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Client: IWT
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Appendix L: Manual

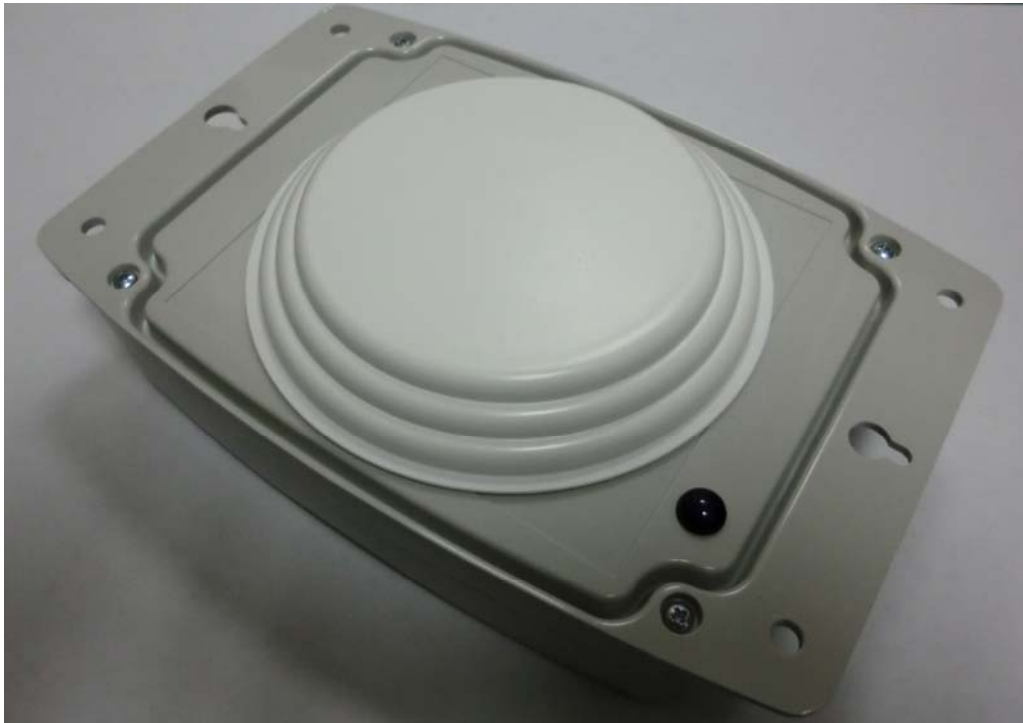
Please refer to the following pages.

INSTALLATION AND USER'S GUIDE

FOR

SENTINEL BEACON

FAP5015-050



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Contents

1.	PRODUCT OVERVIEW.....	3
2.	SAFETY INFORMATION	3
2.1	Requirements for FCC Compliance.....	3
2.2	Requirements for MSHA Compliance.....	4
3.	SPECIFICATIONS FOR FAP5010-001	5
4.	DESCRIPTION.....	6
4.1	Outputs.....	6
4.2	Components Necessary for Installation	6
5.	PRIOR TO INSTALLATION	7
5.1	Site Survey.....	7
5.2	Visually inspect each Sentinel Beacon to ensure that:.....	7
6.	INSTALLATION INSTRUCTIONS.....	7
6.1	Installations Below Ground	7
6.1.1	Antenna Placement	7
6.1.2	Applying Power to the Sentinel Beacon	8
6.1.3	Sentinel Beacon Enclosure Placement.....	9
6.2	Installations Above Ground	9
6.2.1	Sentinel Beacon Installation Instructions.....	9
7.	OPERATING AND MAINTENANCE INSTRUCTIONS	10

1. PRODUCT OVERVIEW

Innovative Wireless Technologies' Sentinel Beacon is a transmitter intended primarily for use in industrial mining applications. The **FAP5015-050 Sentinel Beacon** design provides enhanced tracking for miners and equipment in high-traffic areas of a coal mine.

2. SAFETY INFORMATION

IMPORTANT INFORMATION ON SAFE OPERATION. READ THIS INFORMATION BEFORE INSTALLING AND OPERATING THE SENTINEL BEACON.

