

HazardAvert™ Forklift Operations Manual for IP
Patents Pending
12/7/08

**HazardAvert™ Forklift
Operations Manual
For
International Paper**

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1. Introduction

The HazardAvert™ IP Forklift System warns people that they are entering a hazardous zone of a forklift. The most important application is to alert the operator when a pedestrian enters his/her zone of the forklift.

Many of the hazards created from forklift equipment in a warehouse environment are a result of pedestrians being in the path of or being hit by movements of the large machines. Being in close proximity to a hazard is the most obvious contributor to being injured or killed. The HazardAvert™ Forklift system has the capability to alert the pedestrian and the operator if the forklift equipment becomes dangerously close to any pedestrian who is using a HazardAvert™ Personal Alarm Device (PAD).

Pedestrians working in the vicinity of a forklift should be equipped with a PAD. The PAD is typically carried in their shirt pocket. The HazardAvert™ Forklift system includes a Field Generator that produces an oscillating magnetic marker field around the forklift machine, which is then detected by the PAD. The PAD measures the strength of the marker field and emits both an audible and visual alarm while transmitting that alarm information to the generator which activates either Alarm #1 or Alarm #2 circuits.

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2. Purposes and Warnings

The purpose of this manual is to provide proper instructions for use and operation of the Frederick Mining Controls (FMC) HazardAvert™ IP Forklift system. The following warnings and disclaimers are to ensure the safe use of the product as intended by the manufacturer.

WARNING: HazardAvert™ is to assist pedestrians and forklift operators to follow safety procedures. The following information is not to supersede any Federal, State, Local, Original Equipment Manufacturer (OEM) or company Policy, Laws and/or Standard Operation Procedures (SOP) that have been set forth on safe operation of this machinery.

WARNING: The Generators emit a Magnetic field that may interfere with Pacemakers, Implantable Cardioverter Defibrillators (ICD) or other implantable medical devices. If you have an implantable medical device you must seek a medical evaluation by a physician before working around this generator, also you must notify warehouse management of your condition and the results of the physician findings before working with the HazardAvert™ equipment.

WARNING: If IP management or warehouse personnel should modify the manufacturer's initial settings then they are responsible for changes to the documentation.

DISCLAIMER: Frederick Mining Controls, LLC does not promise nor guarantee that personnel will be kept safe by using HazardAvert™ and can not be held liable for damages.

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3. Installation of Generators

The purpose of this section is to provide proper instructions for installation of the Field Generators for the FMC HazardAvert™ Forklift system.

3.1. Placement of Generator

The placement and direction of the field generator on the forklift is extremely important for successful operation of the system. The front of the field generator unit **must** be pointed in the direction of travel (“facing the forks”) as shown in figure 1 below. The generator also **must** straddle the two bars on the metal grate of the forklift operator’s cage.

