

# HOMEWORKS <sup>TM</sup>

## **RS-232 Protocol**

**Data Protocol for Communicating  
with Lutron's HOMEWORKS System**

**LUTRON<sup>®</sup>**



# HomeWorks RS-232 Protocol Overview

## HARDWARE OVERVIEW

- 3 wire RS-232C protocol
- 9 pin female D type connector
  - pin 2 = transmit, pin 3 = receive, pin 5 = signal ground
- Communication Parameters
  - 9600 baud
  - 8 data bits
  - 1 stop bit
  - no parity
  - no xon/xoff

## COMMAND SET SUMMARY

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**WARNING:** All strings sent to HomeWorks must be followed by a carriage return, CR. In the following literature a CR is denoted in hexadecimal as \$0D (the \$ means hexadecimal). If you are typing in an ASCII string from a terminal do not follow a HomeWorks command string with the typed ASCII characters \$, 0, D (this is NOT the same as a hexadecimal \$0D). Instead, press the <ENTER> key on your keyboard to generate a CR (which is a hexadecimal \$0D). All commands must be in CAPITAL letters.



## Command “A”

This command is used to adjust (raise/lower) the intensity level of lights attached to a HomeWorks keypad button.

### Format:

Cmd	R/L <sup>4</sup>	Inc <sup>5</sup>	Pnl # <sup>1</sup>	Keypad # <sup>2</sup>		Button # <sup>3</sup>		CR
A	+/-	0-3	1-8	0	3	1	0	\$0D

<sup>1</sup>Valid panel numbers are between 1 and 8.

<sup>2</sup>Valid keypad numbers are between 01 and 16; where 16 is address 0 on a rotary dial keypad.

<sup>3</sup>Valid button numbers are between 01 and 15; see diagrams on page 25.

<sup>4</sup>R/L specifies what is to be done, a raise or a lower.

+ = Raise

- = Lower

<sup>5</sup>Inc is the increment size of the raise/lower command:

0 = AutoInc (see note below)

1 = 3% raise/lower

2 = 6% raise/lower

3 = 12% raise/lower

**Note:** The AutoInc command specifies the Auto-Increment mode. In this mode, the HomeWorks panel figures out how fast to raise and lower.

At high end: 12% inc change

At low end: 6% inc change

For best results (smooth fading) send AutoInc commands approximately 1.0 second apart.



## Command “B”

This command is used to simulate a button press of a HomeWorks master keypad.

### Format:

Cmd	Pnl # <sup>1</sup>	Keypad # <sup>2</sup>		Button # <sup>3</sup>		CR
B	1-8	0	1	0	5	\$0D

<sup>1</sup>Valid panel numbers are between 1 and 8.

<sup>2</sup>Valid keypad numbers are between 01 and 16; where 16 is address 0 on a rotary dial keypad. You can **not** control the HW-TEL9 (keypad number 17) via the RS232.

<sup>3</sup>Valid button numbers are between 01 and 17; see diagrams on page 25.

**Note:** If a button is programmed as a “raise” or “lower” button, this will not activate raise or lower. To raise or lower, use the “A” command (see page 3).



# Control Command Set Details

## Command "C"

This command is used to set the Real Time Clocks in all panels.

### Format:

Cmd	Month <sup>1</sup>		Day <sup>1</sup>		Year <sup>1</sup>		Hour <sup>3</sup>		Min <sup>1</sup>		Day of Week <sup>2</sup>	CR						
C	<sup>4</sup>	0	1	/	0	1	/	9	4	<sup>4</sup>	1	7	:	3	2	<sup>4</sup>	4	\$0D

<sup>1</sup>Each quantity must be two digits, include leading zeros when necessary.

<sup>2</sup>Valid numbers are between 1 and 7, with 7 being Saturday.

<sup>3</sup>Hour is in military format and must be two digits (00 through 23).

<sup>4</sup>This is the space character which is hexadecimal \$20.

