



# I-Station

## Software Integration Technical Documents Scope & Waveware Protocol



### 1 Introduction

Your HME Wireless ("HMEW") Computer Controlled Paging System allows you to use Windows™ based PC software to send paging messages to one or more persons via pagers, and other devices that incorporate paging data receivers. You can setup automatic transmission of messages or you can compose messages on the fly and transmit them immediately. When you attach your paging transmitter to a PC, plug in the provided power adapter, and install and activate your paging software, you will be ready to use the paging system.

The HMEW Computer Controlled Paging

#### 1. **System is comprised of the following components:**

- Serial Transmitter Unit
- Right Angle Antenna
- Serial Cable
- Transmitter Power Supply
- Serial to Ethernet Adaptor

#### 2. **Your HMEW Computer Controlled Paging System has the following capabilities:**

- PC controlled operation via RS-232 serial port.
- 2 Watts effective radiated power with approximately 1 mile open field range.

- See the label on the Transmitter Unit to identify the operating frequency of the paging system.
- Industry standard protocol covering the full range of paging functions, including:
  - 512, 1200 and 2400 bps RF data rates
  - Tone/vibe only, numeric and alphanumeric paging message formats
  - Multiple tone/vibration patterns
- PC controlled automatic switching between tone/vibe only, numeric, and alphanumeric paging message formats, including multiple tone/vibe cadences.
- PC controlled automatic switching between 512, 1200, and 2400 bps RF data rates.
- Optional unique paging transmitter IDs available for use by VARs/Distributors.
- Communications protocol designed to ensure reliable communications and to support supervisory controlled applications.
- No paging receiver database programming is required within the paging transmitter. The unique communications protocol in the HMEW paging transmitter allows you to operate the transmitter with an unlimited quantity of paging receivers.

### 2 Obtaining pagers for your Paging system

You can use a wide variety of paging receiver types with HMEW Paging Systems, including tone/vibe, numeric, alphanumeric, and wireless message centers. You can obtain HMEW compatible paging receivers from [www.hmewireless.com](http://www.hmewireless.com). The paging receivers that you obtain for use with the HMEW.

#### 1. **Paging Systems should meet the following basic specifications:**

- **Frequency**
  - All paging receivers used with the paging system must be of the same frequency and must match the frequency of the paging system transmitter.
  - HMEW uses a standard frequency of 457.5750 MHz.
- **Pager Type**
  - You can mix different paging receiver types in a HMEW installation, depending on your HMEW paging system. You can obtain the following paging receiver types for use with the HMEW paging system:
    - **Tone/vibe only (no display),** with or without multiple tone/vibrate cadence features. HMEW paging systems support pagers with multiple tone/vibrate features. HMEW Tone/Vibe Pagers have two capcodes and have multiple tone/vibrate features.

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## Manual



### - Numeric

paggers that can receive numeric message only.

### - Alphanumeric

paggers that can receive text messages (A-Z; 0-9; and other special characters).

### • Paging Data Rate

- You can mix different paging data rates (baud rates) in a HMEW installation. You can set the data rate of the paging receivers to 512 or 1200bps (bits per second). The standard Data Rates for HMEW paggers is 1200 bps.

### • Capcodes

- Each paging receiver used in a HMEW paging system installation must have a capcode (address) programmed into it. Each paging receiver used with a particular HMEW installation, regardless of paging receiver type, must have a unique capcode programmed into it, in order to transmit messages to that specific paging receiver. It is recommended that you obtain a group of paging receivers, of a particular type, with sequentially assigned capcodes. Contact your paging systems dealer for capcode assignment information. HMEW capcodes consist of two parts, Base ID (3 digits), and Pager ID (4 digits).

Base ID	Pager ID
XXX	XXXX

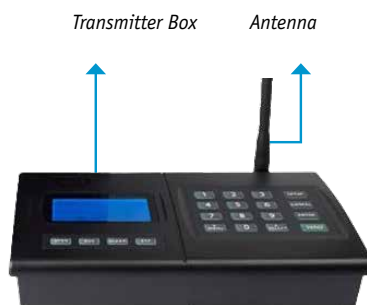
The HMEW base ID is always the

first 3 digits, and represents the location of the customer. It will always be the same for a specific location.

The last 4 digits is always the pager number multiply by 8. For example, if you have a base ID of 017, and a pager number 1, your capcode will be 0170008. For pager number 2, you will have a pager number of 0170016. For pager number 3, you will have a pager number of 0170024, and so on. Our paggers are typically shipped 1200 baud.

