



Communications with the Rhino Channel Bank

1.0 Overview

The Rhino channel bank line of products includes a serial port for remote two-way communications and remote uploading of firmware.

This document is intended to define the communications API for the Rhino channel bank line, and a host that has an available serial COM port.

2.0 Serial Port

The Rhino channel bank will continuously transmit ASCII character streams with start identifier, line position, and character count. Each of the lines are exact duplicates of the four line LCD display, allowing the host to receive real time status from the Rhino channel bank with minimal delay.

The data that flows over the Rhino serial port is dependant on the current screen being displayed. The Rhino will accept commands from the host to allow for changing of the display, and hence the data that is transmitted.

Data is transmitted when there is a change. The data is variable in length, therefore the update can be a single character, or up to the entire display.

2.0.1 Physical Connection

The Rhino channel bank serial port is a standard RS-232c serial communications port, utilizing a DB9 female connector. It is intended for the user to connect a straight-wired serial cable with male-female end connectors. The female end of the cable should be connected directly into the serial COM port of a WindowsXP based computer.

2.0.2 Serial Port Communication Parameters

Baud Rate: 19,200
Stop Bits: 1
Parity: none

2.0.3 Serial API – transmit side

A consistent data stream is transmitted from the Rhino. A minimum of five bytes to a maximum of 44 bytes can be expected.

Byte 0: 0xFF (start of frame)

Byte 1: x position that corresponds to the display position



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Byte 2: y position that corresponds to the display position
Byte 3: length of data in bytes
Byte 4: first byte of data
Byte N: last byte of data

Byte 0 is always 0xFF.

Byte 1 is the horizontal character position on the line (byte 3 defined data) where the data is to start. This number is zero based, that is the first position on the very left of the display is position zero, and the most right position is 39.

Byte 2 is the vertical position on the display where the data is to start. This number is zero based, that is the first position on the very top of the display is position zero, and the most bottom position is three.

Byte 3 is the data byte count that is to be expected starting with Byte 4. Note that this value can be from one to 40 in value.

Byte 4: first data byte
Byte N: last data byte, where N as defined as (Byte3+3)

2.0.3.1 Examples and Recommendations

It is recommended that the host maintain a copy of the current display on hand, that way the status of the display can be updated with a serial receive handler that populates the data in tandem with the Rhino. The recommended data array would be a four by 40 byte (or character) array.

* Recommended storage array: `char szDisplay[4][40];`

Where the [4] identifies the Y position, and [40] defines the X position.

Here are examples of how the Rhino sends data out the serial port.

Single Character:

```
printf("%c%c%c%c%c%c", 0xFF, g_byXPos, g_byYPos, 1, cData);
```

Stream of Characters:

```
printf("%c%c%c%c%c%c", 0xFF, g_byXPos, g_byYPos, uBytes, pszString);
```

2.0.3 Serial API – receive side

The Rhino supports multiple commands (see below), but essentially for normal use the Rhino receive side is simply a mimic of the buttons on the front of the Rhino. For



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example, to unlock the panel, the commands that correspond to pressing the first, third, second and fourth buttons would be sent.

The data that the Rhino sends is dependant on the current LCD screen being displayed on the Rhino. Simulating the button presses means that the host must keep track of the screen currently viewed.

To simulate the button press, simply send a single byte to the Rhino with the lower four bits defining the button pressed. The bit definition is zero (0) if the button is depressed, and one "1" if it is not. The bit positions are defined as follows:

2.0.3.1 Bit Position Dependency

- Bit 0: button 1 (left most)
- Bit 1: button 2 (center left)
- Bit 2: button 3 (center right)
- Bit 3: button 4 (right most)
- Bit 4: don't care
- Bit 5: don't care
- Bit 6: don't care
- Bit 7: don't care

2.0.3.2 Bit Data Value

- 0 = button depressed
- 1 = button not depressed

Please note that it is possible to press more than one button at a time by simply setting the proper bits to zero. Certain sequences may require this!

2.0.3.3 Receive Side Commands

- 0x00 = Initialize Screen – this will cause the Rhino to send four 40 character streams of data to the host, essentially refreshing the host screen
- 0x01 = Button – send the button code as defined above
- 0x02 = Lock – locks the keypad on the Rhino
- 0x13 = Bootloader – initiates an erase of Flash memory, and loads the bootloader so that new code can be uploaded. This will completely render the Rhino useless until new code is uploaded.

3.0 Ethernet Port

This feature will only be available on units with the Ethernet and USB port hardware.

TBD



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4.0 USB Port

This feature will only be available on units with the Ethernet and USB port hardware.

Functionality will be identical to the serial port.

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