**Note:** This command requires software version RSPNL5-3 or later.



## Command “G”

This command is used to turn GRAFIK Eye 3100 units to a desired scene (scene 0 is off).

### Format:

Cmd	Pnl # <sup>1</sup>	Address <sup>2</sup>	Scene# <sup>3</sup>		CR
G	1-8	1-8	0	2	\$0D

<sup>1</sup>Valid panel numbers are 1 through 8.

<sup>2</sup>Valid GRAFIK Eye addresses are 1 through 8.

<sup>3</sup>Valid scenes are 00 (off) through 16.

### Notes:

1. The fade rate used will be the fade rate programmed to the destination scene of the GRAFIK Eye.
2. The “>” character can be used to enter a range of GRAFIK Eye devices. The format for the panel and address numbers become:

Starting		>	Ending	
panel #	address#		panel #	address #



## Command “K”

This command is used to enable and disable HomeWorks master keypads.

### Format:

Cmd	Function <sup>1</sup>	Pnl #	Keypad # <sup>2</sup>		CR
K	+ or -	1-8	0	1	\$0D

<sup>1</sup>To enable a keypad use the ASCII character “+”; to disable a keypad use the ASCII character “-.”

<sup>2</sup>Valid keypad numbers are between 01 and 16; where 16 is address 0 on a rotary dial keypad.



## Command “L”

This command is used to turn on and off the LEDs of the HomeWorks master keypads.

### Format:

Cmd	Pnl #	Keypad # <sup>1</sup>		LED States <sup>2</sup>				CR
L	1-8	0	1	16-13	12-9	8-5	4-1	\$0D

<sup>1</sup>Valid keypad numbers are between 01 and 16; where 16 is address 0 on a rotary dial keypad.

<sup>2</sup>LED states are 16 bits represented as four ASCII hexadecimal characters. Refer to the next section for how LED states are determined. See diagrams on page 25 for button/LED mapping.

**Note:** This command actually controls one condition in the keypad LED's truth table. Therefore, an LED that has been set to turn off may not do so because lights that have been assigned to the button corresponding to that LED are ON.

### How to Determine LED States

Hexadecimal is a numbering system based on 16. Counting from 0 to 15 in hexadecimal goes as follows, 0, 1, 2, 3, ..., 9, A, B, C, D, E, and F. One hexadecimal digit is four (4) binary bits and thus four (4) LEDs can be “bit” represented by one (1) hexadecimal digit. Four hexadecimal digits can represent  $4*4 = 16$  LEDs. The “Hexadecimal to Binary Translation” table on the next page shows the hexadecimal to binary translation for a single hexadecimal digit 0-F. To define 16 LED states you need four (4) hexadecimal digits. The table must be used four times, once for each hexadecimal digit.

For example, on keypad 1 of panel 1, the LEDs 1-3 and LED 15 are to be turned ON, and LEDs 4-14 are to be turned OFF. This would be accomplished as follows:

A 0 will represent OFF, a 1 will represent ON.

```
LED states 16 - 13:  0100          (LED 15 ON)
LED states 12 - 9:   0000
LED states 8 - 5:    0000
LED states 4 - 1:    0111          (LEDs 1-3 ON)
```

Using the table on the next page, we translate the above bit mapping into hexadecimal:

```
LED states 16 - 13:  0100 = 4
LED states 12 - 9:   0000 = 0
LED states 8 - 5:    0000 = 0
LED states 4 - 1:    0111 = 7
```

Thus, the LED states in hexadecimal would be:                   4 0 0 7  
and the string to be sent to the HomeWorks system would be:   L 1 0 1 4 0 0 7 <CR>