## 3. Transmitter Set-up

- Lock the antenna onto the antenna jack on the right hand corner of the receiver unit.



- Connect one end of the DB9 serial cable to the serial jack of the black box receiver.
- Connect the other end to the COM port of the PC where your table management software is located.





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### 4. Serial Paging Protocol

This section is included for those who want to develop their own paging control software or add an interface for the HMEW Computer Controlled Paging System to their existing software applications. Your HMEW Computer Controlled Paging System communicates with a PC or other host system via RS-232 at 9600 Baud, 8 data bits and 1 stop bit. The eighth data bit is ignored. The paging system maintains an input buffer which can receive commands from the PC while a page is being transmitted. The input buffer should be able to contain approximately five paging messages before getting full. When a command is received from the PC, the paging system responds with a message that includes error messages if the command was not understood or not properly transmitted. The normal response will echo the paging request command along with a status message.

**HMEW Computer Controlled Paging System is compatible with Scope and Waveware protocol. Details of these protocols are described below.**

#### A. Scope Protocol

The Scope Message command is formatted as follows.

##### • Numeric Pagers

Example serial message string transmitted from the host to the transceiver:

```
NF0870008A12345<CR>
```

##### • 'N'

Pager type. This character will inform the transceiver that this message is destined for a Numeric pager. Any data not preceded by this will be ignored.

The maximum message length within the characters allowed for the Numeric transmission format is 20.

##### • 'F'

Pager Baud rate. To change the transmission baud rate in a message string. *Placing a letter "F" after the "N" will alter it to 1200 baud.*

##### • '0870008'

Pager capcode - 7 digit pager identity number. All seven digits must be used. Please refer to information above for more details about the capcode.

##### • 'A'

Beep Type - which are four valid characters A,B,C or D.

##### • '12345'

Numeric Message

##### • '<CR>'

'Carriage Return', which is not transmitted but represents the end of message marker.

On sending a message to the unit in the correct format the transceiver will immediately recompose the string into the POCsAG format and transmit the same at the pre-programmed baud rate. The time taken to transmit the message is dependent upon the pager baud rate and the length of the message string.

##### • Alphanumeric Pagers

Example serial message string transmitted from the host to the transceiver:

```
AF0700008A Barcode Error Aisle 3 <CR>
```

The data format is exactly as for alpha pagers, except that the recognition character at the front of the message is changed from an 'N' to an 'A' and the data can include the ISO 646 character set (full alphabet including both upper and lower case). The maximum message length will be from 512 to 2,000 characters depending on the software issue installed.

##### • 'A'

Pager type. This character will inform the transceiver that this message is destined for an Alphanumeric pager. Any data not preceded by this will be ignored. The maximum message length within the characters allowed for the Numeric transmission format is 20.

##### • 'F'

Pager Baud rate. To change the transmission baud rate in a message string. *Placing a letter "F" after the "A" will alter it to 1200 baud.*

##### • '0870008'

Pager capcode - 7 digit pager identity number. All seven digits must be used. Please refer to information above for more details about the capcode.

##### • 'A'

Beep Type - which are four valid characters A,B,C or D.

##### • 'Barcode Error Aisle 3'

Message to be transmitted, which can include: 0-9, space, -(hyphen),

##### • 'U'

(letter U for 'U'rgent), [,] open/close square brackets, (open square brackets can also be used to identify the letter 'C' for 'C'ancel).



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- **<CR>**

'Carriage Return', which is not transmitted but represents the end of message marker.

### B. Waveware Protocol

- **Paging Message Command**

The Paging Message command is formatted as follows:

- **String Format 1:**

```
<SOH>TBCC...C<STX>XXXX...
XXX<ETX><EOT>
```

- **String Format 2:**

```
<SOH>T,B,CC...C,<STX>XXXX...
XXX<ETX><EOT><CR><LF>
```

*Note: The commas, the <CR> character, and the <LF> character are optional in the Paging Message command.*

*They are used for appearance purposes to separate subparts of the command string and for formatting the echoed output while troubleshooting the system.*

- **<SOH>**

(Hex code 01) is used to mark the start of a message. This character resets the paging system and can be used to abort an incomplete paging command at any point prior to transmission.

- **T**

Alphanumeric character representing the type of paging message to be transmitted.

