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Client: Innovative Wireless Technologies, Inc.  
Model #: FAP6210-001  
Standards: FCC 15.247 & IC RSS-210  
ID's: SP8-FAP6210001/9568A-FAP6210001  
Report #: 2011030

## **Appendix J: Manual**

Please refer to the following pages.

# **IWT Miner Mesh Handset Operator Manual FAP6210-001**



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## 1.0 PRODUCT OVERVIEW

Innovative Wireless Technologies' Miner Mesh Handset (MMH) is a two way radio handset designed primarily for use in industrial mining applications. The MMH is a portable device which provides voice, data and tracking capabilities over an ad-hoc wireless communications network.

Some key features of the MMH:

- Supports simultaneous Voice/Data/Tracking
- High reliability communications in underground environments
- Supports talk around and fostering for extended network range
- High quality voice communications with minimal latency
- Automatic power adjustment for above and below ground use
- Intrinsically Safe when equipped with IS battery pack (Mine Safety and Health Administration Approval No. **TBD**)

## 2.0 SAFETY INFORMATION

**IMPORTANT INFORMATION ON SAFE OPERATION! READ THIS INFORMATION BEFORE OPERATING THE MINER MESH HANDSET.**

**Changes or modifications to this unit not expressly approved by Innovative Wireless Technologies, Inc. may void the user's authority to operate this equipment.**

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### 2.1 GENERAL DEVICE USAGE:

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 ID: SP8-FAP6210001**

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: 9568A-FAP6210001**

**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.

**NOTE:** The following contains important safety information regarding specific absorption rate (SAR) and RF exposure limits included in United States and international standards. Read the information before operating your radio.

- This portable radio generates RF electromagnetic energy during transmit mode. This device has been shown to be compliant for localized Specific Absorption Rate (SAR) for controlled environment limits specified in ANSI/IEEE Std. C95.1-1992 and has been tested in accordance with the measurement procedures specified in IEEE 1528-2003, OET Bulletin 65 Supp. C, RSS-102 and Safety Code 6.

## **RF EXPOSURE GUIDELINES - CAUTION**

To ensure that exposure to RF electromagnetic energy is within the FCC allowable limits for general exposure, always adhere to the following guidelines:

- Do not operate the radio without a proper antenna attached, as this may damage the radio and may also cause the FCC RF exposure limits to be exceeded. A proper antenna is the antenna supplied with this radio by IWT (Antenna Factor: ANT-916-CW-HD), or an antenna specifically authorized by IWT for use with this radio.
- Only use IWT authorized accessories (antennas, batteries, belt clips, speaker/microphones, etc). Use of unauthorized accessories may cause the FCC Occupational/Controlled Exposure RF compliance requirements to be exceeded.

## 2.2 DEVICES USED IN UNDERGROUND COAL MINES:

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

**MSHA Approval Number:** **TBD**

Per MSHA's evaluation, this product has been determined to be intrinsically safe under the following conditions of use:

**TBD**

Never disassemble the handset, add or remove accessories, change or charge the battery, while underground. Doing so may create an unsafe condition.

## 2.3 PROXIMITY TO BLASTING COMPONENTS:

The transmitted waveform characteristics are short duration (milliseconds/second) pulses, with a power level of one (1) watt or less. For this reason the energy density is very low such that the handset is classified as a low Power RF source as defined by the Institute of Makers of Explosives, Safety Library Publication No. 20. Therefore, the Handset shall not be turned on or operated within five (5) feet with respect to explosives or blasting components.