**Note:** All LEDs for a keypad must be changed together. You can not change 1 LED at a time.





## Hexadecimal to Binary Translation

Hexadecimal Digit	4 Binary Bits	Explanation
0	0000	Tell all four LEDs to go OFF
1	0001	Tell the first LED to go ON and the other three to go OFF
2	0010	Tell the second LED to go ON and the other three to go OFF
3	0011	Tell the first and second LEDs to go ON and the other two to go OFF
4	0100	Tell the third LED to go ON and the other three to go OFF
5	0101	Tell the first and third LEDs to go ON and the other two to go OFF
6	0110	Tell the second and third LEDs to go ON and the other two to go OFF
7	0111	Tell the fourth LED to go OFF and the other three to go ON
8	1000	Tell the fourth LED to go ON and the other three to go OFF
9	1001	Tell the first and fourth LEDs to go ON and the other two to go OFF
A	1010	Tell the second and fourth LEDs to go ON and the other two LEDs to go OFF
B	1011	Tell the third LED to go OFF and the other LEDs to go ON
C	1100	Tell the third and fourth LEDs to go ON and the other two to go OFF
D	1101	Tell the second LED to go OFF and the other LEDs to go ON
E	1110	Tell the first LED to go OFF and the other LEDs to go ON
F	1111	Tell all four LEDs to go ON



## Command “M”

This command is used to enable/disable real time messages on a case by case basis for K, L, and D messages.

### Format:

Cmd	K	L	D	CR
M	+	-	+	\$0D

+ = ON

- = OFF

**Note:** This command requires software version RSPNL7-0 or higher.



# Control Command Set Details

## Command “N”

This command is used to do the following:

- turn on or off HomeWorks switches
- set HomeWorks dimmers to desired intensities with desired fade rates
- enter and exit Security mode or Vacation mode

### Format:

Cmd	Unused		Fade Rate <sup>1</sup>		Intensity <sup>2</sup>		Pnl # <sup>3</sup>	Device # <sup>4</sup>		CR
N	0	0	0	2	3	1	1-8	2	0	\$0D

<sup>1</sup>Valid fade rates are between 00 and 11 (see table below).

**Note:** Fade rates are ignored by switching devices, relay cards, and GRAFIK Eyes.

Code	Fade Rate	Code	Fade Rate
00	0 sec.	06	1 min.
01	2 sec.	07	2 min.
02	4 sec.	08	8 min.
03	8 sec.	09	15 min.
04	15 sec.	10	30 min.
05	30 sec.	11	60 min.

<sup>2</sup>Valid intensities for dimmers, switches, and relay cards are between 00 and 31 (00 being off and 31 being full intensity). Valid intensities for GRAFIK Eyes are between 00 and 16 (00 being off; 16 being scene 16)

<sup>3</sup>Valid panel numbers are 1 through 8.

<sup>4</sup>Valid device numbers are 1 through 64. The conversion factor for calculating a device’s RS-232 number from its bus and address numbers is:

for dimmers/switches: device # = (bus address - 1) X 4 + control address

for relay cards: device # = 48 + card slot position

for GRAFIK Eyes: device # = 56 + control address

where the control address is given on the microboard subassembly LED displays when the status of that device is changed. Device conversion tables are shown on page 12.

To enable/disable Vacation playback mode or Security mode use 00V for Vacation playback mode and 00S for Security mode as the panel and device #. In each case, use 00 intensity to disable and 31 intensity to enable.

### Notes:

1. Serena™ shades cannot be controlled with this command. To control Serenas, use the simulated button press command “B” (see page 4).
2. Switching devices respond to either 00 or 31, all other intensities are ignored.
3. The “>” character can be used to enter a range of devices. The format for the panel and device numbers become:

Starting		>	Ending	
panel #	device #		panel #	device #



# Control Command Set Details

## Notes on Directly Controlling Devices from the RS-232 Port

The HomeWorks panel cannot process “N” commands very fast due to protocol and hardware limitations of the dimmers and switches. Multiple “N” commands should be sent to the panel with a minimum space of 0.8 seconds in between. To achieve faster control of devices from the RS-232 port it is recommended that “phantom keypads” be used with the RS-232 “B” command (see page 4).