2.1 Requirements for FCC Compliance

Changes or modifications to this unit not expressly approved by Innovative Wireless Technologies (IWT) may void the user's authority to operate this equipment.

FCC ID: SP8-FAP5015-050

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

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.

IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The Sentinel Beacon must be installed 20cm or more from any personnel in order to comply with FCC exposure requirements.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These designed limits provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no

guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

2.2 Requirements for MSHA Compliance

This device has been evaluated by the Mine Safety and Health Administration (MSHA) per Title 30 Code of Federal Regulations Part 23.

MSHA Intrinsic Safety Evaluation Number: 23-XXXXXX

Per MSHA's evaluation, this product has been determined to be intrinsically safe and may be used in areas where permissible equipment is required under the following conditions:

- The Sentinel Beacon is approved for use by MSHA with the following C size batteries ONLY: Duracell MN1400, PL1400, Energizer E93
- Do NOT mix batteries of different types or manufacturers.
- Replace both batteries at the same time.
- The Sentinel Beacon's antenna must be located greater than 3.3 feet from blasting circuits.
- Where magnetic mounting is used for the Sentinel Beacon, the magnets must comply with MSHA Program Information Bulletin (PIB) 09-36 which states permanent magnets may not be used in the same mining section as remote control equipment using Hall-effect switches.

The Sentinel Beacon is approved for use by MSHA with the (non-detachable) Astron Wireless: NP91WGIR3MMX9I.

3. SPECIFICATIONS FOR FAP5010-001

ENVIRONMENTAL	
Operating Temperature	-30C to +60C ambient ¹
Storage Temperature	-40C to +80C ambient (without batteries)
Dimensions	7.6" x 5.1" x 2.25"
Weight	1 lb (without batteries)
Enclosure	IP65
POWER	
Battery	
Type	Alkaline C cells (x2)
ELECTRICAL	
Frequency Range	902 – 928 MHz
RF Transmit Power	+10 dBm

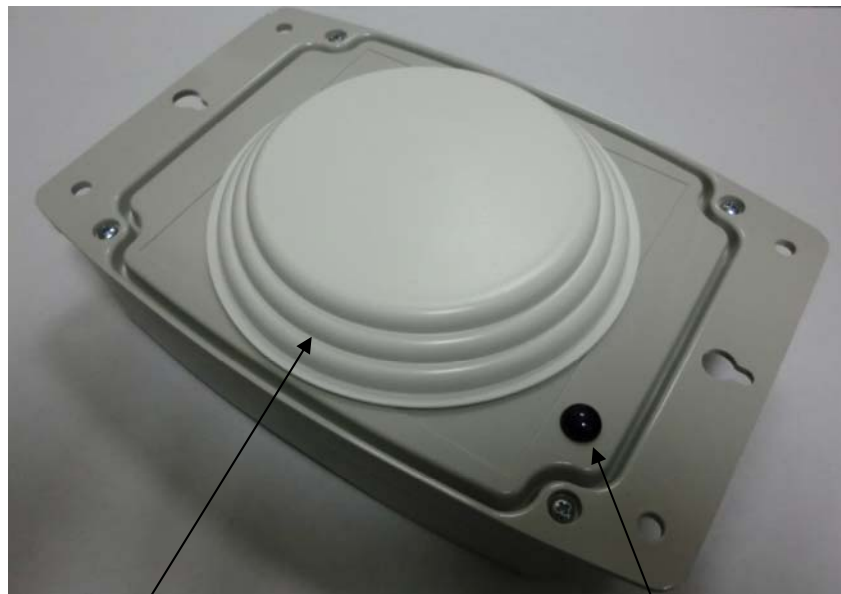
Note 1: Operating at extreme temperatures may influence the battery life of the Sentinel Beacon. To maximize battery life, maintain operating temperatures in the range +15C to +35C.

