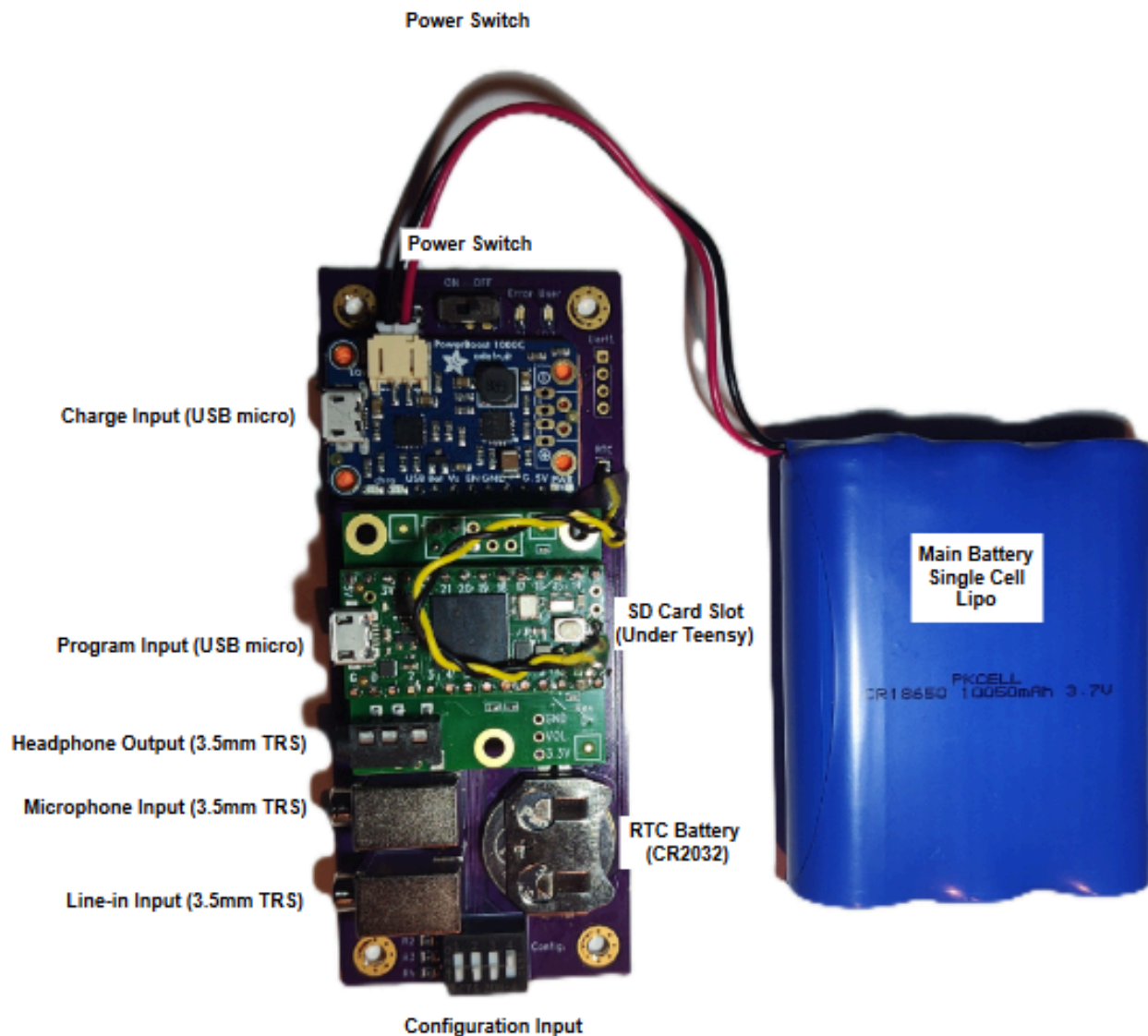


West Lab Hydrophone Data Logger

The West Lab Hydrophone Data Logger uses a Teensy 4.0 and the Teensy Audio shield to periodically record audio data. The Teensy is powered using an Adafruit Powerboost-1A and a 10Ah battery. The 4 dip switches on the data logger allow for 4 gain/level* settings, input selection, and mode selection.