With “phantom keypads” you assign devices and intensities to keypad buttons that are not physically in the system but are stored in the HomeWorks memory. To do this manually:

- 1) Disconnect the keypad from the HomeWorks system by pulling off the four-pin connector.
- 2) Write down the keypads original address position. Turn the address dial to any unused position. “Phantom keypads” use up an address slot (1-16) just like normal keypads do and you must keep track of them.
- 3) Connect the keypad back to the HomeWorks system.
- 4) Program your “phantom buttons” just as you would normal keypad buttons. Refer to the “Start- Up” section of the Residential Systems binder for more information about programming keypad buttons.
- 5) Program multiple “phantom keypads” by repeating steps 1 - 4. When done programming all “phantom keypads” return the address dial back to its original position.

“Phantom keypads” can also be programmed using the HomeWorks Windows Programming Utility (HW-WPU). Refer to the HW-WPU instruction guide (P/N 362-800).

### Device Number Conversion Tables

Dimmers/Switches		
Bus	Control	Device Number
1	1	1
1	2	2
1	3	3
1	4	4
2	1	5
2	2	6
2	3	7
2	4	8
3	1	9
3	2	10
3	3	11
3	4	12
4	1	13
4	2	14
4	3	15
4	4	16
5	1	17
5	2	18
5	3	19
5	4	20
6	1	21
6	2	22
6	3	23
6	4	24

Dimmers/Switches		
Bus	Control	Device Number
7	1	25
7	2	26
7	3	27
7	4	28
8	1	29
8	2	30
8	3	31
8	4	32
9	1	33
9	2	34
9	3	35
9	4	36
10	1	37
10	2	38
10	3	39
10	4	40
11	1	41
11	2	42
11	3	43
11	4	44
12	1	45
12	2	46
12	3	47
12	4	48

Relays		
Bus	Control	Device Number
15	1	49
15	2	50
15	3	51
15	4	52
15	5	53
15	6	54
15	7	55
15	8	56

Serena		
Bus	Control	Device Number
14	1	65
14	2	66
14	3	67
14	4	68
14	5	69
14	6	70
14	7	71
14	8	72

GRAFIK Eyes		
Bus	Control	Device Number
13	1	57
13	2	58
13	3	59
13	4	60
13	5	61
13	6	62
13	7	63
13	8	64



## Command “V”

This command is used to find the version of RSPNL firmware present in the HoweWorks processor you are connected to.

### Format:

Cmd	CR
V	\$0D

### Response From HomeWorks:

Where X and Y are the current revision level.

Version			CR
X	-	Y	\$0D

This command is only valid in revision 6-2 and higher. For demo code in revision 6-7 and higher, the X – Y will be followed by a –D to indicate “Demo.”



# Monitor Command Set Details

## Command “?”

This command is used to do the following:

- determine the status of devices in the system
- determine if the system is in Vacation playback mode
- determine if the system is in Security mode

### Format:

Cmd	Pnl #	Device # <sup>1</sup>		CR
?	1-8	2	0	\$0D

<sup>1</sup>Valid device numbers are between 01 and 72.

To determine if the system is in Vacation playback mode, use 00V for the panel and device numbers.

To determine if the system is in Security mode, use 00S for the panel and device numbers.

### Response From HomeWorks:

Identifier	Pnl #	Device # <sup>1</sup>		Intensity <sup>2</sup>				CR
!	1-8	2	0	-	-	-	-	\$0D

<sup>1</sup>Valid device numbers are between 01 and 72. The devices are as follows:

Device Type	Numbers	Device Formula
Dimmers	01 - 48	(bus address - 1) * 4 + control address
Relays	49 - 56	48 + card slot position
GRAFIK Eye	57 - 64	56 + control address
Serena	65 - 72	64 + control address

where the control address is given on the microboard subassembly LED displays when the status of that device is changed.

<sup>2</sup>Intensities are in the range of 00 (off) to 31 for dimmers. Intensities are 00 (off) or 31 (on) for switches and relay cards. Intensities are 00 (off) to 16 (scene 16) for GRAFIK Eye units. Intensities are from 0000 to 4095 for Serena units.

