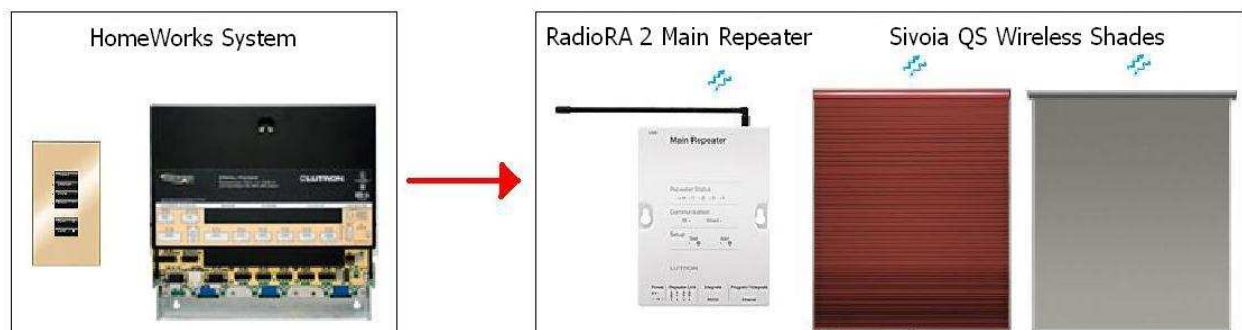HOMEWORKS®

# Interfacing *HomeWorks*® Illumination with Sivoia® QS Wireless Shades (including Cellular shades)

## Overview

*Lutron HomeWorks* Illumination systems are fully compatible with and should be used with *Sivoia* **QED** shades.  In some instances, a customer may have *Sivoia* **QS** wireless shades installed and would like to have control of the shades from a *HomeWorks* Illumination system.  This application note addresses the above scenario and describes a solution for interfacing *HomeWorks* Illumination with *Sivoia* QS wireless shades (including Cellular shades).



## 1.  What hardware do I need?

- A *Lutron HomeWorks* Illumination system with a P5 processor with one available RS-232 port.
- A null-modem RS-232 cable with male connectors on both ends.
- A *Lutron RadioRA 2* main repeater.
- *Lutron Sivoia* QS wireless shades / cellular shades.

## 2.  What software do I need?

- *Lutron HomeWorks* Illumination
- *Lutron RadioRA 2* Essentials or Inclusive software

## 3.  How do I connect the systems?

The *Sivoia* QS wireless shades will communicate wirelessly with the *RadioRA 2* main repeater.  The RS-232 connector on the main repeater must be connected to an RS-232 connector on the *HomeWorks* processor (Link 3 or Link 7) using the null-modem RS-232 cable.  (See image on next page)
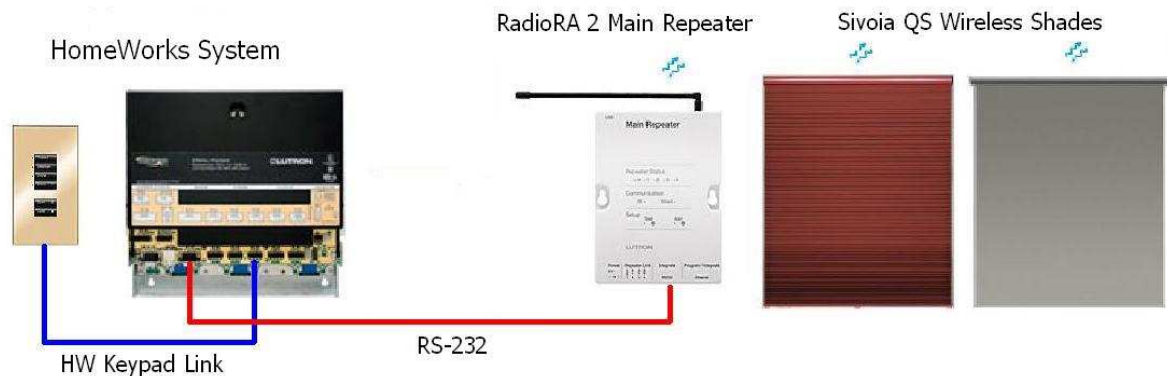
## 4. How are the systems programmed to work together?

