# CedarGrove\_Clock\_Builder

A collection of CircuitPython classes for supporting clock and calendar display functionality. The classes support the following features:

* Operates on Adafruit PyBadger, FeatherM4Express, and ItsyBitsyM4Express host platforms,
* Compatible with CircuitPython 5.0.0 and associated library distribution,
* Numeric and text year, month, day-of-month (date), hour, minute time representation,
* 12 and 24-hour display modes with AM/PM indicator (where permitted by the display),
* Host platform battery monitoring (where permitted by the host platform and display),
* Selectable automatic Daylight Savings Time adjustment,
* Message text display,
* Time setting functionality via integral host platform buttons, USB-based REPL, or rotary encoder,
* Selectable clock “tick” sound and display indicator, and
* Display brightness control.

Clock\_Builder is a collection of classes that can be used for standalone or imbedded clock and calendar timekeeping functionality. The classes accept and produce Python structured time objects. Clock parameters can be read or set as values.

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## Implementation Notes

### Hardware:

* Adafruit PyBadge, EdgeBadge
* Adafruit Feather M4 Express
* Adafruit ItsyBitsy M4 Express

### Software and Dependencies:

* Adafruit CircuitPython libraries:
  + simpleio
  + adafruit\_ht16k33 (for LED displays)
  + adafruit\_display\_text.label (for PyBadge display)
  + adafruit\_bitmap\_font (for PyBadge display)
  + adafruit\_imageload (for PyBadge display)
  + adafruit\_pybadger (for PyBadge features)
* Fonts, graphics, and sound files:
  + OpenSans-9.bdf (for PyBadge display)
  + Helvetica-Bold-36.bdf (for PyBadge display)
  + batt\_sprite\_sheet.bmp (for PyBadge display)
  + tick\_soft.wav (for PyBadge sound output)
* Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

## Clock\_Builder Classes:

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| *class* bigled\_7x4\_display. BigLed7x4Display(*\**, *timezone=”Pacific”, hour\_24=False, auto\_dst=True,*  *sound=False, brightness=1.0, debug=False*) |

Class representing the cedargrove\_clock\_builder.bigled\_7x4\_display. Tested with the Adafruit Feather M4 Express host platform and 1.2-inch 7-Segment Display (PID #1265).

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| *class* led\_7x4\_display.LED7x4Display(*\**, *timezone=”Pacific”, hour\_24=False, auto\_dst=True,*  *sound=False, brightness=1.0, debug=False*) |

Class representing the cedargrove\_clock\_builder.led\_7x4\_display. Untested.

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| *class* led\_7x14\_display.LED7x14Display(*\**, *timezone=”Pacific”, hour\_24=False, auto\_dst=True,*  *sound=False, brightness=1.0, debug=False*) |

Class representing the cedargrove\_clock\_builder.led\_7x14\_display. Tested with the Adafruit Feather M4 Express host platform and Quad 0.54-inch AlphaNum FeatherWing (PID #3127).

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| *class* pybadge\_display.PyBadgeDisplay(*\**, *timezone=”Pacific”, hour\_24=False, auto\_dst=True,*  *sound=False, brightness=1.0, debug=False*) |

Class representing the cedargrove\_clock\_builder.pybadge\_display. Compatible with the Adafruit PyBadge and EdgeBadge host platforms.

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| *class* repl\_display.REPLDisplay(*\**, *timezone=”Pacific”, hour\_24=False, auto\_dst=True,*  *sound=False, brightness=1.0, debug=False*) |

Class representing the cedargrove\_clock\_builder.repl\_display. Compatible with the Adafruit PyBadge, EdgeBadge, ItsyBitsy M4 Express, and Feather M4 Express host platforms.

### Shared Class Parameters:

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| **Parameters:** | * **timezone** – The input range minimum. Can be any positive or negative value, smaller or larger than the input range maximum. Input range minimum and maximum values cannot be equal. Defaults to 0. * **hour\_24** – The input range maximum. Can be any positive or negative value, smaller or larger than the input range minimum. Input range minimum and maximum values cannot be equal. Defaults to 65535. * **auto\_dst** – The output index minimum. Can be any positive or negative value, smaller or larger than the output index maximum. Output index minimum and maximum values cannot be equal. Defaults to 0. * **sound** – The output index minimum. Can be any positive or negative value, smaller or larger than the output index maximum. Output index minimum and maximum values cannot be equal. Defaults to 65535. * **brightness** – The size of an output index slice. Can be any positive or negative value other than zero. Defaults to 1.0. * **debug** – Turn on debug printout. Boolean value. Defaults to False. |

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| show(*datetime*) |

The primary function of the PyBadgeDisplay class. Displays the date, time, and clock settings.

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| **Parameters:** | **datetime** – The Python structured time input value to display. No default value. |

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| set\_datetime(*xst\_datetime*) |

Provides manual input of time using the PyBadge buttons and display. Accepts only Python structured Standard Time (xST) value and returns an adjusted Daylight Saving Time (xDT) structured time value, sound flag, and “something was changed” status flag.

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| **Parameters:** | **xst\_datetime** – The Python structured time input value express as Standard Time (xST). No default value. |

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| tick(*in\_max=65535*) |

Play tick sound (if supported on the host platform).

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| **Parameters:** | **in\_max** – The input range maximum. Can be any positive or negative value, smaller or larger than the input range minimum. Input range minimum and maximum values cannot be equal. Defaults to 65535. |

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| message(*text=””*) |

Place message in clock message area and play a notification sound (if supported on the host platform).

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| **Parameters:** | **out\_min** – The index output minimum. Can be any positive or negative value, smaller or larger than the output index maximum. Output index minimum and maximum values cannot be equal. Defaults to 0. |

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| zone(*timezone=”Pacific”65535*) |

Changes the clock's time zone. Default is Pacific.

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |

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| hour\_24(*dst=False*) |

Changes the display for 24-hour or 12-hour AM/PM formatting. Default is 12-hour (False).

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |

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| dst(*dst=False*) |

Time is US DST. Default is Standard Time (False).Changes the default output index maximum to a new value.

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |

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| zone(*timezone=”Pacific”*) |

Changes the default output index maximum to a new value.

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |

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| zone(*timezone=”Pacific”*) |

Changes the default output index maximum to a new value.

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |

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| zone(*timezone=”Pacific”*) |

Changes the default output index maximum to a new value.

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |

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| zone(*timezone=”Pacific”*) |

Changes the default output index maximum to a new value.

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |

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| battery(*volts=0*) |

Display the battery icon proportional to the battery level.

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| **Parameters:** | **out\_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535. |