When a GRAFIK Eye, relay card, or HomeWorks dimmer is not responding, a 99 is returned. For a Serena not responding, a 9999 is returned. For GRAFIK Eyes, relays, and dimmer/switches, the intensity field is **only** two characters. For Serena, it is four.

### Notes:

1. A Serena Shade (devices 65 - 72) will return 0000 or 4095 if the Serena is presently at the default off position.
2. A switched device will return 00 if off and 31 if on.
3. The “>” character can be used to enter a range of devices. The format for the panel and device numbers become:

Starting			Ending	
panel #	device #	>	panel #	device #



## Command “I”

This command is used to determine the status of the keypad LEDs.

### Format:

Cmd	Pnl #	Keypad # <sup>1</sup>		CR
I	1-8	0	1	\$0D

<sup>1</sup>Valid keypad numbers are between 01 and 16.

### Response From HomeWorks:

Identifier	LED States <sup>2</sup>				CR	LF
L	16-13	12-9	8-5	4-1	\$0D	\$0A

<sup>2</sup>LED states are 16 bits represented as four ASCII hexadecimal characters; to decode LED states, see “How to Determine LED States” on page 8 and the “Hexadecimal to Binary Translation” table on page 9.



## Command “Q”

This command is used to determine if keypads are enabled or disabled.

### Format:

Cmd	Pnl #	Keypad # <sup>1</sup>		CR
Q	1-8	0	1	\$0D

<sup>1</sup>Valid keypad numbers are between 01 and 16; where 16 is address 0 on a rotary dial keypad.

### Response From HomeWorks:

Identifier	Pnl #	Keypad # <sup>1</sup>		Status <sup>2</sup>		CR
@	1-8	0	1	-	-	\$0D

<sup>1</sup>Valid keypad numbers are between 01 and 16.

<sup>2</sup>The status will be as follows:

If the keypad is enabled, then “+ +” will be returned.

If the keypad is disabled, then “- -” will be returned.





## Command “R”

This command is used to display the real time messages (K, L, and D messages on pages 19-20) that are enabled/disabled.

### Format:

Cmd	CR
R	\$0D

### Response From HomeWorks:

K	stat	L	stat	D	stat	CR	LF
K	+	L	-	D	+	\$0D	\$0A

+ = ON

- = OFF

**Note:** This command requires software version RSPNL7-0 or higher.



## Command "TIME"

This command is used to read the Real Time Clock from the connected panel.

### Format:

Cmd				CR
T	I	M	E	\$0D

### Response From HomeWorks:

Month		Day		Year			Hour		Min.		Sec.			day <sup>2</sup>	CR	LF				
0	1	/	0	1	/	9	4	1	1	3	:	2	3	:	3	2	1	N	\$0D	\$0A

<sup>1</sup>This is the space character which is hexadecimal \$20.

<sup>2</sup>Valid day characters are:

- N Sunday
- M Monday
- T Tuesday
- W Wednesday
- R Thursday
- F Friday
- S Saturday

**Note:** This command requires software version RSPNL5-3 or later. If the clock seconds field does not change when it is read back twice, then the time clock chip is not running. Try setting the time using the "C" command (page 5) and then using the "TIME" command again.



# Real Time Responses

These functions are enabled by moving the third dip switch on the HomeWorks Panel Microprocessor Board to the ON position.

## Keypad or Telephone Interface Button Pressed or Released

The following response is sent out over the RS-232 port anytime:

1. A keypad button is pressed or released.
2. A telephone interface function is activated.

### Format:

Identifier	Pnl #	Keypad # <sup>1</sup>		Button# <sup>2</sup>		State <sup>3</sup>	CR	LF
K	1-8	0	1	0	5	+/-	\$0D	\$0A

<sup>1</sup>Valid keypad numbers are between 01 and 16. The telephone interface is number 17.

<sup>2</sup>Valid button numbers are between 01 and 17; see diagrams on page 25.