4.1 Setting up the RadioRA 2 System:

a. First, the *RadioRA 2* system must be programmed through the *RadioRA 2* software. If a project does not exist for the *RadioRA 2* system, please create a new project file, and add the wireless shades as needed to the Design screen of the *RadioRA 2* software. Once you have added all of the shades that will be in the *RadioRA 2* project, please proceed to the Program screen.
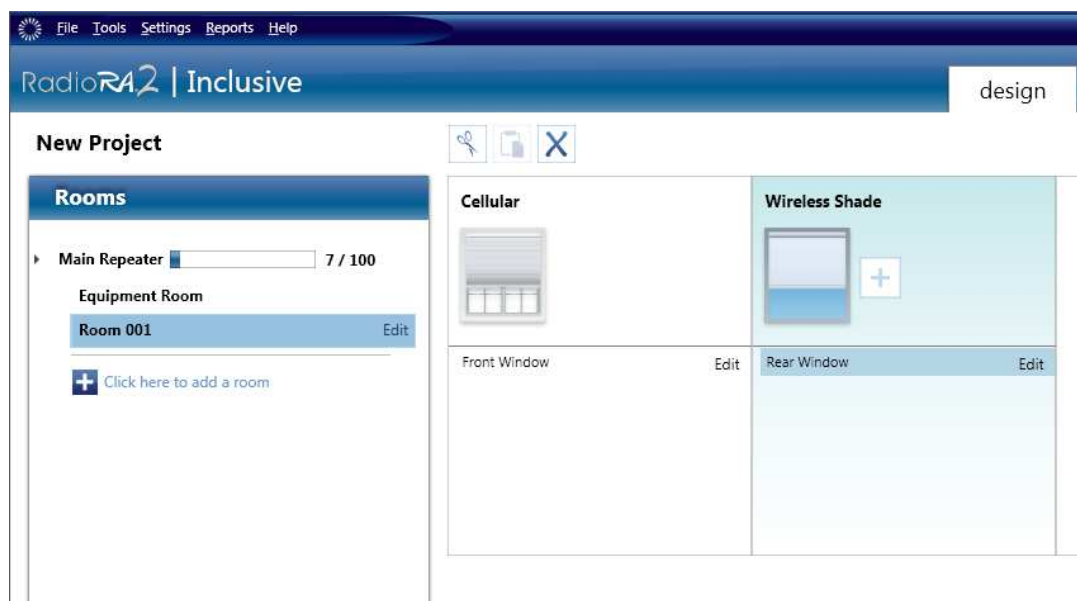


b. On the Program screen, select the Main Repeater. On the left side of the screen, you should see a visual representation of the Main Repeater appear. Directly below the image of the antenna, you should see a line that says "Phantom Button:", and is followed by a drop-down box. The number in that box represents the phantom button that is being programmed. It is recommended to make all phantom buttons single action, so that multiple presses to the same

phantom button do not result in unpredictable behavior. Note that the maximum number of phantom buttons is **100**.
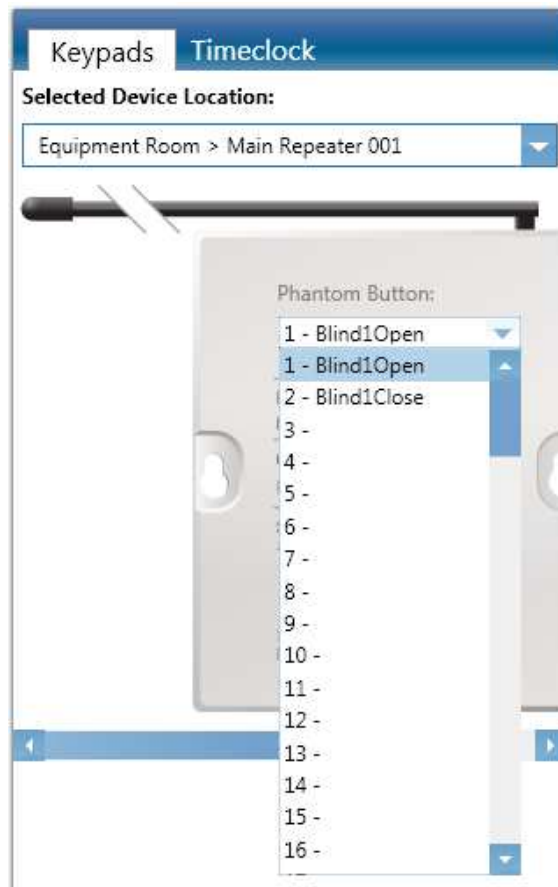