A = Alphanumeric  
N = Numeric

- **B**

Numeric character representing the data rate, in bits per second, at which the paging message is to be transmitted  
5 = 512 bps  
1 = 1200 bps  
2 = 2400 bps

*Note: This numeric character may have one or no leading commas separating it from the paging message type.*

- **C...C**

One to seven decimal numeric digits representing the capcode of the paging receiver to which the message will be transmitted. Capcodes are seven digit strings. Capcodes that begin with leading zeroes do not require the leading zeroes to be included in this numeric string, if you use comma delimiters. If comma delimiters are not used, you must include leading zeroes.  
*Note: This numeric string may have one or no leading commas separating it from the data rate.*

- **<STX>**

(Hex code 02) is used to mark the beginning of a string of message characters to be transmitted. For paging message types of 1 to 4 Beeps (defined by the 'T' character above), this character and all following characters are ignored by the paging transmitter, until another <SOH> is encountered. This character may have one or no leading commas separating it from the capcode.

- **X...X**

A string of 0 to 256 alphanumeric message characters to be transmitted. For paging message types of 1 to 4 Beeps, this character and all following

characters are ignored by the paging system, until another <SOH> is encountered.

- **<ETX>**

(Hex code 03) is used to mark the end of a string of message characters to be transmitted. For paging message types of 1 to 4 Beeps, this character and all following characters are ignored by the paging system, until another <SOH> is encountered.

- **<EOT>**

(Hex code 04) is used to mark the end of a Transmit Paging Message command string. All following characters are ignored by the paging system until a <SOH> character is encountered.

- **<CR><LF>**

(CR is Hex code 0D, LF is Hex code 0A) These characters are ignored by the paging system unless contained within a message string and are used only for formatting output on a PC. The <CR> and <LF> characters are optional.

### Example 1:

```
<SOH>A,5,700008,<STX>This is a
test<ETX><EOT><CR><LF>
```

will send the message "This is a test" at 512 bps to an alphanumeric pager with capcode 0700008. Note: The POCSAG alphanumeric character set is the entire ASCII 7 bit character set.



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### Example 2:

```
<SOH>N,5,0800016,<STX>412-3433<ETX><EOT><CR><LF>
```

will send the message "412-3433" at 512 bps to a numeric pager with capcode 0800016

Note: The POCSAG numeric character set allows Hyphen (-), space, left bracket ( [ ), and right bracket ( ] ) characters in addition to the normal numeric character set.

### Example 3:

```
<SOH>N11820728<STX>412-3433<ETX><EOT>
```

will send the message "412-3433" at 1200 bps to a numeric pager with capcode 1820728.

Note: the lack of commas and the implied leading zeroes on the capcode.

### Example 4:

```
<SOH>3,1,0630800<EOT>
```

will send a three beep tone/vibe only message at 1200 bps to a tone/vibe only, a numeric, or an alphanumeric pager with capcode 0630800 and multiple tone/vibe cadence capability. Certain paging receiver models may not be designed to respond to multiple tone/vibe cadence messages.

### Example 5:

```
<SOH>2,1,860008<STX>412-3433<ETX><EOT>
```

will send a two beep tone/vibe only message at 1200 bps to a paging receiver with capcode

0860008. Note that the portion of the string after the capcode is ignored by the paging system because the paging message type was a paging message type of one to four beeps.

### Example 6:

```
<SOH>450001600<EOT><CR><LF>
```

will send a four beep tone only message at 512 bps to a paging receiver with capcode 0001600.

## 5. Response to All Commands (Waveware Protocol)

The paging system will respond immediately to all commands, including Paging Message commands, Setup Commands, and Status Commands, by echoing the Paging Message command back to the PC, and appending the echoed command with a status message in one of the following formats:

```
<SOH><ACK>V..V,QQ,D,C,II<EOT>
```

The ACK response is sent by the paging system to the PC immediately following a command if the command was understood by the paging system.

```
<SOH><NAK>EE<EOT>
```

The NAK response is sent by the paging system to the PC immediately following a command if the command was not understood by the paging system or if certain errors occur.

- **<SOH>**  
(Hex code 01) is used to mark the start of a message.

- **<ACK>**  
(Hex code 06) is used to indicate acknowledgement of valid reception of a command from the PC.

- **V..V**  
Alphanumeric string that indicates the version number of the firmware in the paging system. The version number is followed by a comma character.

- **QQ**  
A one to two numeric character string that indicates the quantity of paging messages that have been received by the paging system and not yet transmitted (Input Queue). The QQ value is followed by a comma character. This parameter should be monitored if you intend to use software handshaking between your paging control software and the paging transmitter. The paging transmitter Input Queue overflows if the QQ value tries to exceed 14. As an example, with software handshaking, your software should stop sending data at a QQ value of 12 and resume sending data when the QQ value reaches 10 or less. You can query the size of the Input Queue by submitting a Status Command, described on the following pages.

