

# Geospace Seismic Recorder with Internal Battery (GSB)

## USER MANUAL



**7007 Pinemont  
Houston, TX 77040 USA**



Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Geospace Technologies declares that the radio equipment type IEEE 802.15.4 Radio is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address.  
<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0053>

**Operating frequency range: 2405~2480MHz; Max. tune-up power with tolerance: 0±1.0dBm**

CAUTION: Any changes or modifications to this device not explicitly approved by the manufacturer could void your authority to operate this equipment.

### FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

Industry Canada  
(English)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

(French)

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC RF Radiation Exposure Statement:

(English)

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

(French)

Pour se conformer aux exigences de conformité CNR 102 RF exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toutes les personnes.

## Deployment

The GSB should be deployed with the metal plate down. This provides sufficient earth grounding and maximum cooling of the unit as well as providing the GPS receiver in the top to the unit with an ideal “view” of the satellite constellation. The unit should be transported on its side in order to put the unit into standby mode and minimize battery consumption prior to use. Once the unit is ready to be deployed it should be flipped plate down and the GSB will immediately begin power on self-test.

The GSB will test all of its internal circuits followed immediately by an impedance test of the seismic sensors. The LED that can be seen from the top of the GSB will flash codes to indicate the GSB's condition. The GSB will enable the Global Positioning System (GPS) receiver and begin to flash the code that indicates that it is searching for satellites. Within a few seconds the GPS receiver will have sufficient satellite information to obtain a 3 dimensional fix. The flash code will change to indicate this condition and the GSB will now begin to acquire seismic data if it has been programmed to begin recording immediately. See Programming below. After several minutes the internal GSB clock will be sufficiently disciplined and the GPS receiver will be turned off. The flash code will again change to indicate this state. See the flash codes below.

## Radio Status Monitoring

A GSB may be connected to a laptop computer and used as a hub to monitor the status of any GSBs within a 50m to 100m radius via a high frequency radio link. In this mode the laptop/hub monitors and logs status information from all of the GSBs that it communicates with. The laptop stores the GPS location, acquisition status, temperature, battery status and the nonvolatile memory status of each GSB. By moving the hub throughout the seismic spread all of the GSBs in the survey may be monitored and logged. This logging may take place during acquisition of seismic data with no adverse effect on the data quality.

## Flash Codes

### GSB Start-up Error Codes

<b>Critical GSB Error:</b>	LED flashes repeatedly on solid for 1 second followed by off for one second.
<b>Critical Seis Input 1 Error:</b>	LED on solid for 1 second followed by 1 short pulse.
<b>Critical Seis Input 2 Error:</b>	LED on solid for 1 second followed by 2 short pulses.
<b>Critical Seis Input 3 Error:</b>	LED on solid for 1 second followed by 3 short pulses.
<b>Critical Seis Input 4 Error:</b>	LED on solid for 1 second followed by 4 short pulses.
<b>Critical Battery Error:</b>	LED on solid for 1 second followed by 5 short pulses.
<b>Non-Volatile Memory Error:</b>	LED on solid for 1 second followed by 6 short pulses.
<b>Non-Volatile Memory Full:</b>	LED on solid for 1 second followed by 7 short pulses.

### GSB Run Time Codes

<b>GPS on but no GPS fix:</b>	One LED flash per second.
<b>GPS on with GPS fix:</b>	Two quick flashes once per second.
<b>Recording with GPS off:</b>	One quick flash each 8 seconds.
<b>Sleeping:</b>	Two quick flashes each 10 seconds.
<b>Running geophone tests:</b>	LED flashes on for 10 ms 5 times per second.

## Downloading

The GSB non-volatile memory may be read and cleared by removing the battery connection and inserting the unit into one of the outlets in the GeoReaper. See the GeoReaper User Manual for further instruction.

## Programming

The GSB recording parameters such as sample rate, pre-amp gain, record mode, and testing, are programmed and stored in non-volatile memory in the GSB by the GeoReaper. See the GeoReaper User Manual for further instruction.