B-ALERT WIRELESS EEG HEADSET SYSTEMS

B-Alert Wireless EEG 9-Channel System – B- ALERT110-W
B-Alert Wireless EEG with AcqKnowledge plus Cognitive State Software – B-Alert110-CS-W
B-Alert Cognitive State Software – B-ALERT-SFT-W (add-on software)
B-Alert Accessories, see page 3

B-ALERT WIRELESS EEG 9-CHANNEL SYSTEM

This complete system includes the B-Alert X10 for wireless acquisition of 9 channels of high fidelity EEG plus ECG, head movement & position, AcqKnowledge software with powerful analysis tools, including automated scoring and reporting options, and B-Alert Cognitive State software.

- Set up in less than 5 minutes
- Comfortable and nonintrusive—low profile fits comfortably under headgear
- Data quality monitoring and feedback simplifies acquisition for non-technical personnel
- Cognitive state classification for engagement, confusion/distraction, drowsiness, workload and stress
- Patented real-time artifact decontamination

Standard Signals

- 9 mono-polar EEG with impedance
- 2-lead ECG
- Heart rate
- Head movement
- PSD by channel

Optional signals

- Differential signals for B-Alert and workload

B-ALERT X10 WIRELESS SYSTEMS

The B-Alert X10 mobile-wireless EEG system delivers real-time measurements for a variety of research and engineering applications, including closed-loop performance monitoring and simulation training; HCI design assessment; situational awareness and team dynamics monitoring; tools for productivity and training enhancement; and fatigue management.

B-ALERT X10 SETUP OVERVIEW

- For step-by-step direction, request B-Alert X10 User Training Videos from support@biopac.com.
OVERVIEW

1. Prepare the B-Alert System.
2. Fill the foam sensors.
3. Apply X10 System to Participant.
4. Applying Mastoid and ECG Sensors.
5. Start Data Collection.
6. Remove X10 from Participant.
7. Clean X10 System.

PLUS—CLASSIFY COGNITIVE STATES

This system includes the B-Alert Cognitive State software with proprietary metrics for real-time monitoring of subject fatigue, stress, confusion, engagement and workload (classify data from B-Alert Wireless EEG systems). The GUI intuitively represents both the raw and processed data for easy understanding by even the untrained user and up to six systems can run simultaneously on a single PC—Windows 7/XP OS only.

To facilitate both real-time and offline analysis, the B-Alert Athena gauges are fully customizable to fit the requirements of the user. In the standard format (shown below), the easy-to-read dashboard gauges (Top Left) and time series (Bottom) windows present B-Alert's highly validated second by second metrics: Engagement, Workload and Drowsiness (along with Heart Rate). Heat maps (Top Right) display EEG power spectral densities (PSD) in both spatial and temporal maps for the traditional Hz bands (Beta, Alpha, Theta, Sigma).

B-Alert Wireless EEG bio-metrics are normalized to an individual subject using 5-minutes of baseline data from three distinct tasks with the sleep onset class predicted from the baseline PSD values. A probability-of-fit is then generated for each of the four classes for each epoch with the sum of the probabilities across the four classes equaling 1.0 (e.g., 0.45 high engagement, 0.30 low engagement, 0.20 distraction and 0.05 sleep onset). Cognitive State for a given second represents the class with the greatest probability. B-Alert cognitive state metrics are derived for each one-second epoch using 1 Hz power spectra densities (PSD) bins from differential sites FzPO and CzPO in a four-class quadratic discriminant function analysis (DFA) that is fitted to the individual’s unique EEG patterns. The table briefly describes each baseline task and the B-Alert classification.

**B-ALERT COGNITIVE STATE SOFTWARE (ADD-ON, SOFTWARE ONLY)**

Classify Cognitive States with this analysis software add-on for B-Alert Systems (Windows 7/XP OS only)
HARDWARE SPECIFICATIONS:

Channels: 9 EEG with fixed gain referenced to linked mastoids; 1 auxiliary differential channel with programmable gain

Sampling rate: 256 samples/second

Dynamic range: Fixed gain ± 1,000 µV

Resolution: 16 bit, CMRR 105 dB

Bandpass characteristics: 0.1 Hz and 65Hz (at 3dB attenuation)

Noise: ~ 1.5 µV @ 10 Hz and 50 kΩ impedance

Head movement/position: Angles obtained with 3D 12-bit accelerometer

RF Band: 2.4 to 2.48 GHz (ISM band)

Transmission mode: Bi-Directional with B-Alert BT – USB dongle

Data transmission range: ~ 10 meters, line of sight with onboard antenna

Transmission power: ~ 1 mW

System power consumption: ~ 40 mA @ 3.7 V

Battery capacity: Standard 2 x Li-ION batteries - 500 mAH, 12-hours of continuous use

Optional 4 x Li-ION batteries: 1000 mAH, 24-hours of continuous use

Battery charging: Internally charged with custom cable and USB wall charger

On-line impedance monitoring: Initiated by host computer using bi-directional link

Head unit dimensions: Size 13 cm (L) x 6 cm (W) x 2.5 cm (H); Weight 110 g with standard battery

User control: On/Off

Indicator LEDs: Green - wireless synced, Red – on but not synced

Software Compatibility: Windows 7 and XP, PC with 2.0 GHz or higher processor 1 GB of RAM

Sensor Headset & Accessories

Sensor sites Fz, F3, F4, Cz, C3, C4, POz, P3, P4

Sensor strips Streamline – medium; Standard – small, medium and large

Medium = Nasium to Inion ~36 cm

Electrode cream™ Highly conductive, electrolytes and preservatives in non-ionic, hypoallergenic base, buffered to skin pH

Windows 7 or XP OS only.

B-ALERT ACCESSORIES

X10 Sensor Strips

Senors are sized for placement between Nasium and Inion. Sensor strips are typically good for 40 recordings, depending on care during use and cleaning. Worn out strips should be replaced to ensure good data quality. Strip warranty is 180 days.

Strip 9 Sensor & replacement Neoprene

| X10-SENSOR-S | small | 32.0-34.5 cm (approx. 12.6-13.6") |
| X10 SENSOR-M | medium | > 34.5 cm |

Note: Small and Medium sensors should cover 99% of subjects, but a large is available by request in the very rare cases it is needed.
Disposable Study Kits
This disposable study kit for the B-Alert X10 Wireless EEG System contains:

- one sensor strip
- one Neoprene sensor strap with Velcro
- gel and pads for 25 studies
- disposable electrodes (for mastoid) for 25 studies

**RXB-ALERT-KIT-S** small 32.0-34.5 cm (approx. 12.6-13.6”)
**RXB-ALERT-KIT-M** medium  > 34.5 cm