

CELL PHONE MONITOR **WATCH HOUND™**

User's manual version 1.1



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INTRODUCTION

The Watchhound cell monitor uses a narrow-band/high-selectivity receiver controlled by an on-board processor. The Watchhound receiver has a resolution bandwidth of 4 MHz and a square-law detector. The receiver can be set to scan multiple up-link frequency bands assigned to North America, the European Union, Asia and Australia, as listed in Table 1:

Table 1. Frequency Bands Covered by Watchhound

Air Interface Technology	Up-Link Frequency Band (MHz)
North America	
GSM-850, GSM-900, CDMA, Cellular	824 - 849
	896 - 901
GSM-1900 / PCS-1900	1850 - 1910
E.U./Asia/Australia	
E-GSM-900	880 - 915
GSM 1800 (DCS-1800)	1710.2 - 1784.8
WCDMA/UMTS	1920 - 1980

The receiver detector output is used to control the state of the following indicators, alerts and electrical interfaces:

1. Height of signal strength bar chart in the monitoring screen (LCD)
2. visual alert in the monitoring screen (LCD)
3. frequency of detected signal in the monitoring screen (LCD)
4. cellphone icon in the monitoring screen (LCD)
5. natural voice alert
6. Color of illumination of the mini-trackball (Red/Blue)
7. dry contact electrical interface (Open/Closed)

The Watchhound unit is normally deployed on a vertical surface (typically a wall) using the mounting bracket shipped with the unit as standard accessory.

The Watchhound unit can be ordered either with an Integral antenna or with external antenna(s), depending on user need(s) and boundary conditions existing at the area(s) of deployment. When ordered with the optional Integral antenna, the Watchhound unit will not have an RF input port, hence it cannot be connected to an external antenna. Otherwise, the unit will have an RF port (SMA) which can be connected to external antennas (standard Omnidirectional or the optional Directional antennas). Figure 1 shows the Watchhound unit when deployed with the standard Omnidirectional antenna.

When deployed as a stand-alone sensor, the Watchhound unit will display real-time signal strength data and alerts on its own LCD. To allow the user to monitor and log alerts of cellphone activity from one or more Watchhound units simultaneously using a dedicated PC, BVS has also developed a PC Software



package available as an optional item.

Figure 1. Watchhound Unit deployed with the standard external Omnidirectional Antenna

Items Supplied

Figure 2 shows the Watchhound unit and accessories, including its carrying case:



Figure 2. Watchhound unit and accessories

The Watchhound package includes the following standard and optional items:

Standard Items

- Watchhound cell monitor (standard unit)
- Operators Manual
- External AC Power Supply
- Dual band Omnidirectional antenna (SMA plug)
- mini-USB Cable
- Ethernet LAN Cable
- Pelican® Briefcase (black with secure lock and keys)
- Mounting Bracket and Screws

Optional Items

Watchhound cell monitor with Integral Antenna (covert unit) ¹

Directional antenna (SMA plug)²

PC Software for networking and logging data from multiple Watchhounds via Ethernet

WATCHHOUND CELL MONITOR UNIT DESCRIPTION

The Watchhound unit can be powered either via the DC input jack (10–40 VDC range) or via its Power over Ethernet (PoE) jack (voltage supplied by an Ethernet switch (or router) with a Power over Ethernet (PoE) standard port). The unit does not have a power ON/OFF switch, but it will turn on and stay on as long as it senses an adequate DC voltage supplied by either one of these two sources. The user does not have to do anything when alternating between these two means of powering the unit. Photographs of the Watchhound unit and its interfaces appear in Figure 3. The unit has an LCD, a speaker, a lighted mini-trackball five electrical interfaces and a reset button as listed (see corresponding numbered arrows in Figure 3 below):

1. Liquid Crystal Display (LCD)
2. Speaker for voice alert
3. mini-Trackball (lighted)
4. External Antenna jack (SMA)
5. DC Power input jack
6. Ethernet (PoE) jack
7. mini-USB jack
8. Dry Contact port
9. Reset Button (reachable via small hole)

¹ Covert unit has no SMA port for external RF input.

² For use with standard unit only.

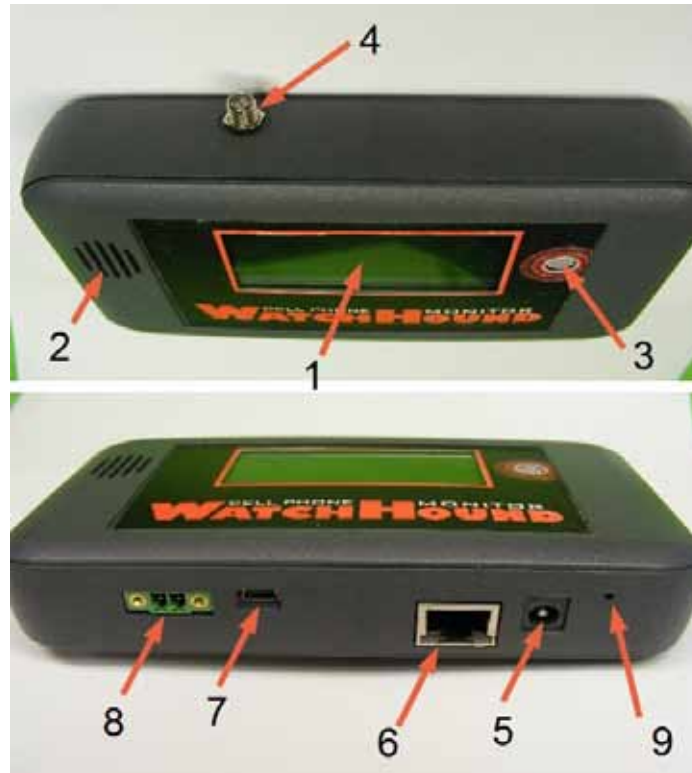


Figure 3. Watchhound Unit User and Electrical Interfaces

The user interfaces are discussed below in the same sequence:

Liquid Crystal Display (LCD)

See arrow 1 in Figure 3. When the unit is powered, the amber monochrome LCD will display the Monitoring Screen (MS) with the last settings the unit had before it was turned off. Thus, if the unit was set to detect the North American cell phone bands just before powering off, next time it is powered on the LCD will display the Monitoring Screen for the same frequency band, seen in Figure 4:

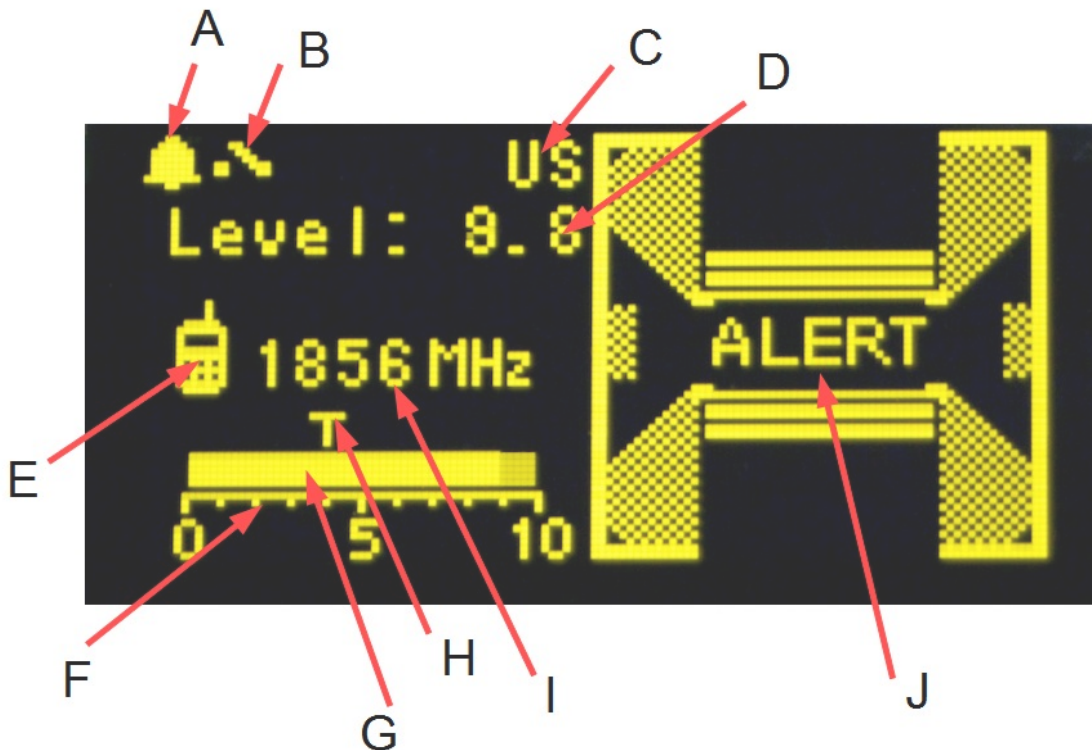


Figure 4. LCD displaying the Monitoring Screen (MS)

All fields and icons in the LCD have been labeled by arrows “A” through “J” and defined as follows:

- A) Bell icon: turns ON when “Sound” is checked in “EFFECTS ON/OFF” screen (see Figure 12 below)
- B) Switch icon: turns ON when “Contact” is checked in “EFFECTS ON/OFF” screen (see Figure 12 below)
- C) Frequency band field (US or EU) selectable in “BAND SELECTION” screen (see Figure 9 below)
- D) Signal Level reading (0 to 10 bar chart scale)
- E) Cellphone icon: turns ON when Signal Level exceeds setting of threshold marker “T” on bar-chart scale
- F) Bar-Chart Scale (a reading level of 10 units corresponds to approximately -20dBm of antenna output ; 1unit of level change is equivalent to ~ 6.5 dB)

- G) Bar-Chart “height” corresponding to detected signal level. *When actual level of antenna output exceeds about -20dBm, Bar-Chart and corresponding Signal Level readings will be clipped to 10*
- H) Threshold setting marker (adjustable via the “**THRES.**” screen in Figure 10 below)
- I) Center Frequency of Channel occupied by detected signal
- J) Flashing visual alert pattern occupying the right-hand half of the LCD. Activates when detected signal level exceeds threshold setting indicated by the horizontal position of the threshold marker “T” along the Bar-Chart Scale.

Speaker

See arrow 2 in Figure 3. When the detected signal level exceeds the pre-set threshold, a voice alert message announcing “**Cellphone Detected !**” is played via this speaker.

mini-Trackball (lighted)

See arrow 3 in Figure 3. The mini-trackball is the only manual-input control device on the Watchhound unit. The cursor on the LCD screen is navigated by rolling the ball to the desired location(s) or field(s) accessible over the screen. A given field is selected by pressing the ball down to “click”. The mini-trackball also provides a visual output to the user by alternating between two colors of illumination:

1. as long as the unit is powered but no cell(s) are detected, the ball is illuminated by a Blue LED
2. when one or more cell(s) are detected, the ball is is illuminated by a Red LED signaling “detection”

External Antenna Port (SMA jack)

See arrow 4 in Figure 3. The SMA type antenna jack is located at the top of the unit, above the LCD opening. This connector is used for connecting the external antenna (Omnidirectional or Directional) to the input stage of the Watchhound unit receiver³.

DC Power Input Jack

See arrow 5 in Figure 3. The DC output plug of the External AC Power Supply (included in the package is) inserted into this port to power the unit (any DC voltage source within 10-40VDC will energize the unit adequately). Alternately, the unit may also be powered via the Power over Ethernet (PoE) jack (arrow 6 in Figure 3).

³ The optional integral antenna version of the Watchhound unit does not have this ports.

Ethernet (PoE) Jack

See arrow 6 in Figure 3. Watchhound unit(s) may be networked over a LAN via this jack to facilitate cellphone activity monitoring and data logging using a computer and optional PC Software package. Additionally, if connected to an Ethernet switch supporting PoE capability, this port will also deliver DC power to the Watchhound unit, eliminating the need for using the AC Power Supply.

mini-USB jack

See arrow 7 in Figure 3. The mini-USB port is used for a direct connection to a computer for running the PC Software available from BVS as an optional item.

Dry Contact Port

See arrow 8 in Figure 3. When activated, this port provides a pair of polarity-insensitive (solid state) contacts⁴ that are Normally Open. When the detected signal level exceeds the Threshold Setting of the “T” marker (see arrow H in Figure 4), the contacts will close and stay closed for as long as the Threshold Level is exceeded by signal(s). This port function is activated via the “EFFECTS ON/OFF” screen discussed below. When the port is not activated, the contacts will be Open.

Reset Button

See arrow 9 in Figure 3. The unit can manually be reset by pressing the button reachable via the small hole pointed to by arrow 9 in Figure 3. Pulling out and inserting back the DC Input plug will also reset the unit, if preferable.

SYNOPSIS OF HIGH-LEVEL SCREENS

This section discusses the two levels of menu screens down from the monitoring screen. To perform specific functions, the user is referred to “SETUP” below, where the lower-level screens are discussed in greater detail.

After the unit is powered, the LCD will display the Monitoring Screen (MS) seen in Figure 4. The MS is the highest-level screen displayed by the unit. To initiate lower level menus or screens, the user needs to access the MAIN MENU screen one-level down, as follows:

⁴ see insulation level with respect to Ground in spec. sheet below.

MAIN MENU Screen

The Watchhound unit MAIN MENU (MM) screen (seen in Figure 5) is the highest-level menu. It is accessed by clicking down the trackball while the LCD is displaying the Monitoring Screen (MS) seen in Figure 4.

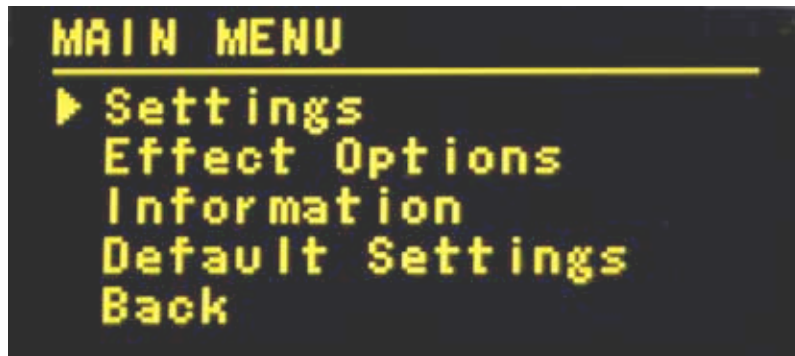


Figure 5. MAIN MENU (MM) Screen

Clicking “Back” in the MM screen will put the unit up in the monitoring state, with LCD displaying the MS (Figure 4). The first four items in the MM screen are:

Settings

Clicking with the triangular cursor to the left of “Settings” in the MM screen (Figure 5) will invoke the “SETTINGS” menu seen in Figure 6:

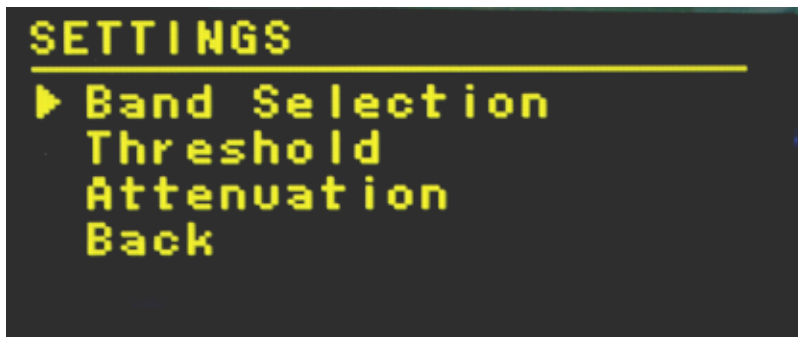


Figure 6. SETTINGS menu

Selecting “Back” returns the user to the MM. The first three items in the menu allow the user, respectively, to:

- a) select either the USA or EU frequency bands (see Table 1 above) for monitoring by the Watchhound unit,

- b) set the signal threshold level for triggering visual and voice alerts and contact closure
- c) adjust extra attenuation (0-30 dB) before the signal enters receiver input stage

Each of these items are discussed in greater detail below, under the respective headings of “Band Selection”, “Threshold” and “Attenuation”.

Effect Options

Selecting the “Effect Options” in the MM screen (see Figure 5) will invoke the “EFFECT OPTIONS” menu seen in Figure 7:

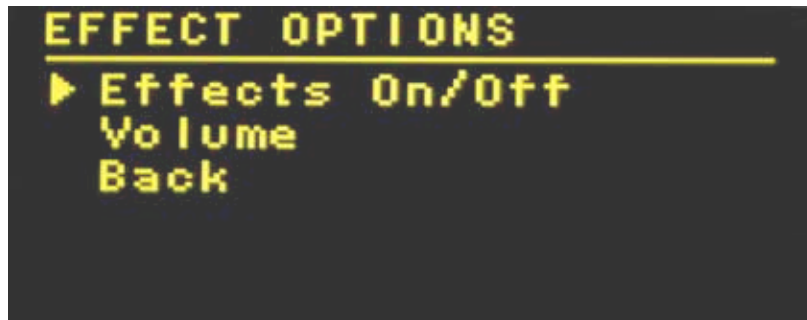


Figure 7. EFFECT OPTIONS menu

Selecting “Effects On/Off” allows the user to activate the Voice Alert and/or the Dry Contact Port via a lower-level screen titled “EFFECTS ON / OFF”. Selecting “Volume” allows the user to adjust the volume level via a lower-level screen titled “VOLUME”, regardless of whether the Voice Alert is active or not. These lower-level screens are discussed below under the respective headings of “Sound”, “Contact” and “Volume”.

Information

Selecting “Information” in the MM screen (see Figure 5) will invoke the “PRODUCT INFO” screen displaying the Firmware Version Number (1.4 in Figure 8) and Watchhound unit Serial Number (six digits to the right of “SN:”) as seen in Figure 8:

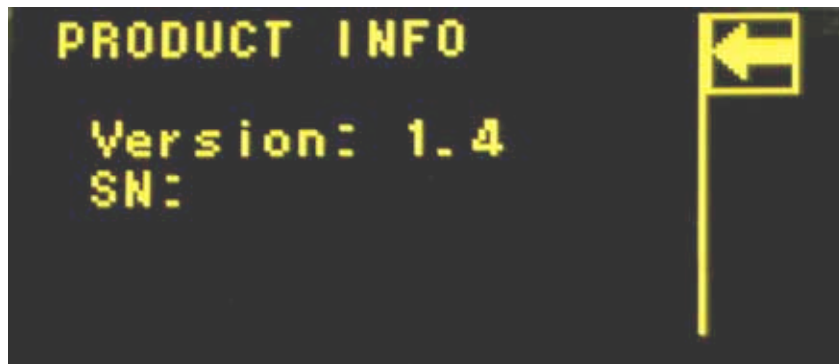


Figure 8. PRODUCT INFO Screen ⁵

Default Settings

Selecting “Default Settings” in the MM screen in Figure 5 will restart the Watchhound unit with the settings (or, attribute values) listed in Table 2:

Table 2. Default Settings

Voice Alert	OFF
Dry Contacts	OFF
Frequency Bands	USA15
Volume	16/31
Threshold Level	4
Attenuation	0 dB

SETUP

Each Watchhound unit must be set up manually. The manual setup is performed in the following sequence of steps:

⁵ Specific unit Serial Number will be displayed to the right of “SN:” in Figure 8.

1. Attach one of the external antennas (standard Omnidirectional or the optional Directional antenna) to the SMA jack on the unit (see arrow 4 in Figure 3). For units with the Integral antenna option this step is skipped.
2. power the unit either via the PoE jack on the unit, or by inserting the DC output plug from the AC Power Supply module into the DC input jack on the unit (see arrow 5 in Figure 3) ⁶
3. select the frequency bands (USA or EU)
4. adjust threshold level
5. add input attenuation (if needed)
6. activate voice alert
7. activate dry contacts
8. adjust volume (for voice alert)

These settings must be done manually even if the optional PC Software is deployed for monitoring the unit(s).

These steps are discussed in detail below:

Antenna Connection

The antenna port (SMA jack) is located just above the LCD when the unit is held in the vertical wall-mount orientation. Either one of the two antennas (Omnidirectional or Directional) terminate in an SMA plug connector and will interface with the SMA jack connector on the unit body (see arrow 4 in Figure 3). Generally, the use of the Omnidirectional antenna will be adequate for most sites of installation. However, there will be some sites or specific sensor locations in a site where use of Directional antenna(s) will be more appropriate because of boundary conditions imposed on the area(s) to be monitored. The criteria to be considered for selection between Omnidirectional and Directional antennas are discussed below, under the heading of “OPERATION AND USE”

Connecting Omnidirectional Antenna

Screw the antenna connector at the base of the antenna to the antenna jack on the unit (see left side of Figure 1). Use of a wrench to tighten antenna connector may damage unit and/or antenna. ***Finger-tight only -- DO NOT use a wrench.***

Connecting Directional Antenna (optional)

Attaching the Directional antenna to the unit is done in two steps, as follows:

⁶ Powering the unit before connecting the external antenna should be avoided.

- 1) attach the Directional antenna to the desired location on a wall (or other vertically oriented surface) by driving screws through the two flange holes on the body of the Directional antenna. The curved (or, concave) surface (front) of the antenna panel should point away from the wall.
- 2) Connect the Directional antenna cable SMA plug end to the SMA jack on the Watchhound unit body. Use of a wrench to tighten the antenna connector to the unit may damage the unit and/or the antenna connector. ***Finger-tight only -- DO NOT use a wrench.***

CAUTION:

The antenna connector (to the unit SMA port) should be **hand-tightened only**. Use of a wrench for this purpose will result in damage to the unit housing and/or the connector, hence nullify the product warranty.

Powering Unit

The unit will be powered as soon as DC input is provided by either one of the following sources:

1. DC output from the External AC Power Supply. To use this source, insert the DC output plug of former to the DC in jack of unit (see arrow 5 in Figure 3).
2. Standard DC supplied by a PoE-capable Ethernet Switch (or Router). To use this source, connect unit Ethernet port (see arrow 6 in Figure 3) to a PoE port on switch, using standard Ethernet cable segment.