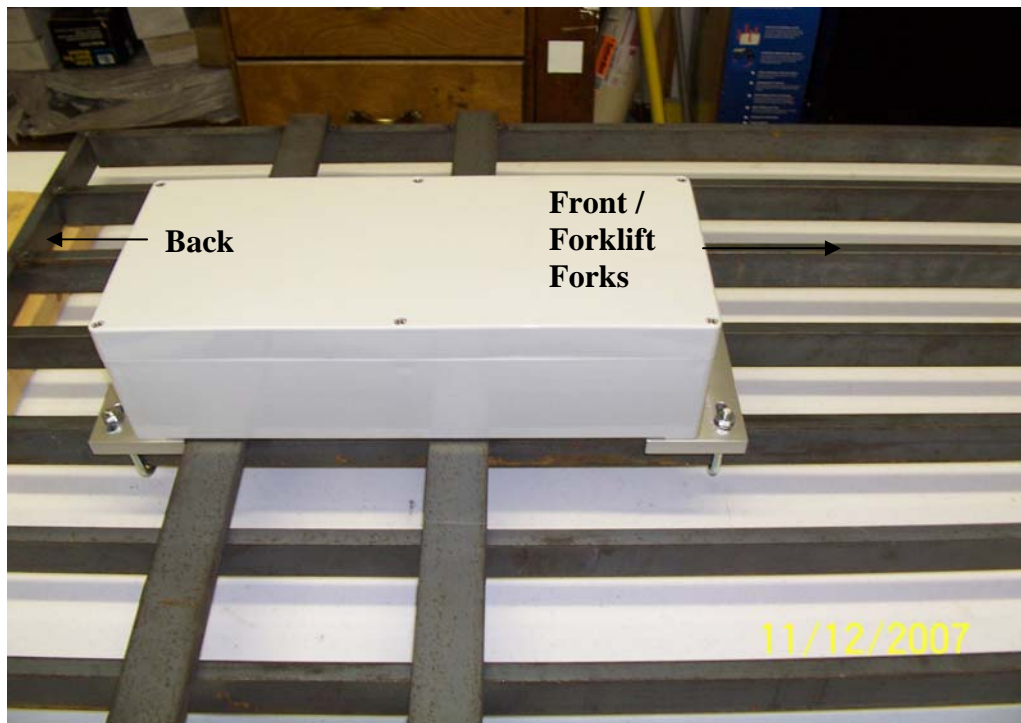


Figure 1: Simulation of Field Generator mounted on top of the forklift operator’s cage (top, down view)

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3.2. Attachment of Generator

The field generator will be attached to the top of the cage of the forklift by brackets and bolts as shown in figure 2 below. Note: Do not over tighten the locking nuts.

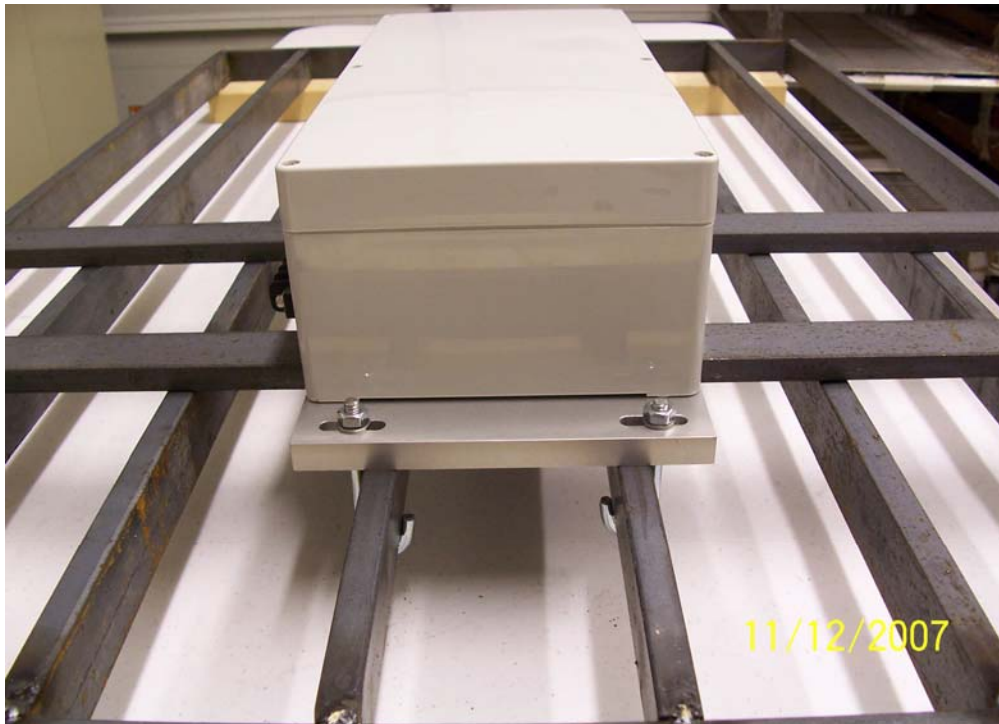


Figure 2: Simulation of Field Generator mounted on top of the forklift operator's cage (back view)

3.3. Attachment of Alarms

Various alarms may be attached to the forklift equipment as instructed by management. Power for the alarms is supplied at terminals Alarm #1 and Alarm #2 on the generator. Both alarm outputs are protected with a 2-amp fuse. Note: only 1 alarm is active at any time.

