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eSoldier

Power Monitoring System

Portable and rugged power monitoring and analysis of on-Soldier equipment

The eSoldier Power Monitoring System is a compact, rugged acquisition logging and analysis system for evaluating the power consumption or power generation of Soldier-borne equipment in situ, during field exercises or other real-time events. The system is designed to facilitate easy, unobtrusive sensor data capture through its lightweight compact design and integration of wireless and wired sensor modules.

The system consists of a core portable data acquisition unit (PDAU), which acquires measurement data from a variety of wired and wireless sensor modules. Sensor modules are available to measure voltage, current, temperature, acceleration, and digital inputs. In addition, a GPS antenna can be connected directly to the PDAU for logging location data.

The PDAU can operate either in a standalone mode or in a cabled mode for real-time monitoring and visualization of acquired data. Easy-to-use software provides an intuitive user interface to configure the system, download and interactively playback all logged data, as well as to display real-time measurement data when operating in cabled mode.

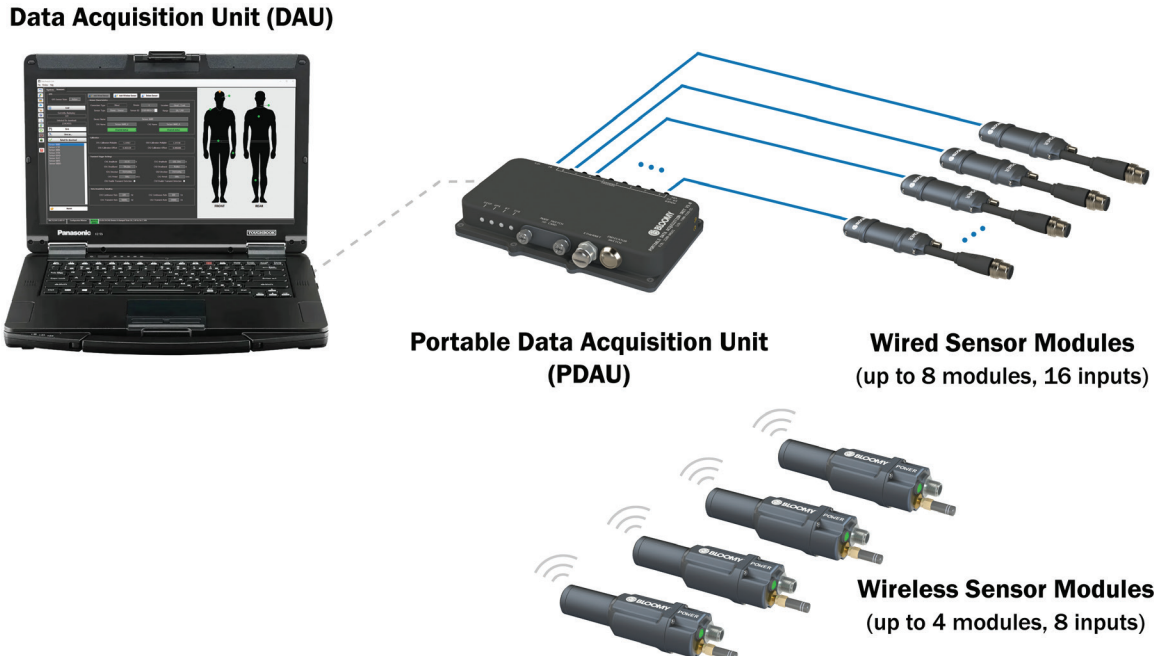
APPLICATIONS

- Power monitoring and analysis of Soldier-borne equipment in field exercises
- Onboard and on-vehicle power acquisition and analysis

FEATURES

- Acquisition and analysis of key power parameters, including high-speed transient events
- Lightweight and compact system for on-Soldier or on-vehicle data logging
- Wireless power sensor modules simplifying placement on personnel or vehicles
- Mix-and-match sensors to measure voltage, current, temperature, acceleration and digital/on-off states
- Integrated GPS for synchronized location data
- Continuous data acquisition at up to 1kS/s and transient events up to 100kS/s
- Rugged, waterproof construction with IP67 rating
- Simplified software interface to streamline setup and provide visualization and analysis of logged data
- NSNs assigned to all core components

SYSTEM DIAGRAM



PORTABLE DATA ACQUISITION UNIT (PDAU)

The PDAU is a rugged, lightweight controller which acquires and logs measurement data from wired and wireless sensor modules and communicates to a computer system running the software. The PDAU can run in stand-alone mode, logging all data to an onboard memory card. Alternatively, the PDAU can be connected to a PC with an Ethernet cable and stream live sensor data for real-time visualization.

The PDAU unit reliably acquires and logs data simultaneously from up to eight wired sensor modules and up to four wireless sensor modules. Most sensor modules provide two channels of data. The system captures data from both wired and wireless sensor modules at a continuous rate of up to 1kS/s per channel. The system can also capture transient events at rates up to 100kS/s. Acquisition rates and transient trigger conditions are user configurable.

The PDAU also incorporates an integrated GPS receiver and external antenna connection, allowing synchronized recording of GPS location and time data.

The PAU is a low-power system and is powered via an external battery or other power source. An Ethernet port allows easy connection to a PC for configuration, data download, and real-time display of acquired data.

