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Jeron Cat. 7980 RPP interface - TAP protocol specification

Revision 1.0 – April 19, 2012

Purpose of the interface:

Jeron Cat. 7980 is primarily used to facilitate staff notification of calls from assigned patient beds initiated thru the Provider 790 Nurse Call system.
When a radio pocket page (RPP) system that supports Telocator Alphanumeric Protocol (TAP) version 1.8 is connected, nurse call system activity generates messages to be displayed on staff pagers.

When notification via pagers is not required/desired, this information may be instead transmitted to a third-party system for staff notification or other purposes.

This document outlines Jeron's implementation of the TAP protocol and description of information available from this interface.

Description of TAP protocol and interface:

This protocol was known as the Motorola Page Entry (PET) as well as the IXO alphanumeric entry protocol until it was adopted by Telocator (now known as the Personal Communications Industry Association - PCIA) in September 1988, as an industry standard protocol for the input of paging requests. It is now referred to as the Telocator Alphanumeric Protocol (TAP). Jeron's implementation supports paging systems which conform to Revision 1.8 (published February 04, 1997).
The TAP protocol is a request / response strategy typically transported via RS-232 serial link as ASCII data.

Any COM port recognized by the Windows OS may be used, including a virtual COM port (when using the Cat. 9753 serial to ethernet adapter and the Redirector driver). Jeron discourages the use of USB serial adapters as these may easily become disconnected.
The RS-232 port parameters are configurable and support Baud rates from 600 to 38400, 7 or 8 data bits, Parity (Even, Odd or None), and 1 or 2 Stop bits.

Data is ASCII (7-bit character set), using standard numeric, upper and lower case alphabetic and some punctuation characters. Certain non-printable ASCII Control characters are also used; Table 1. contains abbreviations used in this document.

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Control Character	Abbreviation	Hex value	Protocol Usage
Start of Text	**<STX>**	$02	Start of Block
End of Text	**<ETX>**	$03	End of Block
End of Transmission	**<EOT>**	$04	Log Off
Acknowledge	**<ACK>**	$06	Acknowledge
Line Feed	**<LF>**	$0A	
Carriage Return	**<CR>**	$0D	
Negative Acknowledge	**<NAK>**	$15	Checksum Error
Escape	**<ESC>**	$1B	
Abandon Transaction	**<RS>**	$1E	Invalid Pager

Table 1. ASCII Control Characters

TAP Protocol – Detailed Description:

The protocol consists of three phases; Log in, Message delivery and Log off. For identification purposes, data flow is indicated as from Jeron [JERON >] or from the Radio Pocket Page system [PAGER >].

Session Log In Sequence

Data flow from:	ASCII Data	Function / Comment
JERON >	**<CR>**	A carriage return character is send every few seconds until the pager system replies to establish a session log in.
PAGER >	**ID=** or **ID=<CR>**	Log in request. ID=<CR><LF> is also acceptable.
JERON >	**<ESC>PG1<CR>**	Log in as paging terminal 1
PAGER >	**<CR><ACK><CR>**	Acknowledge log in received. Jeron ignores the checksum, if provided.
	<CR><NAK><CR>	Request retry
	<CR><ESC><EOT><CR>	Forced Disconnect. This is preferred to <NAK> as it re-starts the log in process.
	If log in is acknowledged, this process continues:	Checksum calculation is described separately.

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PAGER>	**<ESC>[p<CR>**	Log in accepted; ready to accept message transmissions.

Table 2. Log in process

Message Delivery Sequence

Message delivery is performed sending one or more blocks.
To allow the pager system time to transmit to pagers, Jeron will send no more than one block every two seconds during a log in session. Additionally, Jeron will only maintain a log in session for approximately 30 seconds.
A message block consists of the <STX> character followed by the pager ID, <CR>, message text, <CR>, <ETX>, 3-character checksum, <CR>.

Example:
<STX>101**<CR>**105:A NORMAL**<CR><ETX>**3:;**<CR>**

The pager ID is '101', the message text contains the room architectural and bed designator separated by a colon, then the call priority. In this example the room is '105' the bed is 'A' and the call priority is 'NORMAL'. Optional free text may replace or be appended to the call priority text in certain nurse call operations.

Note - While most pager systems support 3 or 4 digit pager IDs, Jeron may be configured to deliver up to 10-digit IDs. Message text may be up to 31 characters with room:bed length up to 18 of those characters.

The pager system responds for each block. It may either -
acknowledge the message block:
<CR><ACK><CR>

request a re-try because of a checksum error:
<CR><NAK><CR>

abandon the transaction because of an invalid pager ID:
<CR><RS><CR>

NOTE - In the event that Jeron receives either of the last two responses, up to two more attempts will be made. After three attempts, Jeron will discard the block, send a forced disconnect sequence and attempt to log in again.

or terminate the log in session:
<CR><ESC><EOT><CR>

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Log Off Sequence

At any time, either Jeron or the pager system may terminate the current log in session by sending the forced disconnect sequence:
<CR><ESC><EOT><CR>

Checksum Calculation:

Each checksum is computed by performing the simple arithmetic sum of the 7-bit values of all characters preceding it in that block. (This means that STX and ETX are included in the sum).

The checksum is then derived from the least significant 12 bits of this resulting sum. The checksum is transmitted as 3 printable ASCII characters having values from Hex 30 to Hex 3F (the characters 0123456789:;<=>?).
The most significant 4 bits of the 12 bit sum are encoded into the 4 LSBs of the first character (HEX 30 [decimal 48] plus the 4 bit value becomes the first ASCII character). The middle 4 bits of the 12 bit checksum are encoded into the 4 LSBs of the second ASCII character and the least significant 4 bits of the 12 bit sum are encoded as the 4 LSBs of the third character.