### 3.0 SPECIFICATIONS FOR FAP6210-001

<b>ENVIRONMENTAL</b>	
Operating Temperature	-30C to +60C ambient
Storage Temperature	-30C to +60C ambient
Dimensions (without Antenna)	5.5"x2.5"x1.5"
Weight (with Battery)	13.5oz
Enclosure	IP67 (When assembled with antenna and IS Battery pack.)
<b>Alkaline Battery Pack</b>	
Voltage	5.8V – 9.0V
<b>IS Battery Pack</b>	
Voltage	TBD
<b>ELECTRICAL</b>	
Frequency Range	902 – 928 MHz
Receiver Sensitivity <sup>1</sup>	-100 dBm
RF Transmit Power – below ground	+28 dBm
RF Transmit Power – above ground	+13 dBm
RF input/output	50 ohms nominal (RP-SMA Connector)

Note 1: Conducted sensitivity measured at BER < 2%

### 4.0 MMH HANDSET DESCRIPTION

The Innovative Wireless Technologies' Miner Mesh Handset (MMH) is a radio handset designed specifically for use in mines and marketed exclusively to industrial mining operations to support communications and tracking of personnel in and around mines. The handset is rated IP67 for protection against entry of water and dust making it well suited for demanding underground environments (when mated with the IS Battery Pack)

## 4.1 HANDSET CONTROLS:

### Volume / Power (On/Off) Knob:

The Volume Knob is located on the top right of the handset. Rotating clockwise will first turn on the handset and then increase the volume. Rotate counter clockwise to lower the volume and turn off the handset.

### Group Select Knob:

The group select knob is located on the top middle of the handset. The knob allows the selection of 16 different groups for voice and text messages. See section 5.1 for more information.

### Emergency Button:

The emergency button is located on the top left of the handset. Pressing the emergency button signals an emergency condition to the Mine Operation Center. See section 5.3 for more information.

### Clear Button:

The clear button is located on the upper left side of the handset. Pressing the clear button will return you to the Home Menu from any sub menu. Pressing the clear button while in the home menu will set the call destination to the currently selected group.

### Push To Talk Button:

The push to talk button (PTT) is located on the middle left side of the handset. Press and hold the PTT button will place a voice call to the current call destination.

### Key Pad:

The keypad is located on the lower front of the handset. It is divided into two sections. The lower section is an alpha numeric pad used for writing text messages and setting the call destination for handset to handset calls. The upper portion is made up of four menu select buttons. Pressing these buttons will activate the menu function located above them.

### Microphone:

The microphone is located on the front left of the handset just above the display. When making a voice call, make sure the microphone is level with your mouth.

### Accessory connector:

The accessory connector is located on the right side of the handset and is used to connect optional accessories such as a speaker microphone. Always make sure the connector is covered when not in use. Use only IWT approved accessories. Using unapproved accessories may result in a non-intrinsically safe condition, unauthorized RF emissions, and may void the warranty. Do not install or remove accessories while below ground.



**Figure 1**

## 4.2 HOME MENU DESCRIPTION:

When the handset is first powered up the home menu will be displayed. The home menu displays the status of the handset and allows you to access advanced functions. See figure 2.

The top of the display shows current status icons.

### Volume:

The volume icon is only active when changing the volume using the volume knob. Additional crescents indicate louder volume. The icon will become hidden a few seconds after the volume adjustment is complete.

### New Text Message:

The new text message icon is displayed when you have unread text messages. Reading or deleting your messages will cause the icon to become hidden. See section 5.2 for more information.

### Talk Around:

The talk around icon is displayed when the current call destination is a talk around group. When in talk around mode calls placed will only be received by handsets directly within range. Calls will not be received by the network or more distant handsets.

### Battery Level:

The battery level icon shows the remaining battery life. If the battery is too low the handset will automatically shut down to protect the battery from damage.

### Signal Strength:

The signal strength icon shows the strength of the current connection to the network. An 'x' indicates that the handset is not within range of the network. While within range of the network up to 4 bars will be shown with more bars representing a stronger connection.

### Emergency:

The emergency icon indicates that the handset has been placed in emergency mode using the emergency button, or that an emergency voice call or text is currently being received.

### Call Destination/Message Display:

The middle part of the display shows your current call destination. Pushing the PTT button will place a call to the destination shown. The destination may be changed by using the group select knob or choosing a different destination from the menu. See section 5.1 for more information. This area is also used for displaying text messages.

