RN-410 Serial Protocol

Rev.1.3 09/12/2007

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1 <u>General Notes</u>

1.1 RN410 Model Types
The RN410 is available with Video and Audio modules, Video module only, or Audio module only. The user should take this into consideration as they review the syntax of commands and responses appearing below.

1.2 Input Ranges:
Inputs range from 1 to 4.

1.3 Audio Ranges:
Input trim value range -5dB to +15dB, output level range -45dB to +5dB.

1.4 Special Characters:
Carriage returns (Enter Key, 0Dh) will be referred to in the document as *<cr>*.
Linefeeds (0Ah) will be referred to in the document as *<lf>*.

1.5 Field Separators:
Fields are separated by *white* space, that is any number of spaces or tabs as long as the entire command is less than 80 characters. A *<cr>* terminates the command. Below is an example describing a command.

EX	05	*<cr>*

So the actual message would look like this:
EX 05*<cr>*

1.6 Command Request Syntax:
This document uses the following notation when describing the syntax of a command request:

BOLD – identifies the command
lower case – identifies data to be entered which is described in the text following the syntax description
“ “   - entry defined within double quotes is to be entered exactly as shown
< >   - entry defined within these brackets is required
[ ]   - entry defined within these brackets is optional
| - a vertical bar denotes a logical choice of entry
 *   - an asterisk following either type of bracket above denotes that data within brackets may be entered multiple times

2 <u>RN-410 COMMAND LIST QUICK REFERENCE</u>

COMMAND	DESCRIPTION	PAGE
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RSP	Response Request	11
STA	Status Request	12
VER	Version Number Request	13
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3 <u>Request/Response Format</u>

All requests and responses will be entirely in ASCII. This will make the RN-410 easy to use with the RN-8200, as well as other control systems from AMX, Crestron, etc.

All requests/responses will have a two to three character type field followed by the data required for that specific request/response. All requests may be terminated with a carriage return (0Dh), the typical terminator, which will be referred to in this document as *<cr>* or may also be terminated with a semi-colon character, "*;*"*.* The semi-colon character may also be used to separate successive commands, thereby allowing multiple commands on the same line. Responses are terminated with a carriage return and line feed (0Ah) *<lf>*.

4 <u>Acknowledging Receipt of Commands</u>

Each request sent to the RN-410 will have two possible responses, one for the acknowledgement of a correct request and an error response. The normal acknowledge response will be "ACK" followed by a *<cr><lf>.* The *<cr><lf>* termination characters are understood in the responses shown below and are omitted.
Example:
    ACK

5 <u>Error Response</u>

It is inevitable that errors occur in the requests sent to the RN-410. If an invalid *command* is sent to the RN-410, the RN-410 will respond with the message "**ERR: unknown command**". If an invalid parameter is sent to the RN-410, the RN-410 will respond with the message "**ERR:** " followed by the valid syntax for the errored entry.

    Example:
A connect request with an incorrect type and input number:

CON R 8
The error response would be:
ERR: CON <<"1"|"2"|"3"|"4"> <"V"|"A"|"VA">>|<"?">

6 Connect Request

The Connect request will instruct the RN-410 to connect an input to the output. The user can also inquire as to which input is currently connected. The format for the Connect request is as follows:

CON	input number	type	*<cr>*

Syntax: CON <<"1"|"2"|"3"|"4"> <"V"|"A"|"VA">>|<"?"><cr>
Where:
CON   Connect Request Header
input number   Input to connect, one ASCII character 1 to 4
type   V for video, A for Audio, or VA for both.
"?"   ? for inquiring configured connections

***Example 1*:**
CON 3 A*<cr>*

Instructs the RN-410 to connect input 3 audio to the output.

***Example Response*:**
ACK

This response means that the command has been received and is valid.

***Example 2*:**
CON 4 VA*<cr>*

Instructs the RN-410 to connect input 4 video and audio to the output.

Example Response:
ACK

This response means that the command has been received and is valid.

Error Example:
CON 6 V*<cr>*

Instructs the RN-410 to connect input 6 video to the output, which is invalid since there are only 4 inputs.

Error Response:
ERR: CON <<"1"|"2"|"3"|"4"> <"V"|"A"|"VA">>|<"?">

Connect Inquiry

If the user wishes to know what input is connected currently, the user would insert a "?" in place of the input number, an Inquiry would look like this:

Example:
   CON ?*<cr>*

Example Response:
   CON 2V 3A

This response informs the user that the RN-410 is currently using input 2 video and output 3 audio.