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3.4. Connection of Generator

Power will be supplied to the generator from the forklift battery. A connection must be made from the battery to the +12VDC and 12VDC RTN terminals on the side of the box. *Note: Use 20 AWG wire or larger.* The alarms for the Warning Zone will be connected to the Alarm #1 output and return terminals on the generator. The alarms for the Stop Zone will be connected to the Alarm #2 output and return terminals also on the generator. See figure 3 below for an example of a mounted generator. Please refer to the wiring drawing at the end of the document (Section 8.0, Attachments) for additional information.

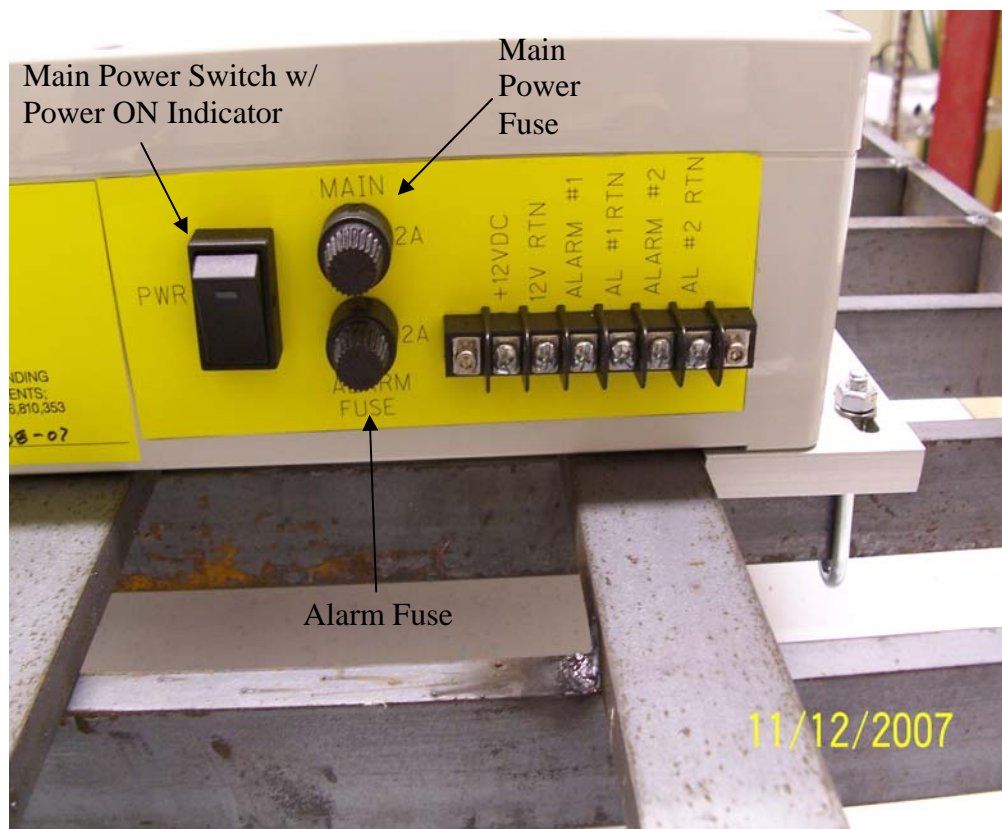


Figure 3: Simulation of Field Generator mounted on top of the forklift operator's cage (side view)

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3.5. Verification of Installation

For mechanical installation, refer to Section 3.2, Attachment of Generator.