* Gain applies to the amplified microphone input. Level refers to the peak to peak voltage of the line-in signal.



Teensy Recommended SD Card

"Most SD cards are optimized for sequential access, where a camera or camcorder reads or writes a single large file. All SD cards work well for playing a single WAV file at a time.

Cards with an "A1" or "A2" rating are likely to have better performance for use with Teensy."



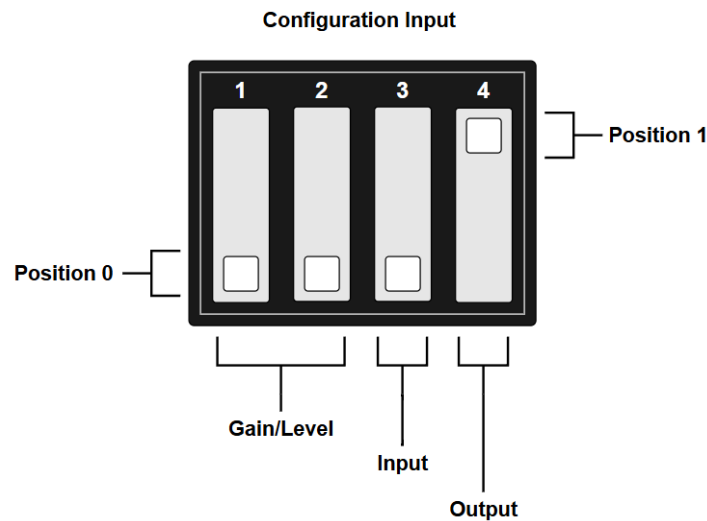
How to use

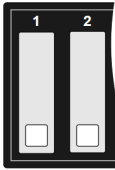


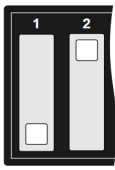
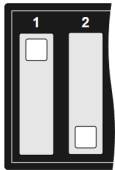


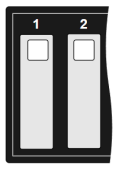
1. Ensure the power switch in the off position.
2. Ensure SD card is inserted into its slot.
3. Ensure the main battery is connected and charged.
4. Ensure RTC battery has charge.
5. Connect Audio device/s.
6. Set the configuration input to the desired configuration(Instruction below).
7. Set the power switch to on position.
8. Observe user and error LEDs for device status.

