



# Strata Proximity Systems Surface PAD Model HA-S-2200-S Users Manual v1.0

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# 1 Overview

The Surface PAD is part of a complete HazardAvert proximity warning system from Strata Proximity Systems which provides warnings to both individuals and to vehicles and machinery to alert them that the individual wearing the PAD has entered too close to an operating piece of equipment and is in a dangerous situation or that vehicles or machinery are getting close enough that a collision possibility exists.

## 1.1 Theory of Operation

The Surface PAD is worn by an individual. The functions of the Surface PAD are:

- To detect the presence of a 73 kHz electromagnetic field generated by vehicles or machinery equipped with the HazardAvert system and to determine if the field strength level detected indicates that the individual is in or is approaching a dangerous situation.
- To provide an audible and visual indication to the wearer of the Surface PAD that they are approaching or are in a dangerous location as a result of the 73 kHz field strength level.
- To transmit a 916.48MHz RF signal to vehicles or machinery equipped with the HazardAvert system signaling that the individual is entering or has entered into a dangerous area relative to the vehicle or machinery.

The Surface PAD has a 73 kHz receiver that is constantly on and monitoring the strength of fields emitted by vehicles and machinery equipped with the HazardAvert proximity and collision avoidance system. The Surface PAD monitors the strength of the 73 kHz fields in three axes and determines if the field strength has risen to a level that would indicate that the individual is approaching a "Warning Zone" or is in a "Danger Zone" due to being too close to the vehicle or machinery. If the Surface PAD determines that the individual is too close to the vehicle or machinery, it gives the individual both a visual and audible indication. At the same time, the PAD transmits a 916.48MHz RF signal to inform the vehicle or machinery that the individual is approaching too close. If the Surface PAD determines that the field strength indicates that the individual is not in a Warning or Danger Zone area, it will transmit a data packet every 10 seconds via the 916.48MHz with its status condition.

The Surface Pad is an assembly comprised of four systems each on a separate printed circuit board. The **PAD System Board** contains three magnetic field pick-up coils each in a physically different axis place 90 degrees from each other. These pick-up coils along with their fixed value capacitors and amplifiers form a 73kHz receiver for reception of fields generated by vehicles or machinery equipped with the HazardAvert system. The System Board also has a PIC microcontroller which receives the inputs from three detectors which independently detect the inputs from the three 73kHz pick-up coils. The PIC through an internal algorithm, determines if the 73kHz field is above a pre-programmed threshold.

If the PIC determines that the received field is above the threshold level, it sends a logic signal and data to an internal **RF Transmitter Board**. The RF Transmitter Board contains a LINX TXM-

916-ES transmitter Integrated Circuit. The TXM-916-ES generates and frequency modulates a 916.48MHz carrier with the data sent from the PIC microcontroller on the PAD System Board. The RF Transmitter board has no alignment procedure as the TXM-916-ES transmitter has a self contained crystal controlled PLL oscillator. This transmitted 916.48MHz signal will alert the vehicle or machinery that generated the 73kHz field that was received, that this particular Surface PAD unit is coming within an unsafe distance of the vehicle or machinery. If the PIC determines that the 73kHz field strength is below the threshold level, it will cause the RF Transmitter to transmit the unit's status and Identification data once every 10 seconds.

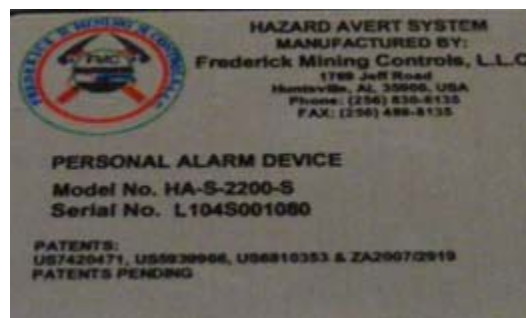
Along with generating the RF signal to alert the machinery or device, the Surface PAD will also alert the person wearing the PAD with both an audible sound and a visual indicator that they are in an area that is too close to the vehicle or machinery. The audible and visual indicators are located on a **Warning Unit Board** which is also within the Surface PAD.

## 1.2 Frequency of Operation

The PAD will transmit as a frequency of 916.48MHz in the ISM Band.

## 1.3 Label Information

The Strata Proximity PAD label is located on the front center of the unit. A picture of the Strata label is below:



The Strata label defines the manufacturing address, model number and serial number of the PAD. MSHA Blasting Distance

## 1.4 FCC Information

The FCC ID for the Strata Surface PAD is **ZQ3-SPS-SPAD1**. When configured by Strata for below-ground 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 Strata Proximity Surface 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.*

## **2 Operation**

### **2.1 Installation Information**

The PAD is to be worn on the protective helmets of workers. The PAD should be at least 3" or 75mm from all other electronic devices such as Spotters, CO sensors, tracking devices, etc. After placing the PAD on the operators hip, performance of the unit should be verified at the Strata Proximity check-out station.

#### **2.1.1 Interoperability Warning**

The Strata Proximity PAD 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 PAD's reception. A safe guideline is to keep PAD *at least 75 mm away* from any electrical devices included but not limited to methane monitor, radio, mobile phone, PDA, battery charger and laptop.

### **2.2 Alerts**

When the PAD is connected to the Strata Battery and sounding pack, the PAD will alert the user with both an audible sound and a visual indicator that they are in an area that is too close to the vehicle or machinery. Once the PAD has determined that the user is too close to the machine, it will begin to warn the user. Multiple levels of warning are provided. The Typical setting is to give a warning that the user enters the Warning Zone and then, as the machine approaches closer and the PAD crosses into the Danger Zone.

### **2.3 Maintenance**

The PAD should be cleaned after each use to ensure all buttons and connectors are free of all 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 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.

### **4 Revision History**

#### **4.1 Version 1.0 – September 1, 2011**

Original release. No revision history