Verify that all electrical connections are correct per the drawing in Section 6.0. Turn on Generator Power Switch and verify that the green LED power on indicator is lit in the switch. Activate PAD and verify there is one beep and light flash for one second. Use PAD to verify the coverage of the protection zones around the forklift machine. Verify that the PAD indicates Alarm Zone #1 with one beep and flash of light per second. Also verify that the PAD indicates Alarm Zone #2 with three fast beeps and flashes of light per second.

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4. PAD

4.1. General Description

A Personal Alarm Device (PAD) is designed to be used as part of the HazardAvert™ system. The PAD will warn pedestrians and forklift operators that they are entering a hazard zone around the forklift equipment.

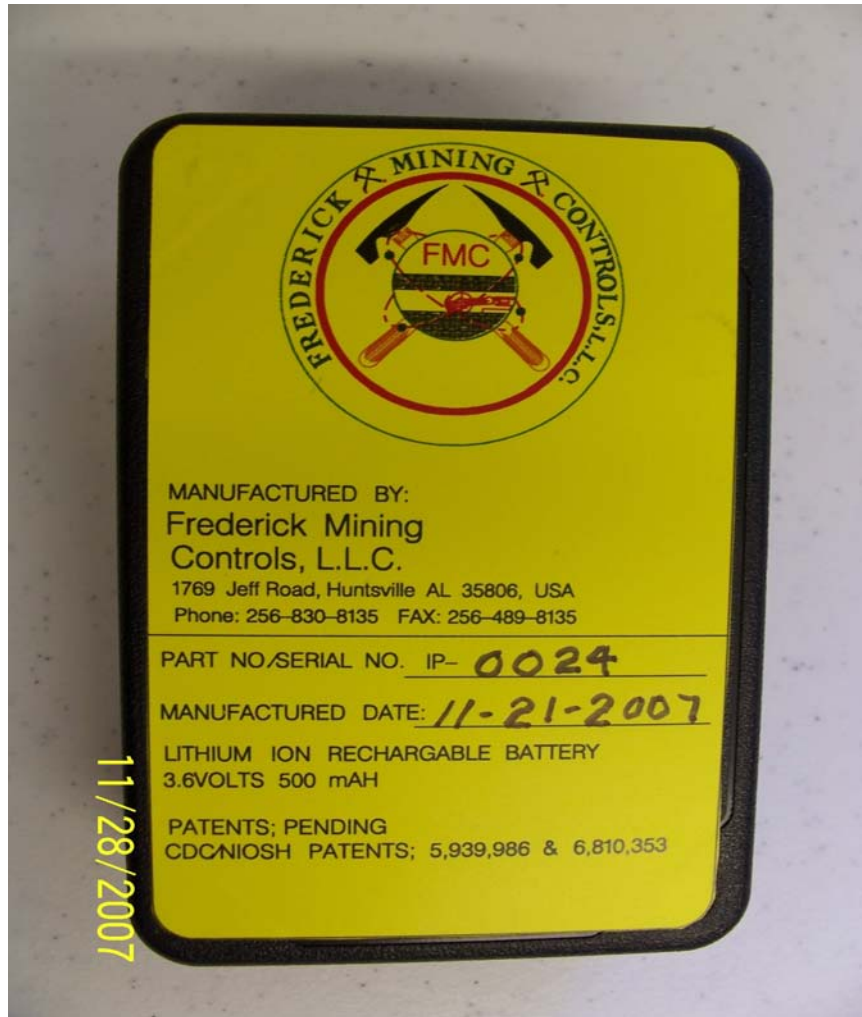


Figure 4: PAD

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4.2. Function

Each pedestrian or forklift operator to be warned about close proximity to the forklift equipment will carry a PAD. The PAD transmits information to the Field Generator on the forklift to initiate actions to produce a safer condition. Entrance into a Warning Alarm Zone is recognized by the PAD, which issues a visual and audible alarm to the pedestrian and sends this information to the generator on the forklift.

