

# WaveWare Interface Specifications

This appendix is included for those who want to develop their own paging control software or add an interface for the **WaveWare v8 Paging Encoder** to their existing software applications. You can choose to use the **WaveWare Paging Protocol** defined in this appendix, the **TAP Paging Protocol**, defined in **Appendix A – TAP Interface Specifications**, **COMP1**, or **COMP2**, or **Scope Paging Protocols** defined elsewhere in this manual.

A simple definition of the difference between the **WaveWare and TAP Protocols** is that the **WaveWare Protocol** is a dedicated connection that doesn't require a login process and it assumes that the **Host Device** maintains a database of all paging parameters associated with a pager, including Cap Code, Encoding Method, and RF Data Rate. The **TAP Protocol** requires a connect and disconnect process and assumes that the **Host Device** only needs to maintain a database of pager reference numbers called **PIN's**, and that the paging system maintains a database of all paging parameters associated with each **PIN**.

**The WaveWare Interface** supports paging messages up to 512 characters in length while the **TAP** interface supports paging messages up to 256 characters in length, group paging, and contact monitoring, and timed messaging. Each protocol has its advantages and disadvantages, but both accomplish the process of causing **POCSAG** encoded paging messages to be delivered to local area pagers.

To configure your **WaveWare v8 Paging Encoder** to use the WaveWare paging protocol, you may be required to configure the Com Port on the encoder board using the **v8 Encoder Setup Software**. Please refer to **Appendix B – Com Port Settings**, for details on configuring communication protocols.

Your **WaveWare v8 Paging System** typically communicates with a **Host Device** via RS-232 at 9600 Baud, 8 data bits and 1 stop bit. The eighth data bit is ignored (no parity). You can configure the paging encoder for other serial communication parameters. Please refer to **Appendix B – Com Port Settings**, for details on serial communication parameters.

The paging system maintains an input buffer which can receive commands from the **Host Device** while a page is being transmitted. The input buffer should be able to contain approximately ten paging messages before getting full. When a command is received from the **Host Device**, the paging encoder 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.

The paging system can use hardware handshaking (**CTS**) to control the flow of paging message commands from the **Host Device**. Alternatively, the paging control software could use the response messages as a means of handshaking between the paging encoder and the paging control software.

The paging encoder encodes paging messages into **POCSAG** paging format and passes the encoded paging message to the attached radio transmitter. If the **Carrier Detect** function is enabled, transmissions will be delayed while interfering signals are detected.

To use group paging in **WaveWare** mode, simply use the **WaveWare v8 Encoder Setup** software to setup a group list in **TAP** mode. The Host Monitoring function, which affects group paging, of the WaveWare Paging Encoder can be reset in **WaveWare** mode only if the **PPHRESET** option is active. For more information on Host Monitoring, its functions and how to reset it, refer to **Appendix K – Timed Messaging**.

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The **Commands** available for serial port controlled paging using the **WaveWare Paging Protocol** include:

- System Identification
- Paging Message
- Setup
- Status

## PAGING MESSAGE COMMAND

The **Paging Message** command is formatted as follows:

### Example 1:

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

### Example 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

**1** = One Beep (tone/vibe only pagers)

**2** = Two Beeps (all pager types)

**3** = Three Beeps (all pager types)

**4** = Four Beeps (tone/vibe only pagers)

**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.

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**C...C** One to seven decimal numeric digits representing the capcode of the paging receiver to which the message will be transmitted. Cap Codes are seven digit strings. Cap Codes 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,5,46180,<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 0046180.

**Note:** The POCSAG alphanumeric character set is the entire ASCII 7 bit character set.

## Example 2:

**<SOH>N,5,0765155,<STX>412-3433<ETX><EOT><CR><LF>**

Will send the message "412-3433" at 512 bps to a numeric pager with Cap Code 0765155.

**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>N1765155<STX>412-3433<ETX><EOT>**

Will send the message "412-3433" at 1200 bps to a numeric pager with capcode 0765155. Note the lack of commas and the implied leading zeroes on the capcode.

### Example 4:

**<SOH>3,1,145678<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 0145678 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>2,1,145678<STX>412-3433<ETX><EOT>**

Will send a two beep tone/vibe only message at 1200 bps to a paging receiver with capcode 0145678. 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>450006123<EOT><CR><LF>**

Will send a four beep tone only message at 512 bps to a paging receiver with capcode 0006123.

# RESPONSE TO ALL COMMANDS

The **v8 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 encoder to the host system immediately following a command if the command was understood by the paging encoder.

**<SOH><NAK>EE<EOT>**

The **NAK** response is sent by the paging encoder to the host system immediately following a command if the command was not understood by the paging encoder 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 host system.

**V..V** Alphanumeric string that indicates the version number of the firmware in the paging encoder. 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 encoder 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 encoder. The paging encoder 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 encoder 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 encoder has been programmed to avoid transmitting when a carrier signal has been detected (see Programming Command below).

**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 host system.

<EE> Two numeric characters that indicate the particular error that caused no acknowledgment of a command from the host system.

**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: 0-7, 2007664-2007671, 2045056-2045063, 2097144+.

**04 = Input Buffer Overflow.** Indicates the serial data input buffer in the paging encoder 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 encoder 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 encoder.

**07 = EEPROM Write Error.** Indicates an internal system error in the paging encoder with regard to the proper storage of configuration information. This condition would likely indicate that paging encoder repair is required.

**08 = Invalid Command Format.** Indicates that the command was not fully recognized as a valid paging encoder command.

## Example 1:

**<SOH>A,5,46180,<STX>This is a test<ETX><EOT><SOH><ACK>V8.01,00,0,1,1A<EOT>**

Echoes the paging message command and acknowledges proper receipt of a command by appending the **ACK**, indicating paging encoder firmware version is 8.01, no paging messages in queue, no carrier signal is being detected, and **Carrier Detect** mode is set to “**ON**”. The last field does not currently provide useful information.

## 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.

# SETUP COMMAND

You may program the **WaveWare v8 Paging Encoder** to monitor for interference using the **Carrier Detect** mode. If the **Carrier Detect** mode is turned “**ON**”, the paging encoder will hold paging messages in queue until an offending carrier signal is no longer detected at the transmission frequency of the paging encoder. The settings programmed by the Setup command will be remembered by the paging encoder even if power is removed from the paging encoder.

The Setup command is formatted as follows:

**<SOH>S,X,V<EOT>**

Where the **S** indicates Setup Mode, **X** is the command type, and **V** is the value. The comma delimiters are optional.

**X** A single numeric value used to indicate the command type. The numeric character is followed by a comma.

Valid values (**X**) are:

**1 = Carrier Detect Mode**

**V** A single numeric value used to indicate the value of the command setting to be saved. The numeric character is followed by an **EOT** character.

Valid values (**V**) are:

**0 = Off**

**1 = On**

## Example 1:

**<SOH>S,1,0<EOT>** will set the Carrier Detect function to the “**Off**” status.

## Example 2:

**<SOH>S11<EOT>** will set the Carrier Detect function to the “**On**” status.

# STATUS COMMAND

You may request the paging encoder to respond with its current programmed settings using the Status command. The Status command is formatted as follows:

**<SOH>S?<EOT>**

Where the **S?** requests the paging encoder to respond with the status of its current programmed settings. The Status Command can be used in supervisory controlled applications to ensure the encoder is still functioning, without causing unwanted paging transmissions.

**This Completes “Status Commands”**

***This Completes the “WaveWare Interface Specifications”***