Selecting Frequency Band

Starting from MAIN MENU, select “Settings” to enter the “SETTINGS” screen. Then select “Band Selection” to enter the “BAND SELECTION” screen (see Figure 9 below). Then select either “United States” or “Europe”. Selecting “Back” returns the user to the MM.



Figure 9. BAND SELECTION screen

Adjusting Threshold

The Threshold level setting determines the signal level at which the unit will activate visual and voice alerts, as well as the Dry Contact port.

To adjust Threshold level:

1. select “Threshold” from the “SETTINGS” screen to go to the “**THRES.**” screen (see Figure 10)
2. Move the cursor box to the “T” icon,
3. press ball down,
4. roll ball up/down to the desired level by observing both position of the “--*” cursor and the numerical field to its right (displaying “4.0” in Figure 10)
5. press ball down
6. move cursor box to “<--” icon
7. press ball down to return to the “SETTINGS” screen



Figure 10. THRES. Screen

Adding Attenuation

The purpose of this screen is to allow the user add extra attenuation (0 to 30 dB range) between the antenna output and the input to the receiver to avoid overloading the receiver when the signal level at antenna output is too high⁷. To get to this screen, select “Settings” from the MAIN MENU screen, once in the “SETTINGS” screen, select “Attenuation” to enter the “**ATTENUATION**” screen seen Figure 11:



Figure 11. **ATTENUATION** Screen (set to ~ 10dB)

To adjust attenuation, follow:

1. Move the cursor box to the Elevator icon (second from top right corner in figure 11),
2. press ball down,
3. roll ball up/down to the desired value (0-30 dB range) by observing the position of the Elevator and the numerical field to its right (displaying “10” in Figure 11) indicating attenuation in units of dB
4. press ball down
5. move cursor box to “<--” icon

⁷ This condition may be encountered when an in-band source is near by or, when a very powerful out-of-band source (such as a cell tower transmitting over down-link bands) is near by.

6. press ball down to return to the “SETTINGS” screen

The maximum attenuation level attainable in this manner is ~ 30 dB, corresponding to a range of about 4.6 divisions along the signal scale on the left side of Figure 11.

Activating/Deactivating Voice Alert

To activate the voice alert, select “Effect Options” from the MM, then select “Effects On/Off” from the “EFFECT OPTIONS” screen to get the “EFFECTS ON / OFF” screen seen in Figure 12:



Figure 12. EFFECTS ON / OFF Screen

Then follow:

1. move the triangular cursor to the left of “__ **Sound**”
2. push down the ball to insert a check mark to the left of “**Sound**” as seen in Figure 12.
3. return to the “EFFECT OPTIONS” screen by pressing on “**Back**”

To deactivate Voice Alert, align cursor with “Sound” and press down ball to remove check mark.

Activating/Deactivating Dry Contacts

To activate the Dry Contacts, select “Effect Options” from the MM, then select “Effects On/Off” from the “EFFECT OPTIONS” screen to get to the “**EFFECTS ON / OFF**” screen seen in Figure 12. Then,

1. move the triangular cursor to the left of “___ **Contact**”
2. push down the ball to insert a check mark to the left of “**Contact**” as seen in Figure 12.
3. return to the “EFFECT OPTIONS” screen by pressing on “**Back**”

To deactivate Dry Contact port, align cursor with “Contact” and press down ball to remove the check mark.

Adjusting Volume of Voice Alert

From the EFFECT OPTIONS menu select “Volume” to obtain the VOLUME screen (see Figure 13):

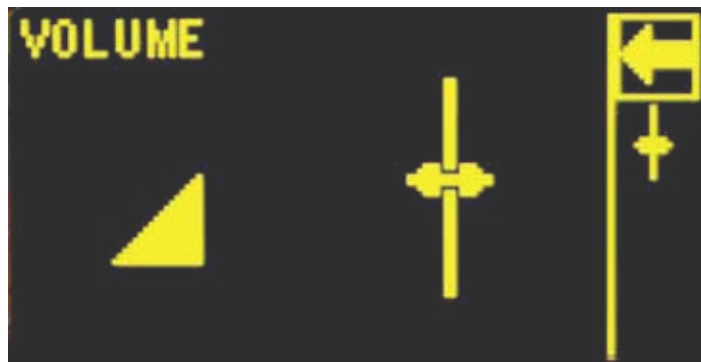


Figure 13. VOLUME screen

Then follow:

1. select the Elevator icon (second icon from top right hand corner) by pushing down ball.
2. adjust volume by rolling the ball up/down as desired,
3. push down ball to click,
4. move box cursor on the left-arrow “□” icon (at top right corner in Figure 13) and push ball down to return to “EFFECT OPTIONS” screen
5. return to “MAIN MENU” screen by pressing ball on “Back”

The Voice Alert Volume may be adjusted regardless of whether Voice Alert is activated or not.

OPERATION & USE

General Guidelines for Good Signal Reception

The Watchhound unit should be kept at about waist to ceiling height from the floor, and at least one foot (but preferably more) away from large metal obstructions or surfaces (reflecting metal walls, heavy steel structural elements, metal-wire screens, etc.). The unit should not be used while the antenna (internal or external) is contained by bags or enclosures made of metal, carbon or other RF energy absorbing or shielding materials; doing so will seriously degrade performance. These criteria are listed in Table 2 below:

Table 2. General Criteria for Good Signal Reception

Keep unit away from large conducting surfaces which tend to short out tangential component of electric fields (this includes the human body).
Ideally, the unit should have unobstructed line-of-sight view in the region of space being monitored.
Avoid enclosing unit in other objects, in particular objects with conducting or energy dissipating surfaces

Criteria for Selecting the External Antenna

To monitor large inner spaces with no significant reflecting/metallic objects or boundaries, the Omnidirectional antenna should be used for uniform sensitivity over 180 degrees of azimuth (if wall-mounted) or 360 degrees of azimuth (if ceiling-mounted).

To monitor inner spaces with significant boundaries or reflecting surfaces, the Directional antenna should be used to selectively enhance sensitivity in a preferred direction, or to reduce sensitivity in directions from which reflections are expected to be generated. For example, when monitoring a long corridor, the Directional antenna would be very adequate for detecting cellphone signals propagating along the longitudinal axis of the corridor, whereas the Omnidirectional antenna would not work as well for the same signal(s). Conversely, for an open inner space without significant reflectors or obstructions, the Directional antenna would miss signals propagating perpendicular to the “preferred” direction of the former, that would otherwise be detected by the Omnidirectional antenna.

Deployment of the Omnidirectional, Directional and Integral antennas is discussed next:

Deploying the Omnidirectional Antenna

The Watchhound unit comes with an Omnidirectional antenna of 3dBi Gain as standard accessory (see Figure 14).