The PAD consists of buttons and/or ports on the top and both sides. The top view includes an On/Off switch as well as an LED light to visually signal and a “sounder port” to audibly signal a zone incursion (see figure 5 below). On one side there is a battery charger connection (see figure 6).



Figure 5: Top View - Functions on a PAD

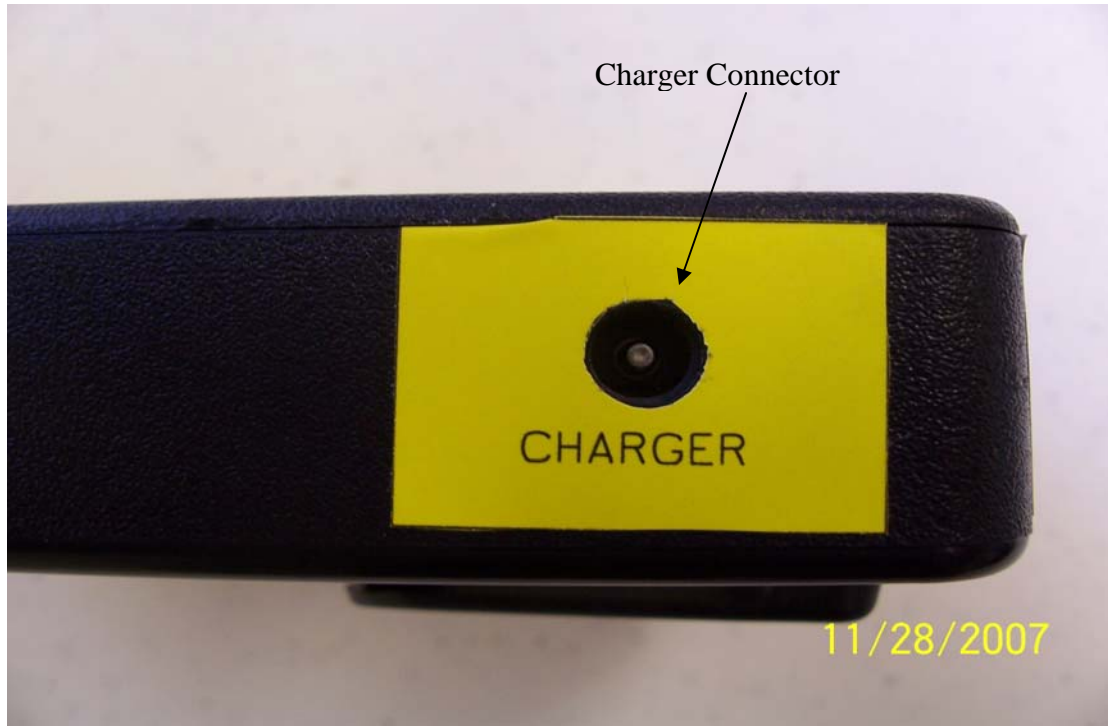


Figure 6: Side view - Functions of a PAD – Charger

All PADs function identically until you activate operator status through the small hole on the side of the PAD (see figure 7). A “push pin” or “paper clip” may be used to activate operator status. The PAD will sound 5 quick beeps to indicate that operator status is activated. Now when the person is seated in the forklift, no alarms will sound. *There will be no alarms as long as the operator is seated or remains within approximately 5 feet of the forklift.* If the system is ON and the operator leaves the machine, alarms will activate approximately 5 feet away. When the operator exits the forklift, the alarms will engage as in “pedestrian” mode to ensure the operator’s safety. When returning to a forklift, the operator will proceed through all alarms until they silence within approximately 5 feet of the forklift. The operator has the capability of becoming operator of any forklift when the PAD is in “operator” mode. The operator status will remain in effect until the PAD is turned OFF and ON again. The PAD will then return to “pedestrian” mode.



Figure 7: Side View – Functions of a PAD - Operator Access

4.3. Location

The PAD should be worn on the upper part of the body preferably in the shirt pocket or outer garment to visually and audibly hear the warnings.