<sup>3</sup>A “+” is sent when the button is pressed and a “-” is sent when the button is released. The telephone interface will only send a button press (“+”) and not a button release (“-”).

## LED Status Has Changed

The following response is sent out on the RS-232 port anytime a keypad's LED state changes.

### Format:

Identifier	Pnl #	Keypad <sup>1</sup> #		LED States <sup>2</sup>				CR	LF
L	1-8	0	5	16-13	12-9	8-5	4-1	\$0D	\$0A

<sup>1</sup>Valid keypad numbers are between 01 and 16.

<sup>2</sup>LED states are 16 bits represented as four ASCII hexadecimal characters; to decode LED states, see “How to Determine LED States” on page 8 and the “Hexadecimal to Binary Translation” table on page 9.



## Real Time Functions

### Device Status Has Changed

The following response is sent out on the RS-232 port anytime the status of a device changes.

#### Format:

Identifier	Pnl #	Bus <sup>1</sup> Address		Control <sup>2</sup> Address	State or <sup>3</sup> Level				CR	LF
D	1-8	0	5	4			1	5	\$0D	\$0A

<sup>1</sup>Valid bus addresses are 01 through 15 with 13=GRAFIK Eye, 14=Serena, and 15=Relay cards.

<sup>2</sup>Valid control addresses are 1-4 for dimmers/switches and 1-8 for GRAFIK Eyes, Serenas, and Relays.

<sup>3</sup>Valid levels for dimmers are 00 (off) through 31 (full on). Valid states for switches and relays are 00 (off) and 31 (on). Valid states for GRAFIK Eyes are 00 (off) through scene 16. Valid levels for Serena are 0000 through 4095. The state field is two bytes for all devices except Serena which requires four bytes.



## Control Commands

1. Turn on device 5 of panel 1 to 26% light intensity with a 15 second fade rate.

Text	N	0	0	0	4	0	8	1	0	5	CR
Hex	4E	30	30	30	34	30	38	31	30	35	0D

2. Turn off devices 2 through 6 of panel 5 with a fade rate of 2 minutes.

Text	N	0	0	0	7	0	0	5	0	2	>	5	0	6	CR
Hex	4E	30	30	30	37	30	30	35	30	32	3E	35	30	36	0D

3. Simulate pressing button 3 of keypad number 4 connected to panel number 1.

Text	B	1	0	4	0	3	CR
Hex	42	31	30	34	30	33	0D

4. Set the Real Time Clock to 9:32 am on Tuesday, Jan. 18th, 1994.

Text	C		0	1	/	1	8	/	9	4		0	9	:	3	2		3	CR
Hex	43	20	30	31	2F	31	38	2F	39	34	20	30	39	3A	33	32	20	33	0D



## Examples

### Monitor Commands

1. What is the status of device 5 connected to panel 1?

Text	?	1	0	5	CR
Hex	3F	31	30	35	0D

Response: Device 5 connected to panel 1 is on at 52% light intensity.

Text	!	1	0	5	1	6	CR
Hex	21	31	30	35	31	36	0D

2. Is the system in Vacation playback mode?

Text	?	0	0	V	CR
Hex	3F	30	30	56	0D

Response: The system is in Vacation playback mode.

Text	!	0	0	V	3	1	CR
Hex	21	30	30	56	33	31	0D

3. What are the status of device 2 of panel 5 through device 25 of panel 6?

Text	?	5	0	2	>	6	2	5	CR
Hex	3F	35	30	32	3E	36	32	35	0D

Response: GRAFIK Eye #4 (device #60) is at preset 2.

Text	!	1	6	0	0	2	CR
Hex	21	31	36	30	30	32	0D

4. What is the status of keypad 1 connected to panel 3?

Text	Q	3	0	1	CR
Hex	4C	33	30	31	0D

Response: Keypad 1 connected to panel 3 is enabled.