c. Select the phantom button that you wish to program, and assign the appropriate shade(s) and preset level to that button. Repeat this step for each individual button that will be "pressed" by the *HomeWorks* system. Be sure to note each button number and the programming, as this will be necessary for setting up the strings on the *HomeWorks* driver later.

d. Once you have completed the programming, activate the *RadioRA 2* system, and transfer the files. If further assistance with this process is needed, please consult the *RadioRA 2* help file and/or Lutron Technical Support.

4.2 Setting up the *HomeWorks* Illumination System:

a. Once the *RadioRA 2* activation and transfer process has been completed, it is necessary to configure the RS-232 driver in the *HomeWorks* software. On the Programming screen in the *HomeWorks* project file, select the "Interfaces" tab, highlight "Serial Equipment" and click "Add" to create the *RadioRA 2* driver.
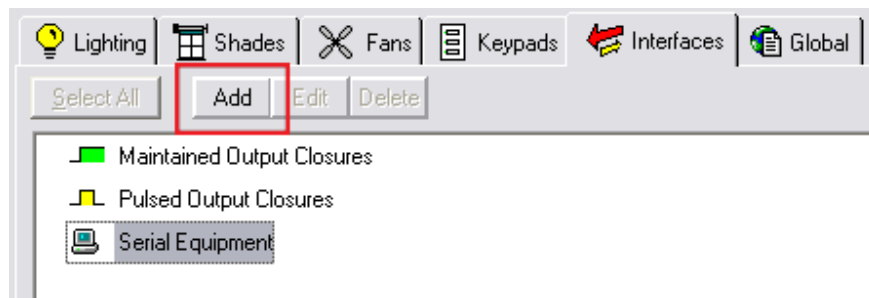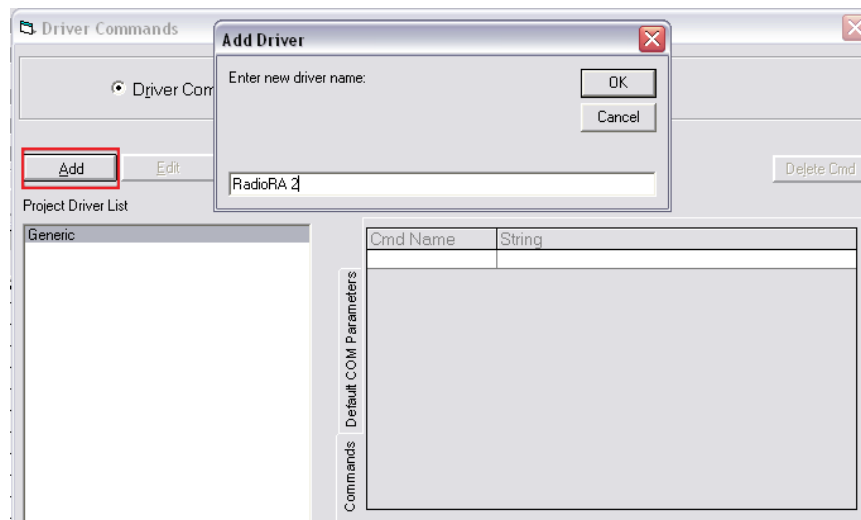