WIRELESS SENSOR MODULES

Wireless power sensor modules provide simultaneous voltage and current measurements for easy recording of continuous and transient power data. Wireless power sensor modules are available with input current ranges up to 8 A, unidirectional or bidirectional, and voltage input ranges of 6V, 24V, or 42V.

The battery-powered wireless module incorporates Bluetooth 5.0 connectivity for robust, high-speed data connection to the PDAU. The cylindrical wireless sensors are designed to be compatible with 1” flashlight mounts.

WIRED SENSOR NODES

Wired sensor modules connect directly to input ports on the PDAU via rugged M5 cable assemblies. Wired sensor modules are available for power, temperature, and acceleration measurements, as well as digital inputs.

Each power sensor module, available with a wireless or wired interface, provides one voltage input (up to 42V), and one current input up to 8A (unidirectional or bidirectional). For temperature measurements, the temperature sensor module includes a built-in RTD (resistance temperature detector), as well as one input for an external RTD. An input module with two inputs for RTDs is also available. The accelerometer module includes a built-in 2-axis, 16g MEMS accelerometer for capturing vibration as well as orientation and tilt. The digital input module can be used for monitoring the on/off state of a 5V digital signal, eg., to monitor the status of a push-to-talk system.

The compact wired sensor modules are designed to fit in a single MOLLE channel for convenient placement.

Sensor Modules

Module Type	Measurements/Parameters	Connection to PDAU
Power Measurement	• 1 voltage input (6V, 24V, or 42V) • 1 current input (ranges up to 8A, unidirectional or bidirectional)	Wireless or Wired
Accelerometer	• Built-in 2-axis accelerometer, ±16g • Static and dynamic data (orientation and vibration)	Wired
Temperature Sensor	• Built-in PT1000 RTD • Additional input for external PT1000 RTD	
Temperature Input	• 2 inputs for external 2-wire PT1000 RTDs	
Digital Input	• Senses state of 5V input	

DATA ACQUISITION UNIT SOFTWARE

The eSoldier Data Acquisition Unit Software enables quick and easy configuration and setup of the system. Dialog windows step the user through the specification of sensors, including location, and all acquisition parameters.

After data is acquired and logged by the PDAU in standalone mode, the Data Acquisition Unit Software is used to download the stored data from the PDAU for visualization and management. The software also can operate a directly connected PDAU in cabled mode, streaming and displaying live sensor data in real-time.

Sensor and Acquisition Configuration

Real-Time Power Data Display

HARDWARE SPECIFICATIONS

POWER SENSOR MODULES (WIRED & WIRELESS)	
Measurements	1 voltage input 1 current input
Voltage Input Range	0 – 6V, 0 – 24V, or 0- 42V
Current Input Range	Unidirectional: • 100mA, 500mA, 1A, 5A, 8A Bidirectional: • ±100mA, ±500mA, ±1A, ±5A, ±8A
I/O Connector	M12 (adapter cables available)
Accuracy* (Wired Module)	0.1% (24V range) 0.3% (5A range)
Wireless Connectivity	Bluetooth LE
Battery (Wireless Module)	CR123A (replaceable) or RCR123A (rechargeable)

ACCELEROMETER SENSOR MODULE	
Measurements	X and Y axis acceleration
Measurement Range	16g
Sensitivity	57mV/g
Bandwidth	500Hz

TEMPERATURE SENSOR/INPUT MODULES		
	Temperature Sensor Module	**Temperature Input Module**
Built-in Sensor	RTD, PT1000	–
External Sensor Inputs	1 input, RTD, PT1000 (2-, 3-, or 4-wire)	2 inputs, RTD, PT1000 (2--wire)
Built-in Sensor		
Measurement Range	-40 to 185°C	
External Sensor Inputs		
External Sensor Range	-200 to 200°C	
Sensor Excitation	570µA	
Sensor Input Connector	M5 (adapter cables available)	

DIGITAL INPUT MODULE	
Input	Digital 5V logic
I/O Connector	M5 (adapter cables available)

*Typical accuracy for 22°C ±7 °C

PORTABLE DATA ACQUISITION UNIT (PDAU)	
Wired Sensor Ports	Up to 8 (16 parameters) Connected via M5 cables (3 ft std.)
Wireless Sensors	Up to 4 (8 parameters) Connected via Bluetooth 5.0
Acquisition Rate (all sensor modules)	Continuous: up to 1kS/s Transient mode: up to 100kS/s
A/D Resolution	16 bits
Integrated GPS Receiver	External antenna connected via SMA connector Latitude, longitude, altitude, and time
Outboard Data Storage	Removable microSD card
Connection to PC	Ethernet (M12 to RJ45 adapter cable)
Power	10 – 19VDC Approx 5 W peak
Power Connector	M5 (adapter cables available)

ENVIRONMENTAL AND MECHANICAL			
	PDAU	**Wired Sensor Modules**	**Wireless Sensor Modules**
Dimensions	6.9" x 4.5" x 1.1"	3.2" x 1.1" x 0.7"	6.1" x 1.6" x 1.2"
Weight	17 oz.	2 oz.	6 oz.
Temperature Range	-25 to 50°C	-40 to 80°C	-40 to 80°C
Ingress Protection	IP67		
MIL Standards	MIL-STD-810G-516 – temperature, ingress, and shock MIL-STD-461G – electromagnetic compatibility (contact BLOOMY® for details)		

Call (860) 298-9925 or visit
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