

Soldier Systems Untangled: Broadsword® Spine™ e-textile Technology

The BAE Systems Broadsword® Spine™ is weaving its way onto the soldier systems and law enforcement market, delivering an e-textile based power and data management capability that diminishes the weight and complexity of dismounted soldier systems.

This off-the-shelf DEF-STAN 23-12 compatible product offers a 'plug and play' architecture that seamlessly integrates a variety of equipment into an efficient and unified system. The Broadsword® Spine™ is a highly configurable lightweight product that delivers smart power management and USB2.0 connectivity through a unique e-textile.

The e-textile is woven from conductive yarns to create a robust network that is lighter and more flexible than cable-based solutions. Cable systems often wrap long lengths of wires around the torso, restricting movement, heightening the risk of snagging and hindering user comfort. The unique fabric-based Broadsword® Spine™ fits inside most load carriages and, once inserted, is barely noticeable. It thereby offers a safer, snag-free solution that is more comfortable for the wearer.

The e-textile connects to eight individual connection points across the torso providing maximum versatility and damage tolerance whilst minimising cost. The wearer can better distribute the load they carry by connecting and positioning any equipment or power source to any available connector. The Broadsword® Spine™ is currently offered with either the Glenair® Mousebud™ connector or the TT Electronics Mag-NET connector. These fabric-mounted connectors sit flat against the load carriage and are designed to not suffer the same fragility as traditional cables and connectors.

User comfort is further increased when the power management capabilities of a Broadsword® Spine™ are considered. When on operation, the user must carry sufficient ammunition, food, water and power to complete a mission. When the electrical equipment carried uses bespoke battery types, spares of each type need to be carried. The weight of the many batteries, combined with



the effort required to manually swap them prior to depletion creates a significant burden for the user. It also generates a complex and costly logistics chain to support power source diversity. The Broadsword® Spine™ alleviates these burdens as it supports the use of a central energy store and battery hot swapping. Just one battery type can be attached to the Broadsword® Spine™ and all electronics will be powered from it. Multiple power supplies can be attached to guarantee

- ▶ power over longer missions and the power management system will automatically switch between connected batteries as they become depleted, with no intervention required by the user. Power scavenging capabilities built into the Broadsword® Spine™ allow the user to recharge a battery from an external power source, such as vehicle power, inductive charging or energy harvesting solutions.

The Broadsword® Spine™ is the ideal backbone for building a soldier system. Its open architecture allows customers and industry partners to develop their own soldier system solutions and interface components without vendor lock in. Both variants of the Broadsword® Spine™ connectors are compatible with the USB2.0 public domain interface specification. Nearly 60 soldier system components have already been successfully integrated with the Broadsword® Spine™ including various radio solutions such as those provided by Harris, Silvus, Steatite & Persistent Systems and Trellisware's TSM MANET radios. Any Android device is compatible with Broadsword® Spine™, acting as a platform to host various types of battlefield management system including Sytematic's SitaWare Edge, Nett Warrior and BAE Systems' Landmap. Body worn cameras, which are becoming increasingly popular with emergency services, have also been used with the system. The Broadsword® Spine™ is also power source agnostic and is capable of working with a large range of batteries such as those offered by Revision, Denchi, Bren-Tronics and US Conformal Wearable Batteries.

In addition to supporting in-service equipment, the Broadsword® Spine™ is a future-proof solution that is already integrating next-generation soldier system equipment. Body worn sensors, inductive charging capabilities, next-generation helmets and GPS denied tracking are all new technologies that are being readily integrated into soldier systems through the Broadsword® Spine™ connectivity backbone. It also allows equipment to be easily swapped out as new capabilities become available, whilst maintaining an open and configurable architecture at the centre of the soldier system.

Whichever equipment configuration is chosen, the Broadsword® Spine™ ensures that the wearer is safe. The integrated power and data management system seamlessly monitors all aspects of power and data output, so the wearer doesn't have to.

Built in tests monitor for system faults and react accordingly, including short circuit protection and over temperature protection.

Having data at rest within the infrastructure of a load carriage containing body armour could pose significant data security issues; however this is not a concern when using a Broadsword® Spine™. The Broadsword® Spine™ is not a host computer; it simply performs the role of a USB hub. Its architecture prevents sensitive data being passed across the body-worn network from being stored, even temporarily, on the Broadsword® Spine™. With this approach to data at rest there is no requirement to perform an approved purge algorithm or to put a round of ammunition through on-board data storage, should the user be in danger of being captured.

Over a 48 hour mission a dismounted soldier carries between 4 and 6 replacement batteries for each piece of electronic equipment. To guarantee power, none of these batteries are allowed to become fully depleted.



Equipment List

PRC-117G Manpack Radio
PRC-152 Radio
Tactical Video Downlink
Go-Book Tactical Computer
Central Energy Supply

Introducing the Broadsword® Spine™ and a central power source reduces the total weight carried by up to 32% and reduces the number of battery types carried by 75%.

A Broadsword® Spine™ can be inserted into almost any load carriage solution, including belt orders, ballistic vests, plate carriers, duty vests for law enforcement officers, and backpacks. The e-textile folds and flexes so that connectors can be positioned to suit individual customer requirements. MTV, IOTV and Lindnerhof SF load carriages have been proven to accommodate a Broadsword® Spine™, as well as the UK VIRTUS solution made by Source Vagabond Systems based in Israel.

A backpack implementation is ideal for users carrying a significant size and mass of electronic equipment. As two Broadsword® Spine™ can connect together, the Broadsword® Spine™ installed into a backpack can be connected to one in a tactical vest/belt, adding the functionality of the backpack to the tactical vest/belt. The wearer can then quickly take on a new role by simply putting on and connecting a backpack. Benefits of doing this include accessing the extended range of a backpack installed radio and extended battery life by utilising the backpack installed battery.

The soldier, more than any other military platform, has more configurations of equipment that vary between role, mission and even user preference. The flexibility of the Broadsword® Spine™ makes it the ideal solution for simplifying soldier systems and significantly lightening the load on the individual. It's these key benefits that have led to several NATO countries trialling the Broadsword® Spine™ product with their specific soldier system equipment.

Broadsword® Spine™ unit prices for both trial and production volume orders are available on request. The product will next be displayed at DSEI 2017 on the BAE Systems stand, S3-110, where live demonstrations will be taking place. Alternatively, further product information can be obtained by emailing broadsword@baesystems.com. ■