### Menu Display

The bottom of the display shows the menu. The home menu allows you to access additional functions of the handset such as changing your call destination, sending and receiving text messages and accessing the handset ID. These functions will be discussed in section 5.0.

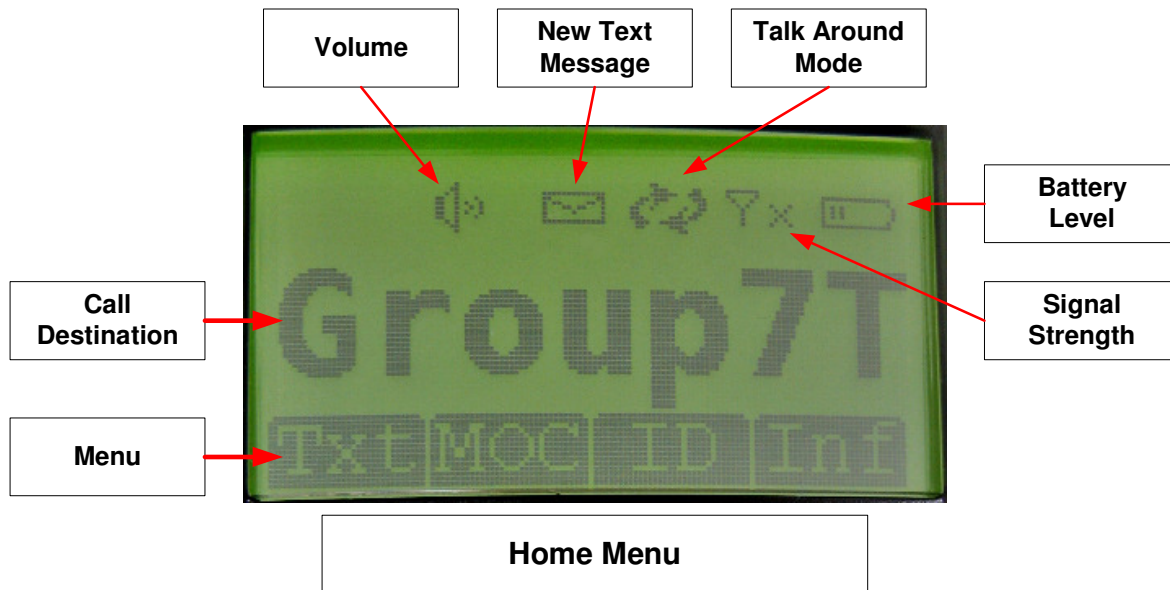


Figure 2

#### 4.3 HANDSET ID

Each handset has a unique ID. This ID is used for tracking and to place calls and send text messages to a specific handset. To show the ID of the handset press the Square (■) key, labeled 'Inf' while in the home menu. The ID of the handset will be shown for a few seconds before automatically returning to the home menu.

