



MilliKey 1000 Hz USB Button Boxes

MilliKey Technical Specifications

Supported Operating Systems	Windows 10 / 7, macOS, and Linux.																		
Supported Experiment Software	Keyboard Events: Any USB Serial: Any software that allows reading / writing to a Serial port.																		
USB Connection Type	Full Speed USB 2 Type A (compatible with USB 3) Use of a USB C port requires a USB C to USB 2 adapter (sold separately).																		
Max. Simultaneous Buttons Pressed	8																		
USB Keyboard Event Sampling Rate	1000 Hz (1000 per second)																		
USB Serial Sampling Rate	1000 Hz (1000 per second)																		
Internal Button Scan Rate	The internal frequency at which button inputs are read and processed is based on the number of buttons: <table border="1"> <thead> <tr> <th># Buttons</th> <th>Button Scan Rate</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>80 kHz (80,000 per second)</td> </tr> <tr> <td>4</td> <td>70 kHz (70,000 per second)</td> </tr> <tr> <td>6</td> <td>60 kHz (60,000 per second)</td> </tr> <tr> <td>8</td> <td>50 kHz (50,000 per second)</td> </tr> </tbody> </table>	# Buttons	Button Scan Rate	2	80 kHz (80,000 per second)	4	70 kHz (70,000 per second)	6	60 kHz (60,000 per second)	8	50 kHz (50,000 per second)								
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Button Release Debounce Interval	15 millisecond (configurable)																		
Button Keyboard Mappings	Each MilliKey button can be associated with one of the following keys: Standard Keys A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12 ` ~ ! @ # \$ % ^ & * () _ + = { } \ ; ' " , . / RIGHT, LEFT, UP, DOWN, PAGE_UP, PAGE_DOWN ENTER, ESC, BACKSPACE, TAB, SPACE, PRINTSCREEN, PAUSE, INSERT, HOME, DELETE, END NUM_1 - NUM_9, NUM_SLASH, NUM_ASTERIX, NUM_MINUS, NUM_PLUS, NUM_ENTER, NUM_PERIOD Modifier Keys SHIFT, CTRL, ALT, or GUI/MENU Note: 1. Each button must be assigned to a unique key. 2. Up to six buttons can be assigned to Standard keys. 3. On the MilliKey LH-8, two of the eight buttons must be assigned to Modifier key. Default Button to Key Mapping <table border="1"> <thead> <tr> <th>Button</th> <th>Key</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> </tr> <tr> <td>3</td> <td>3</td> </tr> <tr> <td>4</td> <td>4</td> </tr> <tr> <td>5</td> <td>5</td> </tr> <tr> <td>6</td> <td>6</td> </tr> <tr> <td>7</td> <td>SHIFT</td> </tr> <tr> <td>8</td> <td>CTRL</td> </tr> </tbody> </table>	Button	Key	1	1	2	2	3	3	4	4	5	5	6	6	7	SHIFT	8	CTRL
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8	CTRL																		
Button Press Event Delay₁	1 millisecond																		
Button Release Event Delay₁	Debounce milliseconds (default: 15 msec) after the physical release event is first detected.																		

USB Serial Interface	Windows 10 and macOS automatically register each MilliKey as a USB Serial device. Windows 7 requires a USB Serial driver to be installed. Download it thanks to PJRC. Linux needs UDEV rule change. Download it thanks to PJRC.						
Upgradeable Firmware	Yes, using LabHackers Device Manager.						
MilliKey DeLux Light Sensor	<table> <tr> <td>Sampling Rate</td> <td>10,000 Hz</td> </tr> <tr> <td>AD Resolution</td> <td>12 bit (output as 16 bit)</td> </tr> <tr> <td>USB Event Delay</td> <td>1 msec</td> </tr> </table>	Sampling Rate	10,000 Hz	AD Resolution	12 bit (output as 16 bit)	USB Event Delay	1 msec
Sampling Rate	10,000 Hz						
AD Resolution	12 bit (output as 16 bit)						
USB Event Delay	1 msec						
Case Size	See MilliKey Model Comparision Chart.						
Button Size							
Button Colors							
Button Count							
Case Material	ABS Plasic (Black)						
*Button Press Event Delay = Time OS Generates Event minus Time of Physical Button Press.							
**Button Release Event Delay = Time OS Generates Event minus Time of Physical Button Press.							
<p>¹ Computer Configuration can impact the ability of your computer to read any USB HID device at 1000 Hz. This can potentially result in increased event latencies (higher mean and stdev). Regardless of the keyboard device or experiment software being used, it is the experiment software that is responsible for accurately time-stamping the keyboard events as they are received. Therefore, the actual accuracy of the keyboard press / release times can not be known without a way to actually test it. MilliKey is the first, and only, response box with the ability to easily test both of these potential sources of error, without the need for any extra hardware. MilliKey Timing Validation can provide sub-millisecond accurate information on: a) the actual latency of MilliKey keyboard events on the computer being tested and b) the accuracy of your experiment softwares' time-stamping of MilliKey keyboard events.</p>							
Contact us if you have questions about our products/services, or to place an order:							
LabHackers Research Equipment 8 Redwood Ave. Halifax, Nova Scotia, Canada B3P1Y4							
Specifications are subject to change without notice.							