- **D**  
Numeric character that indicates whether the carrier detect circuit in the paging system is currently detecting a carrier signal or not. Valid values are:  
0 = Carrier Signal Not Detected  
1 = Carrier Signal Detected  
Note: The carrier detect signal status is passed to the PC whether or not the paging system has been programmed to avoid transmitting when a carrier signal has been detected (see Programming Command below).



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- **C**  
A single numeric value used to indicate the On/Off state of the Carrier Detect mode. The numeric character is followed by a comma. Valid values (C) are:  
0 = Off  
1 = On
- **II**  
A two hexadecimal digit value that is reserved for future use.
- **<EOT>**  
(Hex code 04) is used to mark the end of a message
- **<NAK>**  
(Hex code 15) is used to indicate non-acknowledgment of a command from the PC.
- **<EE>**  
Two numeric characters that indicate the particular error that caused nonacknowledgment of a command from the PC. The possible error values are:
- **01**  
Invalid Message Type. Indicates a message type other than A, N, 1-4 was transmitted.
- **02**  
Invalid Data Rate. Indicates a data rate other than 5, 1, or 2 was transmitted.
- **03 =**  
Invalid Capcode. Indicates an invalid capcode was transmitted.  
Invalid capcodes are:
- **04**  
Input Buffer Overflow. Indicates the serial data input buffer in the paging system has overflowed. This condition would likely be caused by the host system not recognizing the CTS signal.
- **05**  
Paging Buffer Overflow. Indicates the encoded paging message output buffer in the paging system has overflowed. This condition would likely be caused by excessive carrier signal detection while the Carrier Detect mode was enabled.
- **06**  
Invalid Status/Setup Command. Indicates that the command was recognized as a Status or Setup command but the entire command string was not fully interpreted by the paging system.
- **07**  
EEPROM Write Error. Indicates an internal system error in the paging system with regard to the proper storage of configuration information. This condition would likely indicate that paging system repair is required.
- **08**  
Invalid Command Format. Indicates that the command was not fully recognized as a valid paging system command

### Example 1:

```
<SOH>A,5,46180,<STX>This is a test<ETX>
<EOT><SOH><ACK>V3.00,00,0,1,1A<EOT>
```

echoes the paging message command and acknowledges proper receipt of a command by appending the ACK, indicating paging

system firmware version is 3.00, no paging messages in queue, no carrier signal is being detected, Carrier Detect mode is set to ON, and the Transmitter ID is 1A.

### Example 2:

```
<SOH>4,5,0000006<EOT><SOH><NAK>
03<EOT><CR><LF>
```

echoes the paging message command and indicates an error in receiving a command due to an invalid paging receiver capcode in a Paging Message command. Includes a <CR> and <LF> at the end of the response string if they were included in the paging message command.

## 6. Setting the Integration Station Network Configuration

### IP SETUP

- 1) Power up device
- 2) Press SETUP.
- 3) Enter password "1173" followed by the "ENTER" key.
- 4) Use the \* / Menu key to sequence thru the menu items
- 5) When you get to the IP Address, press ENTER then enter 12 digits like 192168001001. Press ENTER to save.
- 6) Use the \* / Menu key to sequence to the LISTEN PORT
- 7) Press ENTER, then enter the 4 digit port. (NOTE: Don't use 21,23,80,99). Press ENTER to save.
- 8) Press CANCEL to exit programming mode.
- 9) Cycle power on the device to update the IP address and PORT





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### SETTING THE PAGING PROTOCOL

Choose which data format you wish to use. You can use either SCOPE or WAVEWARE protocol (Refer to Computer Controlled Paging document). Protocol Scope is recommended.

Now setup the device for that protocol.

- 1) Power up device.
- 2) Press SETUP.
- 3) Enter password "9731" and press ENTER.
- 4) Use the \* / Menu key to sequence thru the menu items
- 5) When you get to the OUTPUT FORMAT menu, use the # key to cycle to SCOPE/HME, then press ENTER key to save.
- 6) Press CANCEL key to exit programming mode.

Your device is now setup to receive SCOPE style messages via TCP/IP socket or the DB9 serial port. In your application, open a TCP/IP socket on the IP/port, send the appropriate SCOPE message.

When you successfully send a page message to it, you'll notice the T icon in the upper right corner of the display come on for about 1 second.



- T** **Transmit / Receive Indicator**  
*Transmit Indicator*  
 – page being sent using keypad or thru RS232 port.
- R** **Receive Indicator**  
*Receive Indicator*  
 – signal is receive from.

For question or assistance please contact us.

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