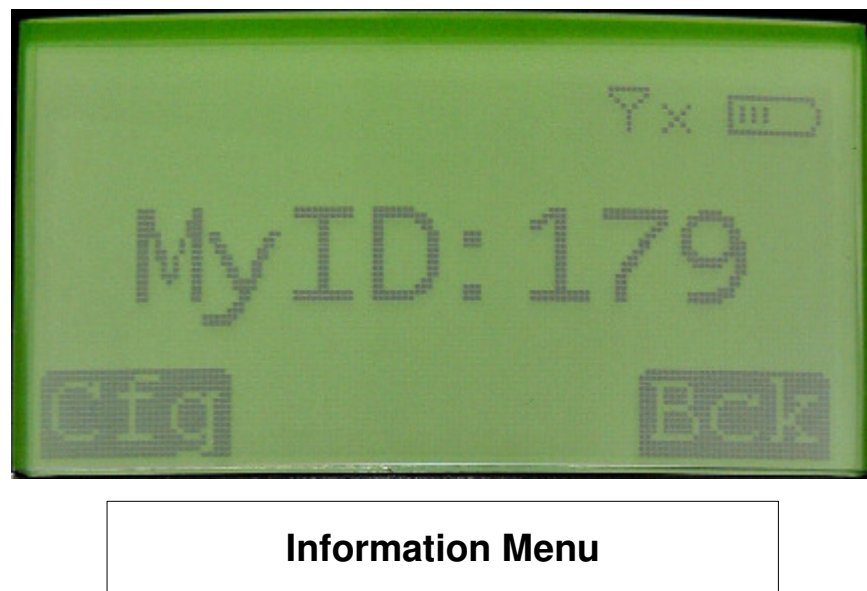


Figure 3

## 5.0 HANDSET OPERATION:

This section details the operation of the handset. The handset will automatically detect the mesh network and adjust its frequency and power as directed by the network. The user can not change any aspects of the RF operation of the handset. The user can place voice calls, send and receive text messages and signal an emergency.

To turn the handset on, turn the volume knob clockwise. There will be resistance and an audible click. Turning the volume knob further will increase the volume. Once the handset is powered on it will take a few seconds to boot before showing the home menu. You may return to the home menu at any time by pressing the clear button. From the home menu you may place voice calls and access additional handset functions.

### 5.1 VOICE CALLS

Voice calls can be placed to your current group, a specific handset or the Mine Operation Center (MOC). The current call destination is shown in the home menu. You may select a different destination by using the Triangle (▲) (▼) keys on the keypad. To place a call simply hold down the PTT button while speaking into the microphone.

#### Group calls

When the handset is first powered on the voice destination is set to the currently selected group as indicated by the setting of the group select knob. You may change the destination group using the group select knob. The 16 available groups are listed below.

Group Knob Setting	Group ID	Call Type
1	Bcast	Network Broadcast Call
2	Group1	Network Group Call
3	Group2	Network Group Call
4	Group3	Network Group Call
5	Group4	Network Group Call
6	Group5	Network Group Call
7	Group6	Network Group Call
8	Group7	Network Group Call
9	Group7T	Talk Around Group Call
10	Group6T	Talk Around Group Call
11	Group5T	Talk Around Group Call
12	Group4T	Talk Around Group Call
13	Group3T	Talk Around Group Call
14	Group2T	Talk Around Group Call
15	Group1T	Talk Around Group Call
16	BcastT	Talk Around Broadcast Call

There are two types of Group calls; Network and Talk Around. Network calls can be received by any handset within range of the mesh network while Talk Around calls can only be received by handsets within direct range of the caller. (Talk Around calls do not use or require the mesh network). Group calls will only be heard by handsets that have selected the same group while Broadcast calls will be heard by all handsets in range, regardless of which group is selected.

To place a group call, make sure that the group you wish to call is shown in the display and press the PTT. If MOC or IDxxx is displayed you may change back into group mode by pressing the Triangle (▲) (▼) key labeled 'GRP' or pressing the Clear Button. You may also change the group using the group knob which automatically places the handset back into group mode.

### **Individual Calls**

Individual are ID specific calls placed to an specific individual handset. Other handsets will not receive the call. A handset can receive Individual calls regardless of the group setting of the destination handset. To place an Individual call, press the triangle (▲) (▼) key labeled 'ID'. 'IDxxx' will appear on the screen. The 'xxx' is the ID of the last handset to which an individual call was made. To change the call destination, use the number pad to enter the ID of the handset you wish to call. If a mistake is made, you can use the Star (\*) key to delete the last character entered. Once the correct ID is displayed, press the PTT button to place the call. This also sets the current ID as the new default ID until the handset is turned off.

When an Individual call is received, the handset will generate an alert tone and display the handset ID. To respond, press PTT and speak into the microphone. If you do not respond within several seconds, the handset will revert to displaying the selected group, effectively ending the Individual call.