Figure 14. Omnidirectional Antenna

To have uniform sensitivity in all directions in the horizontal plane, the antenna should point either up or down. To detect and monitor cellphone use in a confined space with no significant metallic objects and/or reflecting surfaces, place the Watchhound unit at shoulder to ceiling height from the floor, away from obstructions. The Omnidirectional antenna may be deployed with the Watchhound unit mounted on a non-reflecting wall or a ceiling:

1. Wall Mounted for uniform sensitivity over 180 degree of azimuth (antenna vertical with tip pointing up)
2. ceiling Mounted for uniform sensitivity over 360 degree of azimuth (antenna vertical with tip pointing down)

Deploying the Directional Antenna

The Directional antenna should be mounted on a vertical surface at about shoulder height from the floor. This antenna can be supported by its integral flange (see Figure 15) which has two holes for deploying fasteners. The antenna cable has an SMA plug for connection to the SMA jack on the standard unit. The Directional antenna output will be maximum (corresponding to ~10dBi Gain) when the imaginary line connecting the antenna to the expected source is approximately perpendicular to the plane defined by the flat face of the DF antenna panel.



Figure 15. Directional Antenna

Sources 45 to 90 degrees away from the “preferred direction” of the DF antenna will produce substantially diminished antenna outputs.

Deploying the Unit with Integral Antenna

The integral antenna is basically a 1/4 wave monopole oriented along the longest dimension of the Watchhound unit. As such, when the longest dimension of the unit is oriented vertically with respect to the floor (up or down), the integral antenna will have uniform sensitivity in the azimuth plane. If the longest dimension of the unit integral antenna is oriented parallel to the floor, the integral antenna will have slightly higher sensitivity (3dBi at most) to sources lying along the perpendicular line away from the front face of the unit.

APPENDIX 1: Synopsis for the optional Watchhound PC Software

At a high level, this software allows the Watchhound unit alerts and outputs to be displayed, monitored and logged on a PC for one or more units, in real time. The following functions are performed:

- Receives data from multiple sensors connected through TCP/IP.
- Main control panel displays status of all sensors.
- Alerts when activity is detected on any sensor.
- Reports sensor activated at what power level, and at what frequency.
- Logs data from all sensors to a SQL database.
- Reports can be generated from historical data for activity patterns.
- Reports can be printed directly.

WatchHound Security Software (starting with v1.10)

Introduction

WatchHound sensors are remotely fixed cell phone detectors. The WatchHound Security PC software collects real-time data from the WatchHound sensors through TCP/IP connections. This data is stored and can be retrieved at any time for the display of statistics or generation of printed reports.

Installation of Software

The software is contained on an SD card.



WATCHHOUND DISPLAY AT STARTUP

Getting Started

Connect WatchHound sensors in desired areas via TCP/IP. Make sure that the sensors can be accessed on the subnet from the location of the software.

Configure the WatchHound sensors on the devices.

Start the WatchHound Security software.

A pop-up box will state a new database is being created.

A pop-up box will state there are no registered sensors.

Sensors can either be registered by saying 'YES' to opening the list editor or by pressing the 'SENSORS' button.

Follow the steps for registering each sensor in "Registering Sensors".

After registration, the real-time display of sensor statuses will appear.

Quick Tour

The WatchHound has a tab control menu on the upper toolbar of the main screen which separates the functionality into main sections. These are:

REAL-TIME – Displays information real-time being collected from the WatchHound sensors.

REPORT – Allows the user to review stored information in a graphical format and to then be able to print out the information in a report.

POST PROCESS – Allows the user to convert database data into an ASCII readable format for post-processing in a third party application.

The WatchHound also has a menu for 'Settings' and 'Help' along the top edge of the display window as well as 'Sensors'.

There are indicator lights at the bottom of the application as follows:

DETECTION – Lights up when data from any sensor indicates that the locally set threshold has been eclipsed.

DATABASE – Lights up when a record is being written to the database.

RX – Lights up when a record has been received from a sensor.

SYSTEM – A 'running light'. Lights up periodically to indicate security system is functioning correctly.

REGISTERING SENSORS

The screenshot shows the 'Sensor List Editor' window. It is divided into two main sections: 'UNREGISTERED SENSORS' on the left and 'REGISTERED SENSORS' on the right. The 'UNREGISTERED SENSORS' section contains a table with columns: Serial, Firmware Version, IP Address, and MAC Address. It lists one sensor with Serial 300503, Firmware Version 1.6, IP Address 192.168.1.129, and MAC Address 00-20-4A-94-E2-18. Below this table is a button labeled 'SEARCH FOR UNREGISTERED SENSORS'. The 'REGISTERED SENSORS' section contains a table with columns: Name, Description, Serial Number, and IP Address. It lists two sensors: 'Lunchroom' (Serial Number 300503, IP Address 192.168.1.129) and 'Conf Room B' (Serial Number 300523, IP Address 192.168.1.145). Above this table is an 'ADD' button, and below it are 'DELETE' and 'EDIT' buttons. At the bottom of the window are 'APPLY' and 'CANCEL' buttons.

Serial	Firmware Version	IP Address	MAC Address
300503	1.6	192.168.1.129	00-20-4A-94-E2-18

SEARCH FOR UNREGISTERED SENSORS

Name	Description	Serial Number	IP Address
Lunchroom	Lunchroom on the first floor	300503	192.168.1.129
Conf Room B	Conference Room	300523	192.168.1.145

DELETE EDIT

APPLY CANCEL

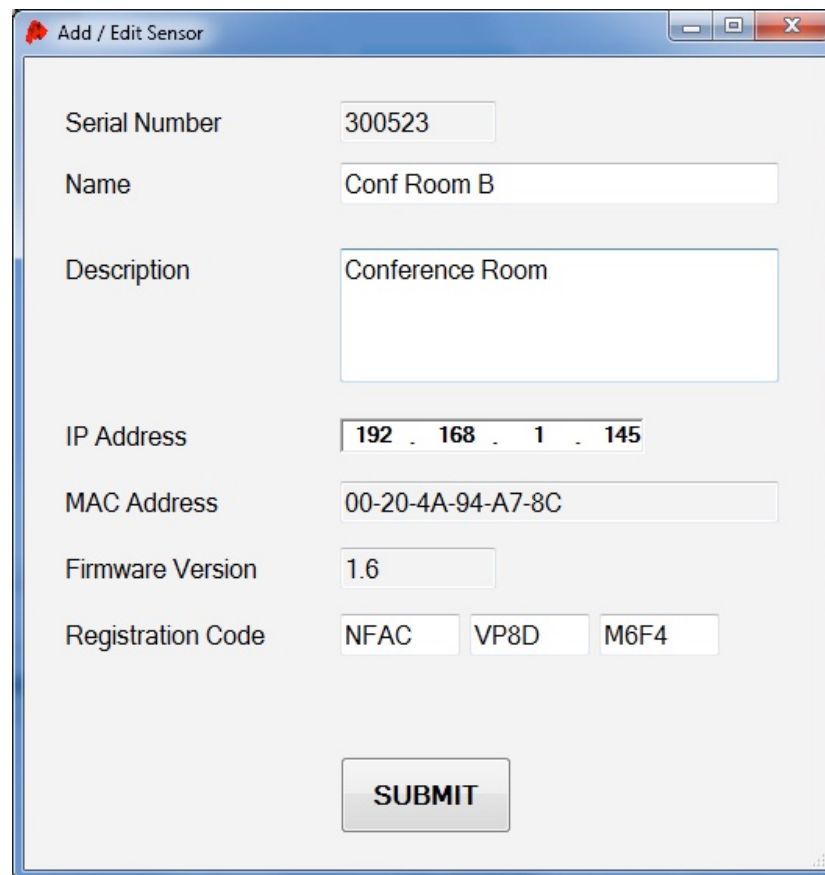
SENSOR LIST EDITOR

Any WatchHound sensor needs to be registered with the Security System before data can be retrieved. Registration can be accomplished by pulling up the Sensor List Editor.