Text	@	3	0	1	+	+	CR
Hex	40	33	30	31	2B	2B	0D

5. What is the status of the LEDs for keypad 4 connected to panel 1?

Text	I	1	0	4	CR
Hex	49	31	30	34	0D

Response: LED for button 3 of keypad 4 connected to panel 1 is on.

Text	L	0	0	0	4	CR
Hex	4C	30	30	30	34	0D



## Real Time Responses

1. Keypad button 3 of keypad 4 connected to panel 1 was pressed.

Text	K	1	0	4	0	3	+	CR	LF
Hex	4B	31	30	34	30	33	2B	0D	0A

2. The dimmer on bus 2, control address 3 of panel 5 has changed to 48% intensity.

Text	D	5	0	2	3	1	5	CR	LF
Hex	44	35	30	32	33	31	35	0D	0A

3. The GRAFIK Eye on bus 13, control address 3 of panel 6 has changed to scene 5.

Text	D	6	1	3	3	0	5	CR	LF
Hex	44	36	31	33	33	30	35	0D	0A

4. The Serena on bus 14, control address 6 of panel 1 has changed to location 3125.

Text	D	1	1	4	6	3	1	2	5	CR	LF
Hex	44	31	31	34	36	33	31	32	35	0D	0A

5. LED for button 10 of keypad 1 connected to panel 2 has turned on (no other LEDs on that keypad are on).

Text	L	2	0	1	0	2	0	0	CR
Hex	4C	32	30	31	30	32	30	30	0D

6. Vacation playback mode has turned on.

Text	C	V	+	CR	LF
Hex	43	56	2B	0D	0A

7. Security mode has turned on.

Text	C	S	+	CR	LF
Hex	43	53	2B	0D	0A



## HomeWorks Intensity Codes

HomeWorks dimmers use codes 00 to 31 to represent light level intensities. The following table converts this code into a percentage of light at full intensity. Switching devices respond to either 0% (00) or 100% (31). All other intensities are ignored.

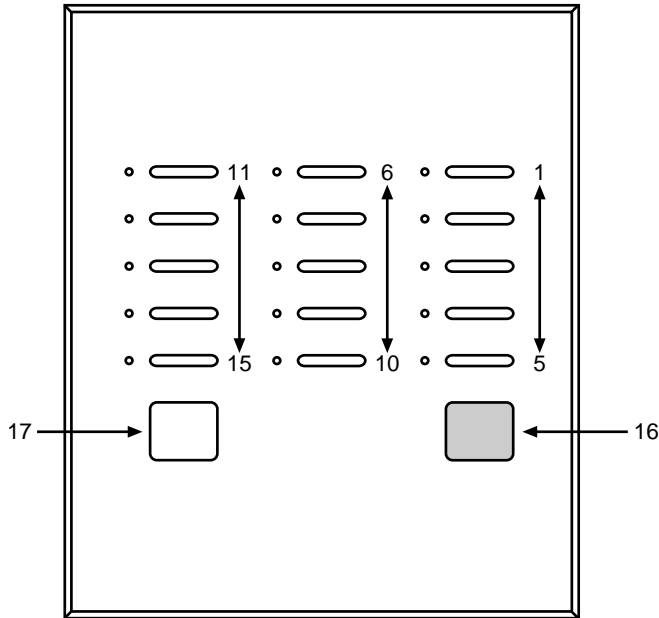
Code	Intensity % full	Code	Intensity % full
00	0	16	51
01	3	17	54
02	6	18	58
03	9	19	61
04	12	20	64
05	16	21	67
06	19	22	70
07	22	23	74
08	25	24	77
09	29	25	80
10	32	26	83
11	35	27	87
12	38	28	90
13	41	29	93
14	45	30	96
15	48	31	100