4. DESCRIPTION

4.1 Outputs

The following is an explanation of the Sentinel Beacon outputs shown in Figure 1:

LED: The blue power LED indicates the status of the Sentinel Beacon (see section 7.0)



Non-Removable Antenna

LED

FIGURE 1: SENTINEL BEACON

4.2 Components Necessary for Installation

The Sentinel Beacon installation uses the following components and accessories (see sections 5.0 and 6.0 for installation instructions):

C Cell Alkaline Batteries:

Two C cell alkaline primary batteries power the Sentinel Beacon. The batteries are located in the battery holders inside the enclosure. Battery maintenance and replacement details are in section 7.

Magnetic Mounting Feet:

The Sentinel Beacon includes holes for three magnetic mounting feet for quick installation. The mounting feet screw into the base of the enclosure. In areas of the mine where magnets are not permitted (per MSHA PIB 09-36), cable ties may be used.

5. PRIOR TO INSTALLATION

5.1 Site Survey

Conduct a survey to determine the appropriate sites to install the Sentinel Beacon from an RF perspective.

5.2 Visually inspect each Sentinel Beacon to ensure that:

- The enclosure is free from damage or defects.
- Four screws properly secure the enclosure lid.

6. INSTALLATION INSTRUCTIONS

6.1 Installations Below Ground

IMPORTANT NOTE:

TRAINED PERSONNEL MUST PROFESSIONALLY INSTALL THE SENTINEL BEACON. FOLLOW ALL MSHA REQUIREMENTS SPECIFIED IN SECTION 2.2.

At each of the sites determined by the survey described in 5.1:

6.1.1 Antenna Placement

Determine the placement for the 900 MHz antenna to ensure proper RF propagation. For units installed in coal mines below ground, mount the antennas to roof bolts using the magnetic antenna mount. Select locations that ensure proper RF communication. Antenna location should not present a safety hazard or opportunity for damage to occur.

Per the Institute of Makers of Explosives (IME) Safety Library Publication No. 20, the recommended clearance distance between the Sentinel Beacon's antenna and any blasting circuit is a minimum 3.3 feet.

6.1.2 Applying Power to the Sentinel Beacon

Battery installation must be performed above ground prior to installing the Sentinel Beacon in a mine. Refer to section 2.2 for MSHA guidelines and warnings associated with the Sentinel Beacon Batteries. Only the following C cell batteries may be used with the Sentinel Beacon: **Duracell MN1400, PL1400 or Energizer E93**

Remove the enclosure lid of the Sentinel Beacon. Insert two C cell batteries into the battery holder. Be sure to check for proper polarity when inserting batteries (see polarity instructions in Figure 2).



**FIGURE 2: POWERING THE SENTINEL BEACON
(SHOWN WITH BATTERIES INSTALLED)**

Remove and replace the enclosure lid gasket. Observe proper orientation when re-installing the enclosure lid. Secure the lid with all four screws.

Step1: Hold the beacon level with the antenna facing up and the (narrow) end with the LED towards you. Maintain this position for 4-5 seconds.

Step2: Tilt the (long) side nearest the LED downward so the antenna faces left. Maintain this position until the LED flashes once (about 5seconds).

Step3: Tilt the unit 180 degrees about the same axis so that the antenna is facing right. Maintain this position until the LED flashes once.

Step4: Return to the unit to the original position so that the antenna is facing up. Maintain this position until the LED begins flashing short pulses at 500ms intervals. This indicates the unit is transmitting.