b. In the Serial Output Definition window, enter "RadioRA 2" in the Name field, then click on "Driver List".
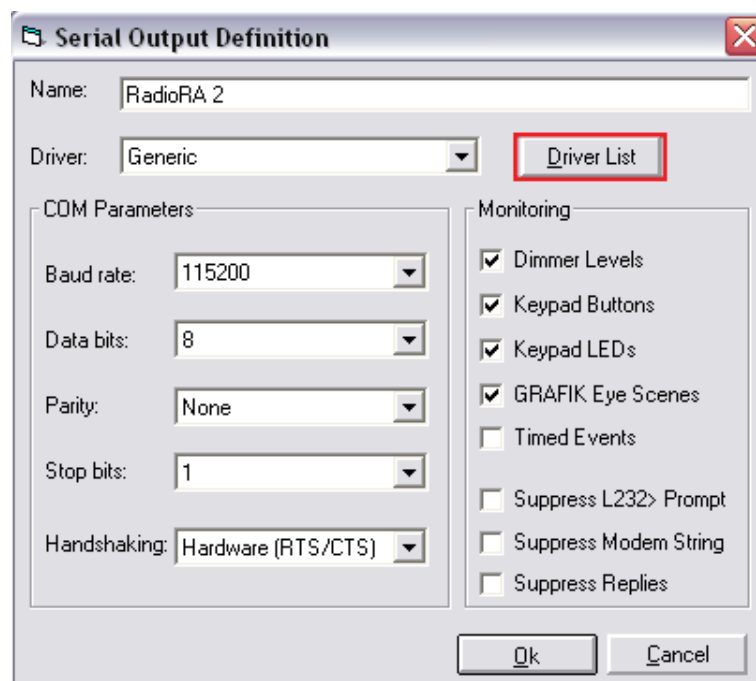
c. In the Driver Commands window, click "Add" and enter "RadioRA 2" as the driver name.



d. Select the RadioRA 2 driver in the Project Driver List, click in the "Cmd Name" field, and type a name that will indicate the desire action to take. The string name should be a logical description of the desired action…"Blind1Open", "Blind1Close"…in order to easily reference from within the programming screen. Once a name has been selected, it will be necessary to build the string that will send the press to the desired phantom button on the *RadioRA 2* repeater.  Click in the "String" space next to the "Cmd Name" that was just entered, and enter the following text:

**#DEVICE,1,X,3^(13,10)**  where "X" is replaced by the desired phantom button number.
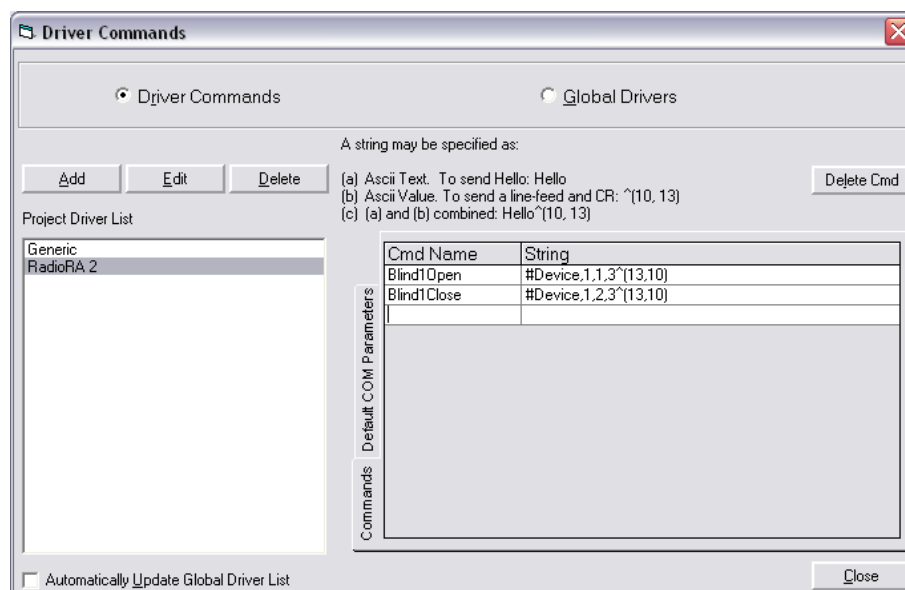
The "#DEVICE" tells the *RadioRA 2* repeater that the *HomeWorks* system is sending a command to a device. The "1" is the integration ID of the device that is receiving the command (in this case, the main repeater, which by default should have an integration ID of "1"). The "X", as was stated before, indicates the desired phantom button. The "3" indicates the action to take…"3" denotes a press, "4" denotes a release. If using only single-action phantom buttons, as is recommended, a release should not be needed. The "^(13,10)" indicates a carriage return and line feed, which instructs the *RadioRA 2* system to execute the command.