7 Help Request

The user will have the ability to get a list of all commands from the RN-410. The user will issue the following request:

HLP	[cmd]	*<cr>*

Syntax: HLP[cmd]<cr>
Where:
HLP   Help Request header
cmd   optional command identifier

If the optional **cmd** is omitted, the RN-410 will respond with the following text message:

Response (*cmd* omitted)**:**
CON   Connect audio, video, or both of a specified input.
HLP   Provides help information for RN-410 command set.
MUT   Mute or unmute audio.
STA   Request status of video and audio connections and volumes.
VER   Request current version number.
VOL   Adjust audio output level or input trim levels.
VRB   Turns on or off verbose command error reporting.

Entering **HLP <cmd><cr>**, where cmd is any valid RN-410 command in the above list, will return specific help for the command requested.

Specific command help is listed below:

Response (*cmd* included)**:**
CON <<"1"|"2"|"3"|"4"> <"V"|"A"|"VA">>|<"?">
        Connect video (V), audio (A), or both (VA) of the specified input (1-4) or ? for inquiry.
        "1"|"2"|"3"|"4"   Input to connect
        "V"|"A"|"VA"   V for video, A for Audio, or VA for both.
        "?"   ? for inquiring configured connections

HLP[cmd]
        Provides help information for the RN-410 command set.
        cmd   optional command identifier

MUT <"M"|"U">
        Mutes or unmutes audio
         "M"|"U"   "M" = mute, "U" = unmute

RSP <"Y"|"N"><cr>
        Enables or disables a response from RN-410.
        "Y"|"N"   Y = response enabled, N = response disabled

STA<cr>

     Status request returns the following:

     STA <Number"**V**"> <Number"**A**"> <MuteStatus> <OutputLevel> <TrimInp1>
     <TrimInp2> <TrimInp3> <TrimInp4>

Number	Input (1-4)
MuteStatus	"M" = Muted, "U" = Unmuted
OutputLevel	output level -45 to +5 in dB
TrimInp	audio trim –5 to +15 in dB for each of 4 inputs

VER<cr>

     Version request returns the following:
     VER Part# Revision#

Part#	"RN-410CA"	"RN-410SA"	"RN-410YA"	"RN-410PA"	"RN-410C"	"RN-410S"	"RN-410Y"	"RN_410P"
Revision#	XX.xx, XX=Major version number, xx=Minor version number

VOL <<"L"|"T" number> <value|"?">><cr>

"L"	"T"	output Level or Trim
number	values of "1" to "4" applicable only when "T" designated
value	volume value -5 to +15 for trims, -45 to +5 for level (in 1 dB increments) or "+" to increment volume in 1 dB increments, or "-" to decrement volume in 1 dB decrements.
"?"	inquiry for the specified level or trim

VRB <"Y"|"N"><cr>

     Turns on or off verbose error message reporting.

"Y"|"N"	"Y" turns verbose on, "N" turns verbose off.

8 Mute Request

      The user will be able to mute the audio on the RN-410 by sending the mute request. The format for the mute request is as follows:

MUT	"M"|"U"	*<cr>*

Syntax: MUT <"M"\|"U"><cr>
Where:
MUT   Start of mute message
"M"\|"U"   "M" = mute, "U" = unmute

Example:
      MUT M*<cr>* – Mutes the audio output.
      MUT U*<cr>* – Unmutes the audio output

9 Response Request

The user will be able to suppress all responses from the RN-410 if they like. The user should ensure that all subsequent requests to the RN-410 are properly formatted as it would be difficult to ascertain their correctness without a response. The format for the Response request is as follows:

RSP	"Y"|"N"	*<cr>*

Syntax: RSP <"Y"|"N"><cr>
Where:
RSP   Response Request header.
 "Y"|"N"   Y = response enabled, N = response disabled

Example:
      RSP Y*<cr>* – Response requested.
      RSP N*<cr>* – Response suppressed.