Sample session:

The following was captured with a serial protocol analyser between Jeron and a commercial radio pocket page system to show actual communication and timing.

10:39:34.593 Jeron Tx -> <ESC><EOT><CR>
<CR>
<ESC><EOT><CR>
<CR>
<ESC><EOT><CR>

10:41:03.953 Pager Tx -> <255>
10:41:19.078 Jeron Tx -> <CR>
10:41:19.093 Pager Tx -> ID=<CR>
10:41:20.218 Jeron Tx -> <ESC>PG1<CR>
10:41:20.234 Pager Tx -> <CR><ACK><CR><ESC>[p<CR>

10:43:06.703 Jeron Tx -> <ESC><EOT><CR>
10:43:06.718 Pager Tx -> 115<CR><ESC><EOT><CR>
10:43:07.312 Jeron Tx -> <CR>
10:43:07.328 Pager Tx -> ID=<CR>
10:43:08.453 Jeron Tx -> <ESC>PG1<CR>
10:43:08.484 Pager Tx -> <CR><ACK><CR><ESC>[p<CR>
10:43:09.640 Jeron Tx -> <STX>101<CR>105:A NORMAL<CR><ETX>3:;<CR>
10:43:09.640 Pager Tx -> <CR><ACK><CR>
10:43:41.250 Jeron Tx -> <ESC><EOT><CR>
10:43:41.296 Pager Tx -> 115<CR><ESC><EOT><CR>
10:43:42.375 Jeron Tx -> <CR>
10:43:42.375 Pager Tx -> ID=<CR>
10:43:43.484 Jeron Tx -> <ESC>PG1<CR>
10:43:43.500 Pager Tx -> <CR><ACK><CR><ESC>[p<CR>
10:43:54.093 Jeron Tx -> <STX>101<CR>105:A NORMALASSIST TO TOILET Sv<CR><ETX>91?<CR>
10:43:54.093 Pager Tx -> <CR><ACK><CR>

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10:44:25.703 Jeron Tx -> <ESC><EOT><CR>
10:44:25.718 Pager Tx -> 115<CR><ESC><EOT><CR>
10:44:26.828 Jeron Tx -> <CR>
10:44:26.828 Pager Tx -> ID=<CR>
10:44:27.937 Jeron Tx -> <ESC>PG1<CR>
10:44:27.953 Pager Tx -> <CR><ACK><CR><ESC>[p<CR>
10:44:56.578 Jeron Tx -> <ESC><EOT><CR>
10:44:56.593 Pager Tx -> 115<CR><ESC><EOT><CR>
10:44:57.718 Jeron Tx -> <CR>
10:44:57.718 Pager Tx -> ID=<CR>
10:44:58.843 Jeron Tx -> <ESC>PG1<CR>
10:44:58.859 Pager Tx -> <CR><ACK><CR><ESC>[p<CR>
10:45:05.875 Jeron Tx -> <STX>101<CR>Svc Clear: 105:A NORMALASSIST T<CR><ETX>983<CR>
10:45:05.875 Pager Tx -> <CR><ACK><CR>
10:45:32.843 Jeron Tx -> <STX>101<CR>Cancelled: 105:A NORMAL<CR><ETX>780<CR>
10:45:32.843 Pager Tx -> <CR><ACK><CR>
10:45:40.453 Jeron Tx -> <ESC><EOT><CR>
10:45:40.468 Pager Tx -> 115<CR><ESC><EOT><CR>
10:45:41.578 Jeron Tx -> <CR>
10:45:41.578 Pager Tx -> ID=<CR>
10:45:42.703 Jeron Tx -> <ESC>PG1<CR>
10:45:42.718 Pager Tx -> <CR><ACK><CR><ESC>[p<CR>

Step-by-step details regarding the sample:

Starting at 10:39:34.593, the Jeron system begins by sending the log off sequence to terminate any previous active session. This is followed by the **<CR>** session log in attempt. At that time, the pager system was disconnected.

At 10:41:03.953, the pager system was connected. At 10:41:19.078, Jeron attempts to log in to the pager system. The log in was completed at 10:41:20.234.

During periods of nurse call inactivity, Jeron will perform a session log in, then log off after approximately 30 seconds. This repeats until nurse call activity generates a message block.

At 10:43:09, the patient / resident in room 105 bed A pushes their nurse call button. A staff member carrying pager 101 is assigned to this room and bed. Jeron is set to ‘Automatic’ mode for paging which will send notification immediately.

10:43:09.640 Jeron Tx -> <STX>101<CR>105:A NORMAL<CR><ETX>3:;<CR>

Pager 101 beeps and displays ‘105:A NORMAL’.

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The call from the patient / resident is also displayed at the nurse console allowing staff to answer and talk with the patient / resident. In this instance, a staff member answered the call at the console, determined what was required, and set a service request with a tag message “ASSIST TO TOILET”. This action generated a message block.

10:43:54.093 Jeron Tx -> <STX>101<CR>105:A NORMALASSIST TO TOILET Sv<CR><ETX>91?<CR>

Once a staff member goes to the patient / resident room, they clear the service request; this generates a message block.

10:45:05.875 Jeron Tx -> <STX>101<CR>Svc Clear: 105:A NORMALASSIST T<CR><ETX>983<CR>

When the original call is cancelled, a final message block is generated.

10:45:32.843 Jeron Tx -> <STX>101<CR>Cancelled: 105:A NORMAL<CR><ETX>780<CR>

Without further nurse call activity, Jeron will return to the log in; wait; log off and repeat process.

Questions regarding this document or the TAP protocol should be directed to:
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