### **Mine Operations Center (MOC) Call**

MOC calls are individual call, dedicated for communication with dispatch console in the mine operations center. To place a MOC call select MOC by pressing the triangle (▲) (▼) key labeled 'MOC'. Press the PTT button to call the MOC.

## **5.2 TEXT MESSAGES**

Text messages may be sent and received in a manner similar to cell phones. To access text messaging press the Diamond (◆) key from the home menu. The display will then change to the text message menu. From here you may view your received text messages, send a text message or clear all current text messages. If no selection is made within a few seconds the display will return to the home menu.



**Text Message Menu**

**Figure 4**

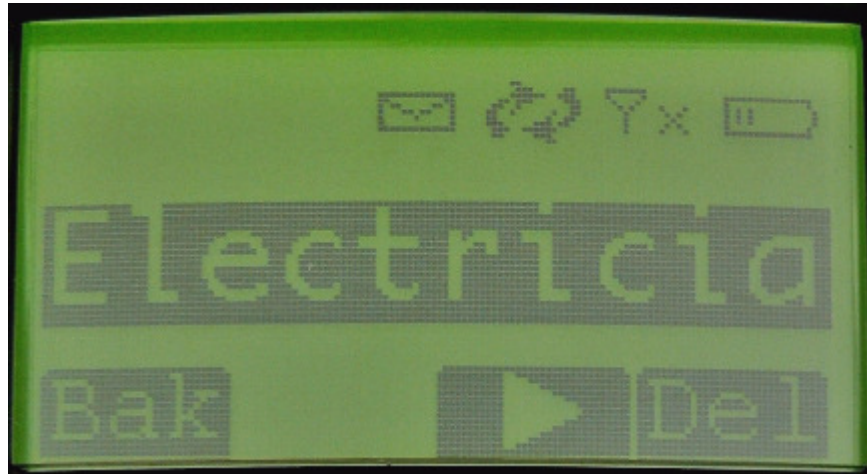
### **Viewing Text messages**

If you have received a new text message an envelope icon will appear in the top of the display. To view this text message press the Diamond (◆) key labeled 'Txt'. The display will change to the Text Message display. Press the Diamond (◆) key again to read your text messages.

Use the Triangle (▲) (▼) keys to scroll through messages that are longer than can be displayed on the screen.

The Diamond (◆) Key labeled 'Next' will advance to the next message. If there are no additional messages the Diamond (◆) key will be labeled 'Bak' and return you to the Home Menu.

The Square (■) key labeled 'Del' will delete the current text message. When deleting a message a confirmation menu will appear. Select yes or no using the Triangle (▲) (▼) keys.



**Text Message Viewing Menu**

**Figure 5**

### **Sending Pre-Programmed Text Messages**

The MMH has several standard text messages pre-programmed. To send one of these messages press the Diamond (◆) Key labeled 'Txt' in the Home Menu. Next Press the Triangle (▼) key labeled 'Sel'. This will bring up a menu displaying pre-programmed messages. Use the Triangle (▲) (▼) Keys to scroll through the messages. You may also use the number keys to jump to a message. Once the message you wish to send is selected, press the Square (■) Key labeled 'Ok'.

The text message is now shown in the middle of the display. If it is longer than can be displayed on the screen, you can use the Triangle (▲) (▼) Keys to scroll through the message.