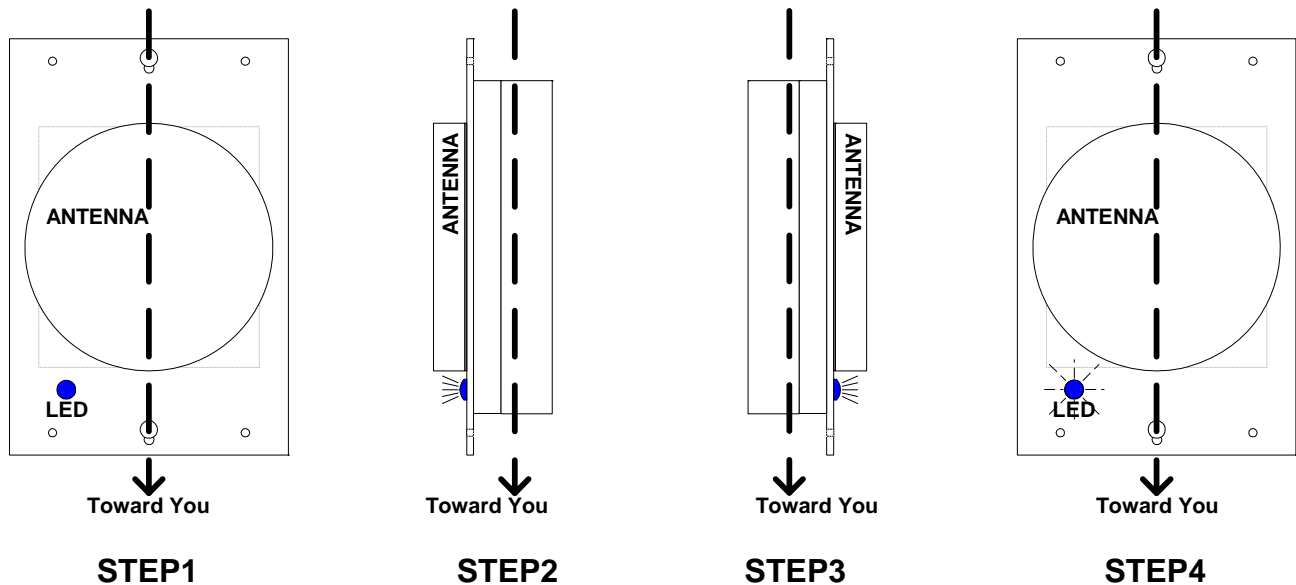


FIGURE 3: TURNING THE SENTINEL BEACON ON

6.1.3 Sentinel Beacon Enclosure Placement

Locate a place to mount the Sentinel Beacon enclosure. Use the enclosure's magnetic mounting feet to mount the Beacon to a roof bolt plate (or other acceptable location). The Sentinel Beacon should be mounted with the antenna disk in a horizontal orientation such that the antenna and the LED are facing away from the roof or other horizontal mounting surface.

In areas of the mine where magnets are not permitted (per MSHA PIB 09-36), cable ties may be used to mount the Sentinel Beacon.

6.2 Installations Above Ground

At each of the sites determined by the survey described in 5.1:

6.2.1 Sentinel Beacon Installation Instructions

Follow installation instructions of 6.1. Equipment above ground should be located so as not to present a safety hazard or cause damage. Secure all equipment using the proper hardware.

Follow all FCC guidelines listed in Section 2.0.

7. OPERATING AND MAINTENANCE INSTRUCTIONS

The Sentinel Beacon does not have any direct user interface.

Monitor the status of the Sentinel Beacon by observing the LED mounted on the outside of the enclosure (LED1):

BLINK (ON—1 ms, OFF—500 ms): Power ON / Device transmitting

OFF: Power OFF / Device not transmitting

The Sentinel Beacon requires little routine maintenance. Inspect each box periodically every 3-6 months to ensure that the box remains free of defects. It is important that the box remains dust tight. Replace defective boxes immediately. Do not continue to use any boxes that may have had their dust seal compromised.

Replace the C cell batteries inside the Sentinel Beacon enclosure once each year. Refer to Section 2.2 for MSHA requirements pertaining to the batteries. To prevent dust and moisture from entering the Sentinel Beacon enclosure during battery replacement, replace the batteries in a location above ground and free from excessive moisture and coal dust.

To replace the Sentinel Beacon's batteries:

1. Prior to removing the enclosure's lid, wipe surfaces of enclosure to remove excess dirt/dust.
2. Remove enclosure lid by unscrewing the four lid screws.
3. Remove the two C cell batteries from the battery holders.
4. Insert two fresh C cell batteries into the battery holders noting proper polarity.
5. Replace the enclosure lid gasket.
6. Replace enclosure lid and secure all four lid screws.

At this point the beacon will be in a non-operational, battery conserving mode. To initiate normal operation of the beacon, follow the instructions in Section 6.1.2.