4.4. PAD Battery Status

A PAD with a low battery voltage will alert the person by producing a double “beep” once per second. PAD should be recharged as dictated by the charger status lights.

4.5. Charging PAD

Connect the charging cord to the battery charging connection in the side of the PAD. Plug the battery charger into the outlet. The LED light on the charger will flash red and green for two times after supplying AC power then both off. The Red LED will be on “in charging mode”. The Green LED will light after battery is fully charged. The PAD should work for 15 hours before recharging, depending on the number of alarm encounters. The operating instructions included with the charger may answer any additional questions.

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Figure 8: PAD Battery Charger

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5. Protection Zones

There are two Protection Zones assigned within the Magnetic Marker Field to warn pedestrians wearing a PAD that they may be in danger. The equipment operator is also notified of any incursions in either zone by activation of the Alarm #1 and Alarm #2 relays. During an incursion in Alarm Zone #1, the PAD will sound 1 beep and 1 flash per 1.5 seconds and this information is sent to the Alarm Zone #1 circuit on the generator to notify the forklift operator. The same procedure applies for Alarm Zone #2 except the PAD sounds 3 beeps and 3 flashes of light per 1.5 seconds.

The Protection Zones are created by the operation of the field generator on the top of the forklift. The two Protection Zones are:

- Alarm Zone #1 – 30 ft from the front of the forklift
- Alarm Zone #2 – 15 ft from the front of the forklift

Please refer to Figure 12 for a rough depiction of the zones and how they relate to the forklift equipment in regards to their order. NOTE: *The figure is not to scale.*

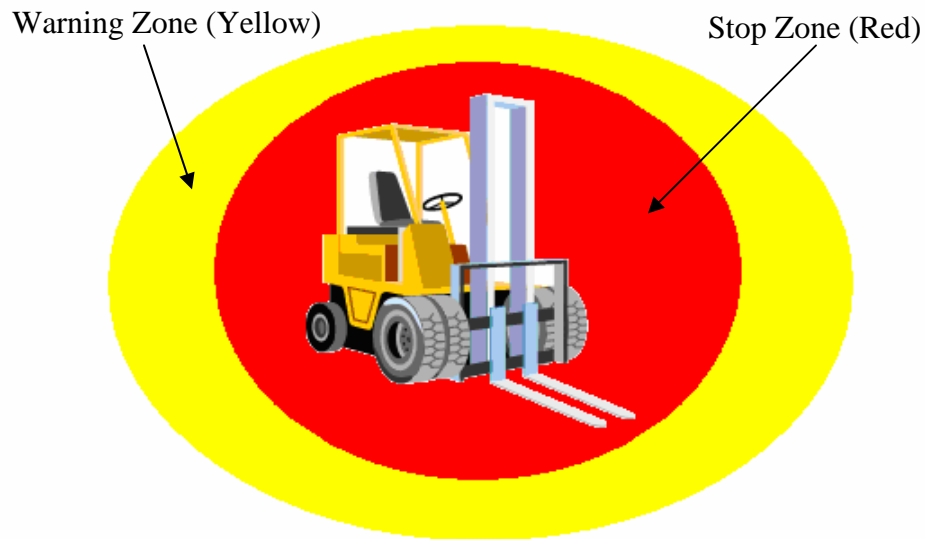


Figure 12: Forklift with Protection Zones

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6. Attachments

See the Interface Diagram for the IP Forklift, Drawing Number HAE10013IP, for more detailed information.

7. Replacement Parts

There are two parts that may be replaced on the generator. They are 1) the Main Power Fuse and 2) the Alarm Fuse. Both fuses are 2-amp SLOW-BLOW.

8. Warranty

If any part of the FMC HazardAvert™ Forklift system fails during the first 6 months, while being properly handled and properly used, FMC will repair or replace the failed part at no cost. Shipping to FMC to be prepaid by customer. FMC assumes no liability for damage to property or injury to personnel resulting from use of the HazardAvert™ equipment.