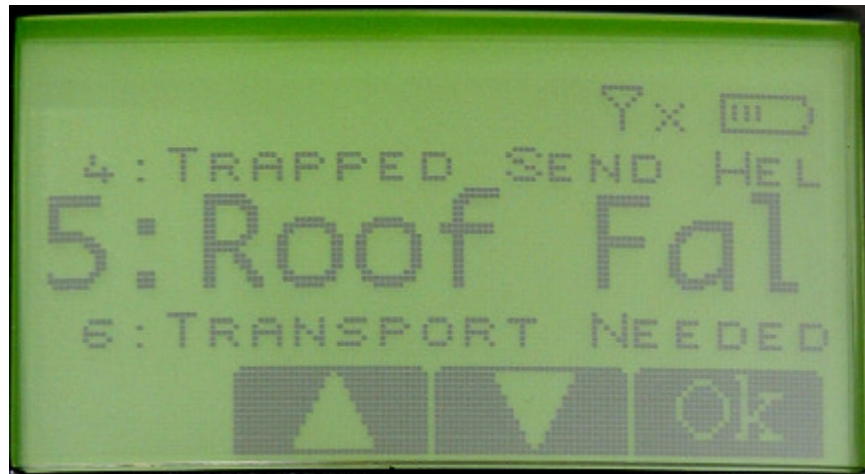
The message destination is shown at the top left of the display. By default, the destination is the currently selected group.

You may change the destination group using the group knob. You may also send messages to individual handsets or to the MOC by pressing the Square (■) Key labeled 'To:' and then selecting the destination using the Triangle (▲) (▼) Keys.

To send a message to a specific handset press the Triangle (▲) (▼) Key labeled 'ID' and then use the keypad to enter the ID of the handset you wish to text.

To send a message to the MOC press the Triangle (▲) (▼) Key labeled 'MOC'.

Press the Diamond (◆) Key labeled 'Snd' to send your message once you have selected the correct destination.



**Pre-Programmed Message Menu**

**Figure 6**



**Text Message Destination Menu**

**Figure 7**

### **Sending Custom Text Messages**

The MMH can also send custom messages. To send a custom message press the Diamond (◆) Key labeled 'Txt' in the Home Menu. Next Press the Triangle (▼) key labeled 'New'. This will bring up a new display. The current destination is shown in the top left and the middle of the display is blank. Use the keypad to enter the text you wish to send. Rapidly pressing a button multiple times will rotate through the letters and numbers displayed on the key. When the letter

or number you wish to enter appears, quit pressing the button. After a second the cursor (thin vertical bar in the display) will appear to the right character just entered indicating that you may enter the next character. The Triangle (▲) (▼) Keys can be used to move the cursor left and right. Press the (#) key to insert a space. Press the (#) key multiple times to rotate through various punctuation and other symbols. Press the Star (\*) key to delete the character to the left of cursor.

You may change the destination in the same way as for a Pre-Programmed text message. Use the Square (■) key to switch between selecting your destination and editing your text message. Press the Diamond (◆) Key labeled 'Snd' to send your message.



**Text Message Editing Menu**

**Figure 8**

### **5.3 EMERGENCY BUTTON**

The emergency button is orange and located on the top of the handset near the antenna. Pressing the emergency button for 3 seconds will place the handset into emergency mode; this will trigger an immediate notification to be sent to the MOC, plus the handset will vibrate and give an audible alert. For the duration of emergency mode, an emergency icon appears in the top-right corner of the display.



Once in emergency mode, you may notify others by placing a call or sending a text message. Completion of either action will also conclude emergency mode. Each handset user who receives the call or text, based on normal destination rules, will receive an audible/tactile alert.

Unless you are placing a voice call or preparing to send a text message, emergency mode will automatically end after 30 seconds.

## **6.0 HANDSET MAINTENANCE:**

The handset is designed to require minimal maintenance from the user. If the handset is dirty, use a 1" paint brush or similar brush to clean loose dust and debris from your handset before wiping clean with a damp cloth taking care not to scratch the display. Do not use chemical or abrasive cleaners as this may result in damage to the chassis.

If using the alkaline battery pack the alkaline batteries may be replaced by the user. To open the battery pack, depress the orange tab and slide the battery cover off. Remove and replace the six alkaline cells. Be sure to follow the diagram for the positive and negative terminals. Use only standard 1.5V AA size alkaline cells. Slide the orange cover back onto the pack until the catch clicks, locking it into place.

Never disassemble the handset or IS battery pack. Doing so will void your warranty. If your handset or its battery pack is damaged do not use it.

## **7.0 WARRANTY INFORMATION:**

TBD