Any sensors which have already been registered will appear in the 'registered' list in the list box on the right.

Press the “Search for Unregistered Sensors” button and the application will attempt to find any WatchHound sensors connected to the network which have not been registered yet.

After the search is complete, a list of any sensors which have not been registered will appear in the list box to the left. These sensors need to be registered one at a time. Highlight one of the entries and then press the 'Add' button. The following dialog box will appear.

A screenshot of a Windows-style dialog box titled "Add / Edit Sensor". The dialog has a light gray background and a blue title bar with standard window controls. It contains several input fields and a submit button. The fields are: "Serial Number" with the value "300523", "Name" with "Conf Room B", "Description" with "Conference Room", "IP Address" with "192 . 168 . 1 . 145", "MAC Address" with "00-20-4A-94-A7-8C", and "Firmware Version" with "1.6". The "Registration Code" field is split into three sub-fields containing "NFAC", "VP8D", and "M6F4". A "SUBMIT" button is located at the bottom center.

Serial Number	300523
Name	Conf Room B
Description	Conference Room
IP Address	192 . 168 . 1 . 145
MAC Address	00-20-4A-94-A7-8C
Firmware Version	1.6
Registration Code	NFAC VP8D M6F4

SUBMIT

SENSOR EDITOR DIALOG

Fill in a name and description for the sensor. Then enter the registration code provided with your sensor (case sensitive). Press the 'Submit' button. If the registration code is correct, the sensor has been registered and can be used to retrieve data.

If the registration code is incorrect, the sensor will not be added to the registered list.

REAL-TIME

When real-time mode is selected, data currently being collected by the WatchHound sensors are displayed. Each sensor has its own box. Each box contains a bar graph with the current level. The name and description of the sensor is also displayed.

The boxes have a background color associated with the status of each sensor as follows:

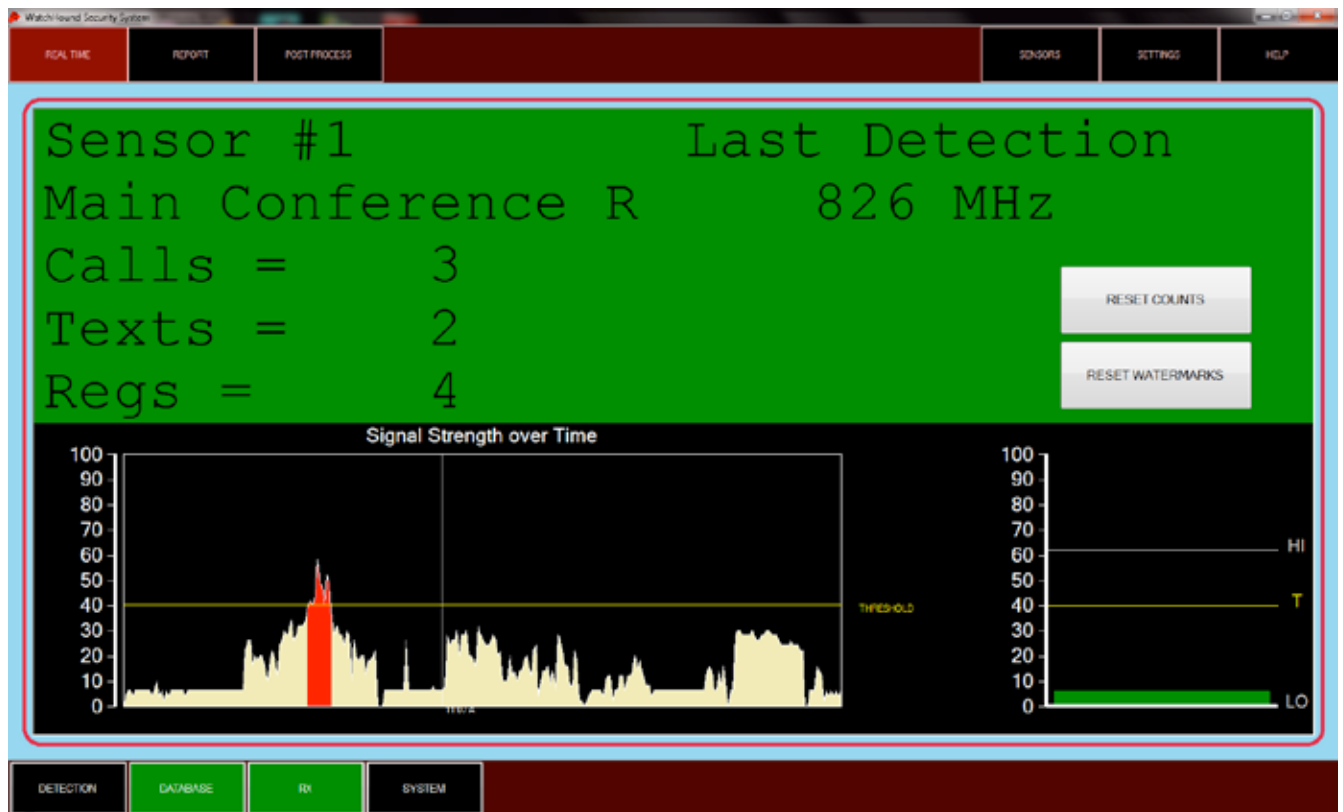
GREEN – Normal operation and no cell phones currently detected.

YELLOW – Data has not been received within the designated timeout period. This could signify a problem with the sensor or a loss of communications with the sensor

RED – Threshold set on the sensor has been eclipsed. A cell phone has been detected!

ZOOM MODE

In order to see more information on a particular sensor, double-click on the sensor box. The security system will 'showcase' the requested sensor. The display panel will show only this sensor.



SENSOR SHOWCASE MODE

The following information is displayed in showcase mode:

SENSOR NAME

SENSOR DESCRIPTION

FREQUENCY OF LAST PHONE DETECTION

NUMBER OF CALL DETECTED

NUMBER OF TEXT MESSAGES DETECTED

NUMBER OF PHONE REGISTRATIONS DETECTED

TEMPORAL GRAPH

A temporal graph from right to left. There are approximately 5 reports per second. The signal strength is reported between 0 and 100.

The threshold which has been set on the sensor is displayed as a line across the graph. This is the level to add an alert signifying a detection.

When the signal strength goes above the currently set threshold the area under the signal strength will appear red. The area will stay red until the signal strength falls below the threshold again.

When the threshold has been eclipsed, counters will be updated. These counters include:

REGISTRATIONS

TEXT MESSAGES

CALLS

Depending on the length of a threshold incursion, one of these counters will be updated. If it is a short burst, it will simply be a phone registering with the network. Slightly longer would be perhaps a text message. Finally, a lengthy incursion would be an actual phone call.

These counters can be cleared at any time by pressing the “RESET COUNTS” button.

There is also a bar to the right of the temporal screen which displays the current reading. The color of the bar is green unless the reading is higher than the threshold. The color would then change to red.

The bar graph also displays high and low 'watermarks'. These are the highest and lowest readings for the sensor. These watermarks can be reset by pressing the "RESET WATERMARKS" button.