## HomeWorks Keypads

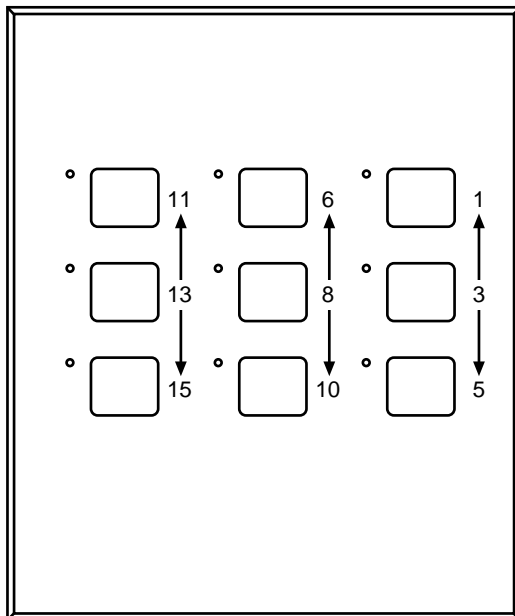
Shown below is an HWV-KP15 Keypad.



**Notes:**

- The large buttons are always numbered 16 and 17.
- A five button control does not use buttons 6 through 15.
- A ten button control does not use buttons 11 through 15.

Shown below is an HWV-KP-LB9 Keypad.



**Note:** A six button control does not use buttons 11, 13, and 15.



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## HOMWORKS RS-232 PROTOCOL

### CHANGES FROM PREVIOUS REVISIONS

#### Revision 1 - Initial Release

#### Revision 2

- The \* character was eliminated from the protocol. This eliminates what was called the “and” option in the last revision. Only one command should be issued at a time and it must be terminated with a carriage return (ASCII 13).
- Load and Save commands were added to the protocol. These commands are for saving or loading the HomeWorks configuration over the RS-232 port. The user can save this information on disk for backup purposes.
- These changes require version RSPNL4-4 or later of the software on the bottom board of the microboard assembly. The software version is either marked on the Lutron tag on the left side of the microboard assembly or on the EPROM itself on the bottom board.

#### Revision 3

- The “G” command was installed to control GRAFIK Eye units.
- The Load and Save functions were eliminated from this document. A different document has been created for these functions.
- The conversion factor for calculating a device’s RS-232 number is:
  - for dimmers: device # = (bus address - 1) \* 4 + control address
  - for relay cards: device # = 48 + card slot position
  - for GRAFIK Eyes: device # = 56 + control address
  - for Serenas: device # = 64 + control addresswhere the control address is given on the microboard subassembly LED displays when the status of that device is changed.
- Real time feedback has been enhanced:
  - Keypad buttons now send messages when they are pressed and when they are released.
  - When any device in the system changes state or level, a detailed message is generated.
  - When a command is issued from the telephone interface a message is generated. See the “K” real time response.
  - When a LED on a keypad changes state a message is generated.
- New commands have been added to set and read the Real Time Clock of a panel.
- The “I” and “L” commands have been modified to control all of the LEDs of a keypad with a single command.



## Revision Updates

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### Revision 4

- The “I” and “TIME” command responses were corrected.

### Revision 5

- The “A” command was installed to adjust the intensity levels of dimmers and GRAFIK Eyes that are attached to a HomeWorks keypad button.

### Revision 5.1

- Control command and timing overview added.
- Timing requirement changed to 0.8 seconds for all commands except “A,” which is 0.6 seconds.

### Revision 6

- Version command added.
- “?” command response changed for Serenas to respond with a four-character position.

### Revision 7

- Real time messages enable/disable command added.
- Real time messages enable/disable query added.
- Timing requirement for the “A” command changed to 1 second.

### Revision A of Manual

- Reformatted document.
- Added large button keypad HWV-KP-LB9.
- Added “Device Number Conversion Tables.”

## **Technical and Sales Assistance**

If you need assistance, call the toll-free

***Lutron Technical Assistance Hotline:***

(800) 523-9466 (U.S.A., Canada, and the Caribbean),

other countries call: (610)-282-3800

Fax: (610) 282-3090

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Coopersburg, PA 18036-1299 U.S.A.  
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