



# Strata Proximity Systems Underground Proximity Generator Users Manual v1.0

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# 1 Overview

The Underground Proximity Generator is a component of the HazardAvert™ Proximity Detection System from Strata Proximity Systems (SPS). HazardAvert™ provides warnings to individuals and machinery to alert them that an individual wearing a portable alarm device has entered too close to an operating piece of equipment and is in a dangerous situation. HazardAvert™ also warns when vehicles or other machinery are getting close enough that the possibility of a collision exists.

## 1.1 Theory of Operation

The Underground Proximity Generator is a component of HazardAvert™ and is mounted on machinery such as Continuous Miners and Shuttle Cars and is connected to a central control unit. The functions of the Underground Generator are:

- To generate and transmit a 73kHz field around a vehicle or piece of machinery to act as a protection zone for collision avoidance and for proximity detection for the protection of individuals.
- To receive a 916.48MHz RF signal from other vehicles or Personal Alarm Devices (PAD).

The Underground Proximity Generator Module generates a 73 kHz signal at the rate of 3mS on and 3mS off at a repetition rate of approximately 200mS. This 73 kHz signal is fed to a wire / ferrite radiator element which is integral to the Underground Proximity Generator Module. The radiator produces a 73 kHz field that is emitted from the Underground Proximity Generator Module. This field creates a protection zone around the vehicle or machine that can be detected by other HazardAvert system components equipped with 73 kHz receivers. The Underground Proximity Generator Module also has an internal 916.48MHz receiver for the detection and demodulation of RF signals from other HazardAvert System components equipped with a 916.48MHz transmitter. As the Underground Proximity Generator Module is transmitting the 73 kHz field, other system devices are receiving the field and making determinations as to their distance from the Underground Proximity Generator Module. If the Underground Proximity Generator Module receives a 916.48 MHz transmission in response to its 73 kHz transmission, it analyzes the 916.48 MHz signal and determines if the transmitting device is in what is considered a "Warning Zone" or a "Danger Zone". If the Underground Proximity Generator Module determines that the transmitting device is in a Warning or Danger Zone area, it will turn on the appropriate LED's to give a visual indication to individuals operating or near the machine that the Warning or Danger condition exists. Information regarding the received 916.48 MHz signal is also passed to a central controller on the vehicle or piece of machinery.

## 1.2 Frequency of Operation

The Underground Proximity Generator will transmit on a frequency of 73 kHz and receive on a frequency of 916.48 MHz

## 1.3 Approvals

### 1.3.1 MSHA Approval

The MSHA approval number is 18-PDA09003-0.

### 1.3.2 Pennsylvania Approval

The Pennsylvania approval number is BFE69-11.

## 1.4 Label Information

The Underground Proximity Generator label is located on the bottom face of the shunt. A picture of the Strata and MSHA label is below:



The Strata label defines the model and serial number of the Underground Proximity Generator. The MSHA label provides the MSHA approval number and specific MSHA certification.

### **1.4.1.1 MSHA Blasting Distance**

MSHA approval requires that a minimum of 40 inches shall be maintained between the Underground Proximity Generator and any blasting circuits, explosives or detonators.

### **1.4.1.2 Pennsylvania Blasting Distance**

Pennsylvania approval requires that the Underground Proximity Generator must be installed at a minimum safe distance of 17 feet from blasting circuits, explosives, and detonators.

Note: Pennsylvania generates such requirements by multiplying the MSHA determined minimum distance of 40 inches by a factor of 5.

SPS magnetic field generators produce a magnetic field that at 100 kHz or .1000 MHz does not achieve the Critical H Field until 1.42 m with a blasting cap having a pickup area of 10 sq. meters.

SPS magnetic field generators are safe to 1.42 m from the blasting caps. SPS does recommend a minimum distance of 25' as a precaution.

## **1.5 FCC Information**

The FCC ID for the Underground Proximity Generator is ZQ3-SPS-UPROX. When configured by Strata for underground use, the device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received including interference that may cause undesired operation.

Any intentional or unintentional changes or modifications to the configuration of the Underground PAD not specifically detailed in this document could void the user's authority to operate the equipment.

*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 limits are designed to 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.

Patent #'s 7,420,471  
5,939,986 and 6,810,353  
Patent Pending

## 2 Operation

### 2.1 Installation Information

The Underground Proximity Generator is mounted on a vehicle or piece of machinery. Metal near the Underground Proximity Generator may impact performance. After installing the Underground Proximity Generator on the machine, performance of the unit should be verified by calibration and test.

#### 2.1.1 Interoperability Warning

The Underground Proximity Generator may experience erratic responses when in *very* close proximity to some electronic devices. Electrical devices may transmit an electrical field and noise from these fields *may* cause interference with the Underground Proximity Generator. A safe guideline is to keep Underground Proximity Generator *at least 75 mm away* from any electrical devices included but not limited to methane monitor, radio, mobile phone, PDA, battery charger and laptop computers.

### 2.2 Charging

The Underground Proximity Generator is directly powered from the controller board and requires no internal battery or charging.

### 2.3 Alerts

Although the Underground Proximity Generator has LED visual indicators, it is not designed to alert the user. The LEDs are used mainly for set up and diagnostics of the system.

### 2.4 Maintenance

The Underground Proximity Generator should be regularly cleaned to reduce buildup of dust and dirt.

## 3 Warranty

Initial system hardware components will be warranted to be free of defects for a period of one (1) year from in service date. Subsequent component purchases will be warranted one (1) year from receipt acknowledgement. Warranted replacement or repair is not applicable in cases of physical damage or abuse as determined at the time of return or inspection.

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## **4 Revision History**

### **4.1 Version 1.0 – October 5, 2011**

Original release. No revision history