e. Repeat previous step for each of the *RadioRA 2* phantom buttons

f. After all of the command names and strings have been entered, click "Close", select the RadioRA 2 driver from the drop-down list and configure the driver to the following settings:

- Baud: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Handshaking: None
- All Monitoring checkboxes: Unchecked
- All Suppression checkboxes: Checked
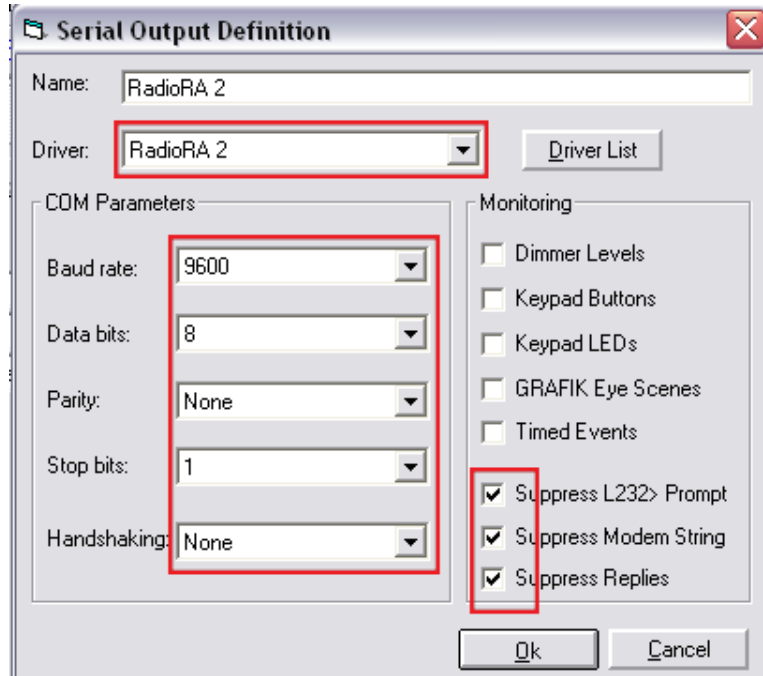
g. On the *HomeWorks* Programming screen, select a keypad button *(1)* that is intended to control *RadioRA 2* devices and name it accordingly (i.e. "Open"). Then click on the "Interfaces" *(2)* tab and select the RadioRA 2 driver *(3)* under "Serial Equipment". Select the appropriate command from the "Command/Level" drop-down list (i.e. "Blind1Open") *(4)* and click "Add/Update" *(5)*.
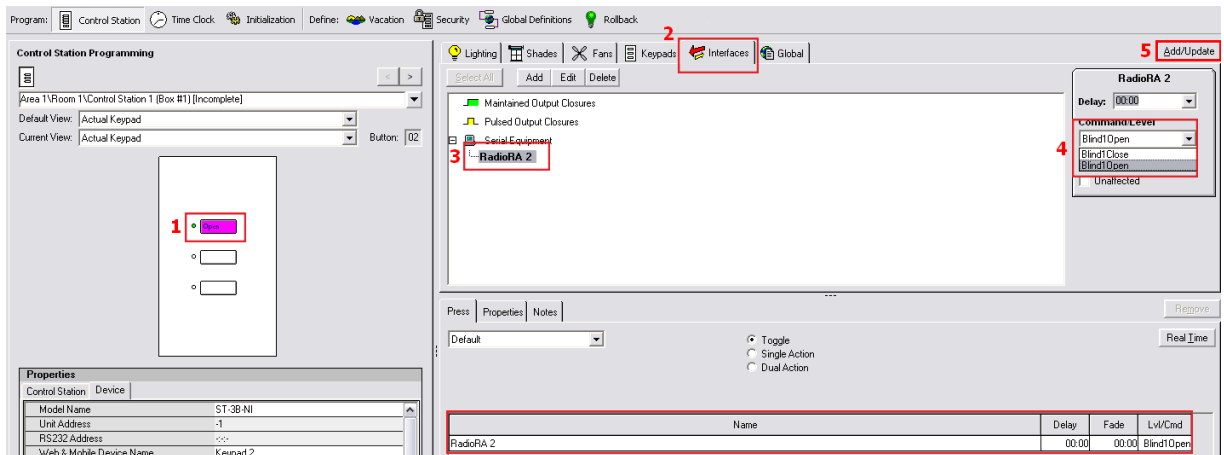


