. Technology provided to warfighters must enhance their combat effectiveness, without being obtrusive or hindering in any way their ability to survive or complete a mission. Time spent packing gear or powering on equipment translates to wasted time when every second counts.

Building on lessons learned over the past five years -- including contracted projects with the U.S. Army and Israeli Defense Forces, multiple field exercises and demonstrations, and operational use of prototype systems by U.S. Special Forces in Afghanistan -- the Black Diamond team explored better human factors for computing and gathered multi-mission requirements for a Commercial Off the Shelf (COTS) foot-mobile C4ISR system. Key findings included:

- An ergonomic solution is critical.
- The system must fit within and interoperate with existing equipment including packs, body armor, radios, ammunition, hydration, tools, etc.

• Missions vary by day and the role of the individual warfighter on the battlefield. Modular options are imperative for different missions.

• Size, weight, power, performance and price are key performance parameters.

Black Diamond Advanced Technology's goal was to approach the wearable computer solution as a complete system, providing true "on the move" performance and situational awareness with a solution that is integrated into the uniform and equipment, provides interoperability with existing system elements, and is flexible for additional missions. This includes not only the computer and display, but all the gear issued to the modern day warfighter.

Size and weight can be reduced when looking at the entire system -- including body armor, communications, power, weapons and hydration -- rather than a single component. Instead of forcing a computer "box" into the gear a warfighter already carries, which results in a bulkier load-out and more weight, the MTS's design allows all the elements to be integrated optimally by modifying elements such as the armor carrier, but also by maintaining the integrity of critical elements like ESAPI plates, magazine pouches, tactical radios and C2/SA software. The result is a lightweight, non-intrusive system that is properly distributed and balanced on the body, and is eas-

integrates body armor and is secured to the standard or custom plate carriers; and a flip-down front pocket allows quick access to the removable UTD and maintains a low profile in the stowed position. Power is sourced from a wide range of existing standard military batteries.

The MTS allows a warfighter to transition from computer operation to direct combat engagement in seconds with a wearable system that is non-intrusive, allows easy access to other equipment and does not hinder field activities. He never needs to stop, put down gear and lose time in a stationary position while powering up or repacking equipment. Since the computer is integrated into a

compact Plate Carrier system, it is easily accessible when needed and stowed in the vest out of the warfighter's way when not in use. This is done without compromising any of the certified ballistics protection, and while providing integrated cable management and protection through the nylon portion of the plate carrier. The optional Tactical Hub provides data, audio and power interfaces for seamless integration of mission-related tools with minimal increase in overall cost, weight and cable snag-hazards.

As a COTS system that is designed for optimal flexibility, Black Diamond's MTS is highly adaptable for specialized missions that require

expensive application-specific equipment, often allowing the warfighter to avoid carrying redundant batteries and display devices. These include targeting (JTACs, TACPs and Forward Observers), Combat Medics, Explosive Ordnance Disposal, Combat Weather and Military Intelligence. For similar reasons, the MTS is also suitable for certain non-military public safety applications -- like border security, drug enforcement, SWAT, disaster response, and critical infrastructure and asset inspection -- that demand a high level of situational awareness. ■

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ily accessible when needed.

While most available rugged computer systems on the market today are either a traditional laptop or tablet design, the MTS deconstructs the computer to fully integrate it into the warfighter's system without adding bulk or complicated assembly. The MTS consists of the Tactical Mission Controller (TMC) with integral power manager and peripheral controller, the 6.5-inch daylight viewable and NVG compatible Universal Tactical Display (UTD), the Tactical HUB for ad-hoc equipment interface and the GPS module.

Using a vest-based configuration, the TMC's low-profile processing platform is carried on the rear of the pack; cables are routed through an interchangeable cummerbund that