10 Status Request

The user may request status from the RN-410 at any time. The returned status will include, in order, current video connection, current audio connection, mute status, output level, and trim value for each of 4 inputs. The format of the Status request is as follows:

STA	*\<cr\>*

Syntax: STA\<cr\>
Where:
STA　　　　　Status Request header

Response: STA *\<Number"***V***"\> \<Number"***A***"\> \<MuteStatus\> \<OutputLevel\> \<TrimInp1\> \<TrimInp2\> \<TrimInp3\> \<TrimInp4\>*
Where:
Number　　　Values **1**, **2**, **3**, or **4** representing the current Video input or Audio input.
MuteStatus　**M** for muted, **U** for unmuted
OutputLevel　Value representing the current Audio Output Level in range –45 to +5.
TrimInp　　　Value representing the current Audio Trim Level in range –5 to +15 for each of 4 Audio sources.

Example:
　　　STA*\<cr\>*
　　　Requests status of the RN-410.

Example Response:
　　　STA 3V 3A U –20 +5 +10 +8 -2
　　　This response means that input three audio and video is currently connected to the output, the audio is unmuted, and the level is -20, and the input trims are +5 +10 +8 -2.

11 Version Number Request

The user has the ability to request the RN-410's Part Number and the current firmware version number. The request is formatted as follows:

VER	<cr>

Syntax: VER<cr>
Where:
VER   Version Request header

Response: VER *Part#   Version#*
Where:
Part#   **RN-410CA**, **RN-410SA**, **RN-410YA**, or **RN-410PA** – for Video with Audio
                option
                RN-410C, **RN-410S**, **RN-410Y**, or **RN-410P** – for Video without Audio option
Version#   XX.xx, where XX = Major version number and xx = Minor version number.

Example:
        VER*<cr>*
        To which the RN-410 with S-Video and an Audio Option and firmware revision 2.05
will respond with the following:
        VER RN-410SA 02.05

12Volume Request

The Volume request is used to adjust input trims or output level. It can be used to inquire about the current value of an input trim or output level. The trims and levels can be set as a value, or adjusted up or down with "**+**" or "**-**".

VOL	"L" | "T" number	value|"?"	*<cr>*

Syntax: VOL <<"L"\|"T" number> <value\|"?"><cr>
Where:
VOL   Volume request Header
"L" \| "T"   output Level or Trim
number   values of "1" to "4", applicable only when "T" designated
value   volume value -5 to +15 for trims, -45 to +5 for level (in 1 dB increments) or
                   "+" to increment volume in 1 dB increments, or "-" to decrement volume in 1
                   dB decrements.   Multiple "+" or "-" may be specified consecutively, each
                   representing 1 dB step.
"?"   inquiry for the specified level or trim

Example:
VOL L 23*<cr>*
Instructs the RN-410 to set the output level to "23".

Example Response:
ACK
This response means that the command has been received and is valid.

Error Example:
VOL T 2 40*<cr>*
Instructs the RN-410 to set input 2's trim to "40" which is invalid.

Error Response:
ERR: VOL <<"L"\|"T" number> <value\|"?">
The RN-410 would send the error message above indicating that the "40" in the message was invalid (trim values are from -5dB to +15dB).

VOLUME INQUIRY
If the user wishes to know what trim or level is set at, the user would insert a "?" in place of the Value, an Inquiry would look like this:

Example:
VOL L ?*<cr>*
This requests the value of the output level, to which the RN-410 would respond:

Example Response:
VOL L –10
This response informs the user that the current output level setting is –10dB.

13 <u>Verbose Request</u>

The user can, during debugging, turn on verbose mode. This mode will expand the standard error messages to include the expected command syntax along with a description of the commands and possible parameters as formatted above in the specific help for that errored command. If an input command is unidentified, verbose mode will output the contents of the general HLP command. If verbose mode is off, then any errored input will result in just the command syntax being output as described in **Syntax** for each command. The verbose request is defined as follows:

VRB	"Y"|"N"	*<cr>*

Syntax: VRB <"Y"|"N"><cr>
Where:
VRB   Verbose request header
"Y"|"N"   "Y" turns verbose on, "N" turns verbose off.

Example:

If the user tries to connect input 6 (which is not in valid range of 1-4) using the CON command, the error message would appear as follows:
ERR:
CON <<"1"|"2"|"3"|"4"> <"V"|"A"|"VA">>|<"?">
    Connect video (V), audio (A), or both (VA) of the specified input (1-4) or ? for inquiry.
    "1"|"2"|"3"|"4"   Input to connect
    "V"|"A"|"VA"   V for video, A for Audio, or VA for both.
    "?"   ? for inquiring configured connections