In addition to adding the serial string, you may also want to add a T/F or state variable as a placeholder to keep the LED lit. (The HW system will not keep the keypad LED lit after the 232 string is sent…the use of a variable and scene logic will allow the HW system to "fake" the LED feedback desired by the customer.)

For example, if the button was intended to close "Blind 1" of the RA 2 system, then the HW button programming should include the appropriate serial string to send to the RA 2 system, and also set the state variable "Blind1State" to "Closed". When the HW button to open "Blind 1" is pressed, it should send the appropriate string to the RA 2 system, and set "Blind1State" to "Open". This will keep the appropriate LED feedback within the HW system to allow it to track with the actual state of the RA 2 system.

h. Repeat previous step for each *HomeWorks* button that is to send a command to the *RadioRA 2* system.

i. Complete an upload to the *HomeWorks* processor, and power cycle the processor for the driver to take effect.

j. Test the driver by connecting your laptop to the processor over the RS-232 port (using a straight-through cable), and opening a HyperTerminal session using the same connection parameters as were used in the driver. (It is important to note that the *HomeWorks* software will no longer connect on this RS-232 port, as having "Suppress Replies" checked makes it impossible for the GUI to detect the processor.)

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k. Test to ensure that the desired strings are received from the *HomeWorks* processor. Press a button on the *HomeWorks* system that should generate a string command to be sent to the *RadioRA 2* repeater. Verify that the properly formatted string appears in HyperTerminal.

l. Test to ensure that no undesired monitoring is enabled. Press a *HomeWorks* button that controls only *HomeWorks* loads, and verify that no strings are sent to the HyperTerminal session.

m. Test to ensure that the replies, modem string, and prompt are suppressed. In the HyperTerminal session, send a random string (not a valid *HomeWorks* command) to the *HomeWorks* processor. No response should be received. Power cycle the *HomeWorks* processor. No text should appear in the HyperTerminal session (definitely not an "L232>" or a modem string).

n. If you receive unexpected feedback, or if the random string results in an "Invalid command" or "Bad command" message from the processor, please power-cycle the processor again, to give the processor a "second chance" to apply the driver. Repeat the previous 3 steps. If the situation is still not resolved, it may be necessary to re-upload before repeating the previous 4 steps again. If multiple attempts still result in unexpected feedback, or the replies are still not suppressed, contact Lutron Technical Support for further troubleshooting assistance.

### 4.3 Setting up the Integration of the two systems:

a. Once the feedback and suppression are working as expected, it is time to test a true connection between the *HomeWorks* processor and the *RadioRA 2* main repeater. The *HomeWorks* processor must be connected to the *RadioRA 2* repeater via the RS-232 connection…the *HomeWorks* processor cannot send strings on the Ethernet port. Also, as both devices use the same RS-232 pin out, a crossover RS-232 cable must be used. Connect one end of the crossover cable to the *HomeWorks* processor, and the other end to the *RadioRA 2* main repeater. (On each device, pin 2 is TX, pin 3 is RX, and pin 5 is GND.)