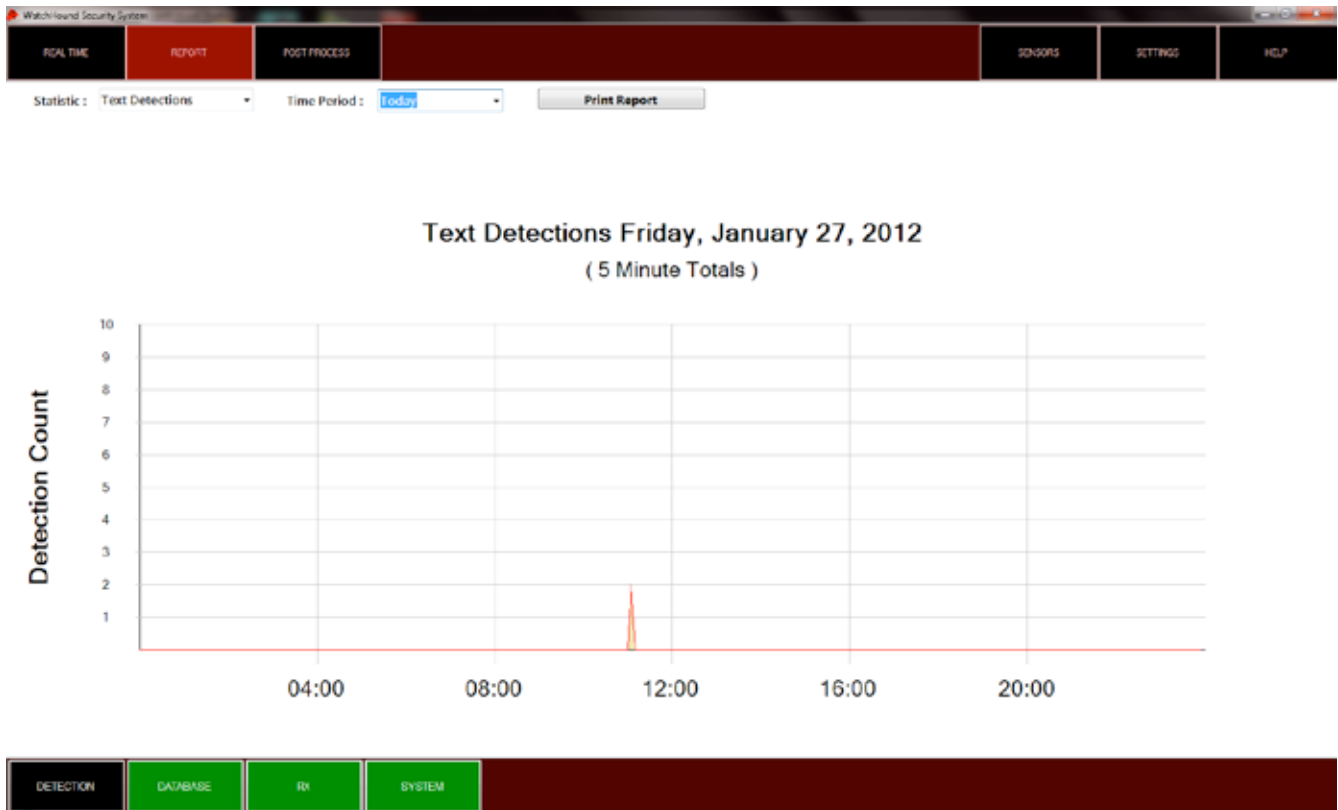
The bar graph also has a line signifying the threshold for the sensor.

REPORTING

Pressing the reporting button will display a graph defaulting to cell phone detection for the current date.

There are two selection boxes in order to generate statistics. The leftmost box lets the user determine what type of report is to be run. The default is a call detection report. The rightmost box lets the user determine the time frame in which the data is to be extracted.

There are reports for calls, text messages, phone registrations. There is also a report showing the number of times each frequency is detected.



TEXT MESSAGE DETECTION REPORT

Examples of time spans for these reports is “Today”, “This Month”, and “Last Year”. Choose the appropriate time frame to be studied. Data is grouped in time depending on the selection. For instance, in a report that is for a single day, the data is grouped in 5 minute intervals.

These reports may be printed by pressing the “PRINT REPORT” button.

These reports are combined for all sensors.

POST-PROCESS

The “post-process” option allows for the conversion of database data into an ASCII-readable file for post-processing in third party applications.

The screenshot displays the WatchHound Security System interface, specifically the POST-PROCESS section. The interface has a dark red header bar with navigation tabs: REAL TIME, REPORTING, POST PROCESS (highlighted in red), SENSORS, SETTINGS, and HELP. Below the header, the main content area is yellow and titled "DATA CONVERSION INTO AN ASCII READABLE FILE". It contains several sections: "DATE RANGE" with two date pickers set to "01/27/2011 10:29 AM" and "01/27/2012 10:29 AM" separated by "thru"; "OUTPUT" with a "Dump File:" label, a text input field containing "datadump", and a "Browse" button; "FIELDS" with six checkboxes: Date, Time, MAC Address, Frequency, Reading, and Threshold, all of which are checked; "DELIMITERS" with four radio buttons: Comma (selected), Space, Tab, and Semicolon, and an unchecked checkbox for "Include Header". A green progress bar is visible below the fields section. At the bottom of the yellow area is a "Dump Data" button. The footer of the interface is a dark red bar with tabs: DETECTION, DATABASE, RX, and SYSTEM.

POST-PROCESS

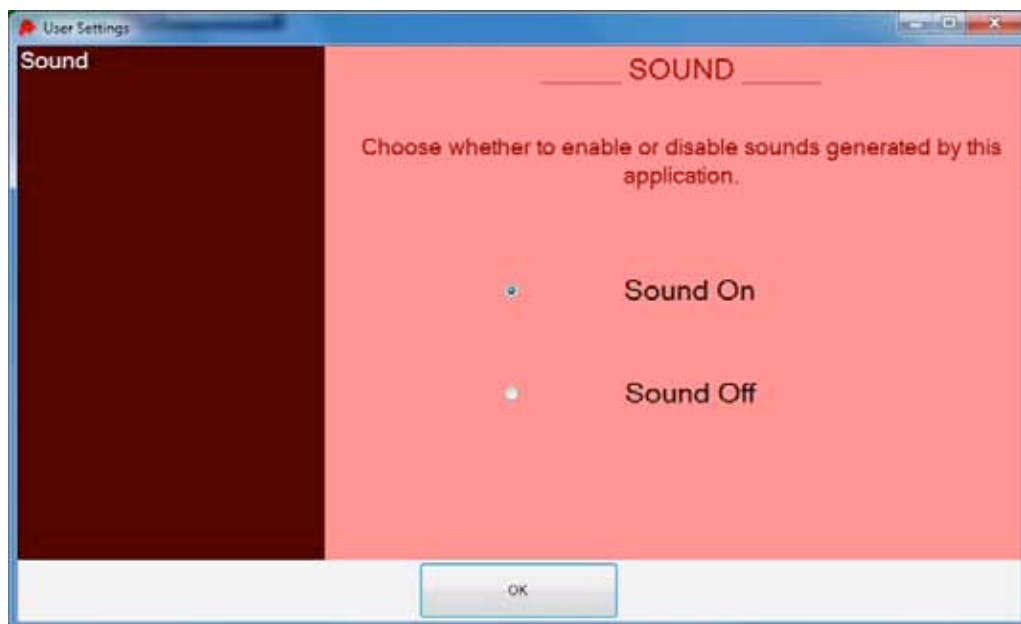
First, a date range is selected for which to convert the data. Then an output file is chosen. Then select the database fields available for conversion. Finally select how the fields will be delimited in each record.

The resulting output records will be output in 5 second intervals. This means that any readings within a 5 second interval will be averaged and output as a single record.

When all of the settings have been chosen, press the “DUMP DATA” button. A popup box stating “Conversion Complete” will appear after the completion of the conversion.

SETTINGS

The sound setting lets the user turn the sound alert on or off. Simply make a selection and it will be applied as soon as the dialog has been closed.



HELP

The help menu shows application information. This includes software version, firmware version (of the hardware) and the serial number of the unit..

1/2 wave Device Antennas

Dual Band for CDMA/GSM (EV-DO)



PSKN series in
Straight Position



PSKN series in
Right Angle Position

- Sleek profile with adjustable elbow for straight or angled operation
- Compact design, groundplane independent with high performance
- Models for all wireless modems including GSM/GPRS/EVDO/1xRTT
- Reverse polarity connectors available for ISM 915 operation

The PSKN Dual band antennas offer excellent performance for broadband wireless data applications. The halfwave design means they can be used on plastic or metal without concern for proper ground size.

Two different series are available; a model for US GSM/CDMA, and a model for EU GSM. The EU GSM 900 MHz lower band also operates with the ISM 915 band, without any sacrifice in performance. Additionally, a model is available with reverse polarity SMA connector, for use in ISM 915.

The PSKN Dual band series for CDMA/GSM (EV-DO) have a "blade" type style and an adjustable right angle elbow. Overall length is 7.75" (20 cm) in a straight position, and 6.75" (172 mm) in a right angle position. Peak gain on all bands is 3 dBi.

The radome material is a semi-flex polyurethane, providing some give when stressed but maintaining long term durability. The antennas are available in SMA, TNC and reverse Polarity SMA for 902-928 ISM applications.

Model Numbers for US CDMA/GSM/Data

Model	Frequency MHz	Connector
PSKN3-900/1900T	824-894 & 1850-1990	TNC
PSKN3-900/1900S	824-894 & 1850-1990	SMA

Model Numbers for EU GSM & ISM 915

Model	Frequency MHz	Connector
PSKN3-925/1800S	870-960 & 1710-1880	SMA
PSKN3-925/1800T	870-960 & 1710-1880	TNC

Model Numbers for ISM 915 with Rev Pol SMA

Model	Frequency MHz	Connector
PSKN3-925/1800RS	870-960 & 1710-1880	Rev SMA

Model Applications/Notes:

- ◆ US GSM/CDMA, Edge/EV-DO, 1xRTT use models with nomenclature 900/1900.
- ◆ EU GSM/Data, or ISM 902-928, Mobitex, Skytel use only models with nomenclature "925/1800".

Note: WiFi, 802.11a/b/g models also available, consult separate spec sheet

Specifications

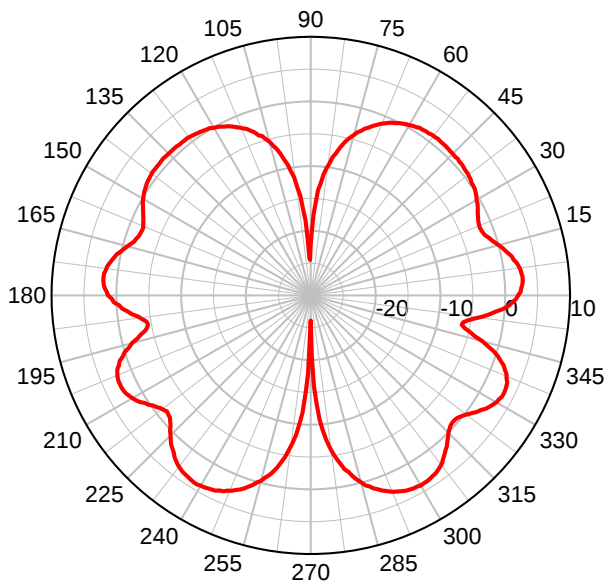
Frequency:		Operating Temp:	
US GSM/CDMA	824-894/1850-1990 MHz	Connector:	-30°C to +60°C
EU GSM	870-960/1710-1880 MHz		SMA, TNC, or Reverse Pol SMA
ISM 915	870 - 960 MHz	Whip Length:	see models indicated above
Gain:	3 dBi peak		6.75" (172 mm) at 90° angle,
Bandwidth@2:1SWR:	See freq range above		7.75" (197 mm) when straight
Impedance:	50 Ohm nominal	Radome Material:	Polyurethane, with black matt finish, and knurled connector
Maximum Power:	5 Watt		

PSKN3-900/1900S Antenna

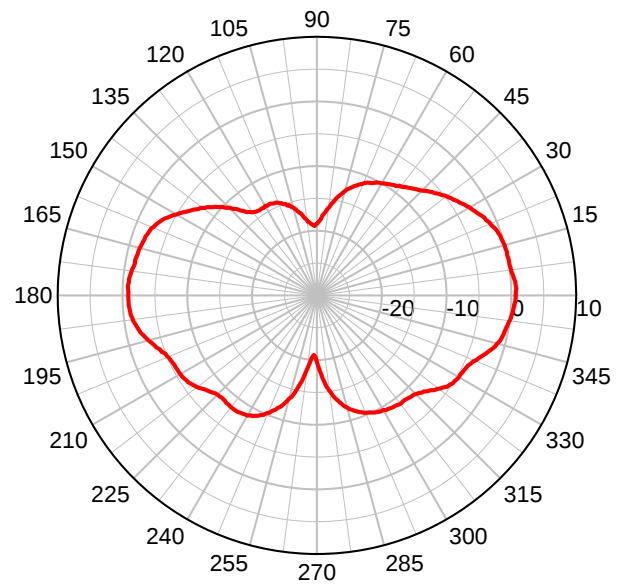
Dual Band 90degree Adj Knuckle Swivel w/SMA

3 dBi, Pattern for Cellular (824-894 MHz) & PCS (1850-1990 MHz)

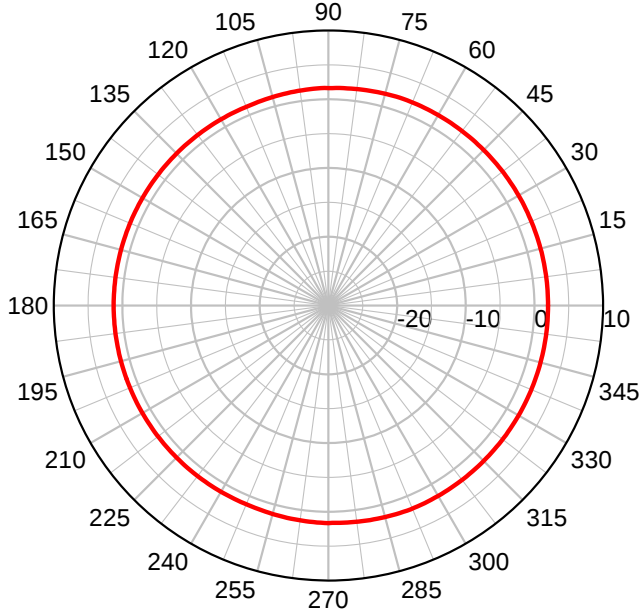
PSKN3-900/1900S-Elevation Plot at 850 MHz



PSKN3-900/1900S-Elevation Plot at 1850 MHz



PSKN3-900/1900S-Azimuth Plot at 850 MHz



PSKN3-900/1900S-Azimuth Plot at 1850 MHz