Female DB-9 Pinout on
HomeWorks Interactive
Processor

5   4   3   2   1
●   ●   ●   ●   ●

●   ●   ●   ●
9   8   7   6
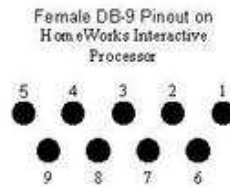
| HWI Pin Number | HWI Pin Name | Description for HWI Processor | Required for Hardware Handshaking | Required for Simple Communications (hardware handshaking disabled) |
|---|---|---|---|---|
| 1 | DCD | Data Carrier Detect (input) | | |
| 2 | TX | Transmit Data (output) | X | X |
| 3 | RX | Receive Data (input) | X | X |
| 4 | DSR | Data Set Ready (input) | X | |
| 5 | GND | Ground | X | X |
| 6 | DTR | Data Terminal Ready (output) | X | |
| 7 | CTS | Clear To Send (input) | X | |
| 8 | RTS | Request To Send (output) | X | |
| 9 | RI | Ring Indicate (input) | | |

b. Test the system by pressing a button on the *HomeWorks* processor (that should send a string to the *RadioRA 2* repeater), and verifying that the desired action took place on the *RadioRA 2* system (i.e. shade went to its level).

c. Power cycle the *HomeWorks* processor, and verify that it resumes normal operation, and repeat the test in the previous step.

d. Power cycle the *RadioRA 2* main repeater, and verify that it resumes normal operation, and repeat the test in step 4.3.b.

e. If at any point, the *HomeWorks* processor begins a cycle of rebooting itself, disconnect the RS-232 cable at the *HomeWorks* processor, and physically power it off for 15 seconds before restoring power. Verify that it resumes normal operation, then repeat the test in step 4.3.b.

f. If you are able to verify that the *HomeWorks* processor is not rebooting, but the *RadioRA 2* repeater is still not responding to the strings from the *HomeWorks* processor, disconnect the RS-232 crossover cable, and connect a laptop to the *RadioRA 2* main repeater using a straight-through cable. Open a HyperTerminal session using the same connection parameters as were described in Step 4.2.a, and send the appropriate "#DEVICE" string from HyperTerminal. If the *RadioRA 2* system still fails to respond to the string, then the problem lies on the *RadioRA 2* side, and *RadioRA 2* troubleshooting should be started (consult Lutron

Technical Support if necessary). If the *RadioRA 2* system responds to the strings from HyperTerminal, then connect the laptop to the *HomeWorks* processor, and re-verify that the strings from the *HomeWorks* processor match the strings that were sent to the *RadioRA 2* repeater. Correct the strings in the serial driver in *HomeWorks*, if necessary, and restart this process beginning at Step #11.

## *Frequently Asked Questions:*

**Can I address and program *Sivoia* QS wireless shades in a *HomeWorks* Illumination system?**
No, *Sivoia* QS wireless shades are not natively compatible with a *HomeWorks* Illumination system and must be addressed and programmed independently using the *RadioRA 2* main repeater and *RadioRA 2* software. It is recommended to use *Sivoia* **QED** wired or wireless shades with a *HomeWorks* Illumination installation to simplify system setup, programming, control, and feedback.

**What are the benefits to using *Sivoia* QS wireless shades instead of *Sivoia* QED shades with a *HomeWorks* Illumination system?**
There are several benefits to using QS wireless shades over QED shades, but there are also some disadvantages (see next question). Here are the benefits:
- Simplified wiring (QS wireless shades only require 2 wires for power and cellular shades require no wires as they are battery operated, QED shades require 7 wires)
- More flexible power supply requirements.
- Future-proof shading solutions. QS wireless shades are forward compatible with *Lutron HomeWorks* QS.

**What are the disadvantages to using *Sivoia* QS wireless shades instead of *Sivoia* QED shades with a *HomeWorks* Illumination system?**
Although QS wireless shades have many benefits (see previous question), they also have several disadvantages when used with a *HomeWorks* Illumination system.
- Additional equipment will be required to interface a *HomeWorks* Illumination system with *Sivoia* QS shades and blinds, adding to the cost and complexity.
- *HomeWorks* Illumination will be limited in the number of shade scenes that can be activated (100 phantom buttons).
- Programming scenes for the *Sivoia* QS shades and blinds will be a manual process requiring information to be typed into a terminal window.

## *Help and Support:*

For additional support and information regarding interfacing *HomeWorks* Illumination Systems with *Sivoia* QS Shades and Venetian blinds, please contact systemsupport@lutron.com.