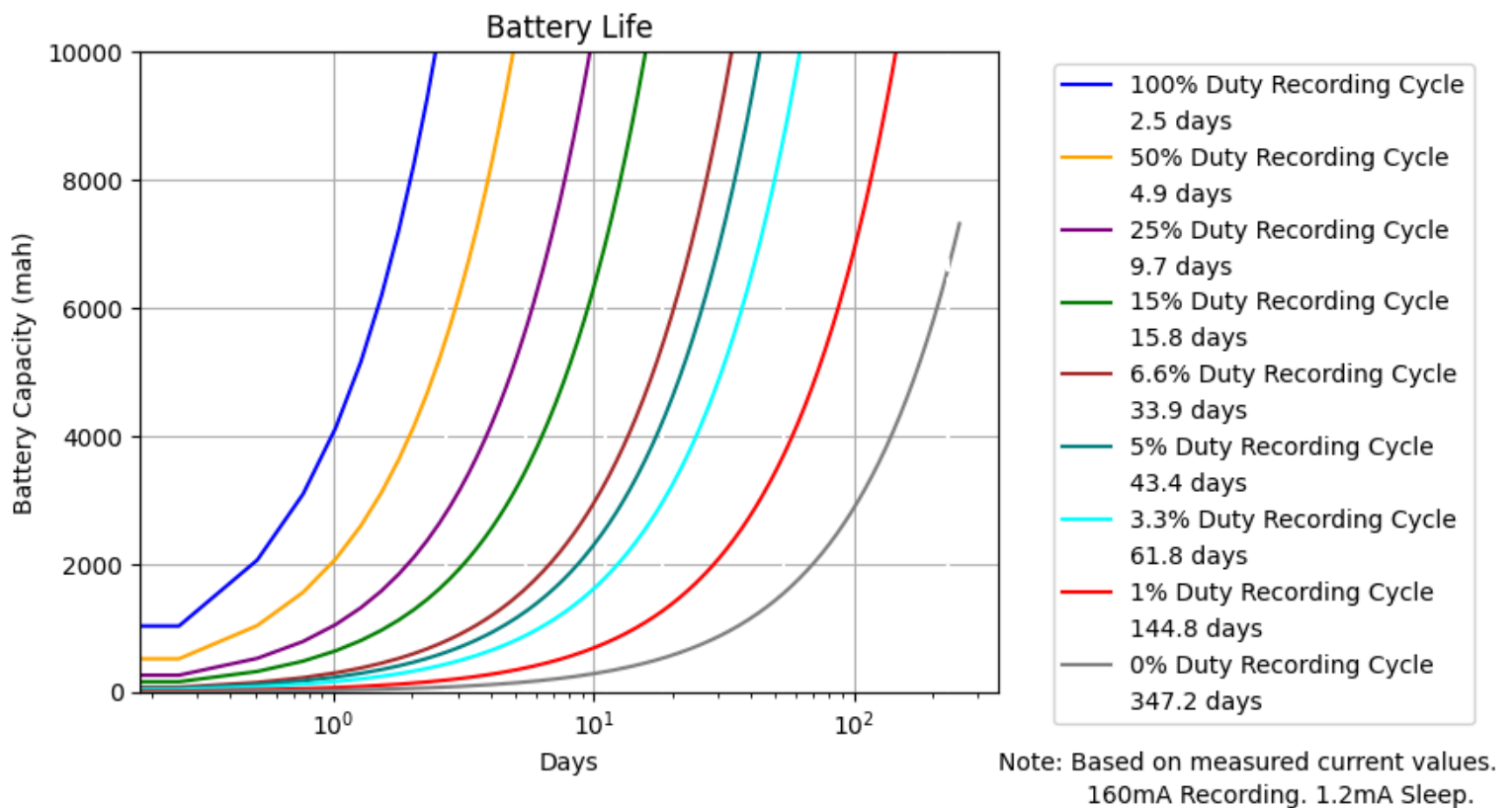
Configuration

Hardware

The device is configured at boot. To configure the device first set the power switch to the off position. Next set the configuration input switches to the desired positions. Last, set the power switch to the on position. The device's user LED will blink based on the configuration being set. First 1-4 blink pattern is gain/level setting. Followed by a one second delay then the next 1-2 blink pattern in the input selection. Finally the user LED will be off for logging mode or solid on for pass through mode.



| Gain/Level | | | Input | | | Mode | | |
|---|----------|------------------|---|----------|-------------|---|----------|--------------|
| Switch Position | User LED | Description | Switch Position | User LED | Description | Switch Position | User LED | Description |
|  | 1 blinks | 0db / 0.24V p-p |  | 1 blinks | Microphone |  | none | Logging |
|  | 2 blinks | 20db / 0.56V p-p | | | | | | |
|  | 3 blinks | 30db / 1.33V p-p |  | 2 blinks | Line-in |  | Solid | Pass Through |
|  | 4 blinks | 40db / 3.12V p-p | | | | | | |



Software

There are two parameters that control the duty cycle of the data loggers schedule. RECORD_PERIOD and IDLE_PERIOD are defined near the top of the sketch. Both use seconds at their unit. The Arduino IDE is used to recompile when there parameters need changed.

```
// Timing parameters, seconds
#define RECORD_PERIOD 60 //60 = 1 min
#define IDLE_PERIOD 840 //840 = 14min
```

The RTC is also set to the time of the system used to program the Teensy. This time will persist as long as the con cell battery is attached and working.

The Teensy is flashed using the Arduino IDE.

Firmware available at the link:

(https://github.com/mmontee/West_Lab_Hydrophone_Data_Logger/blob/main/Software/West_Lab_Hydrophone_Data_Logger.ino)

More information about programming Teensy with the Arduino IDE

(<https://www.pjrc.com/teensy/teensyduino.html>)

Output Data

The data loggers output if a .RAW file type. The below python script can be used to convert the .RAW files into .wav file types.

Output file name encoding:

RECORD.<input_type>.<gain_level>-<year>-<month>-<day>-<hour>-<minute>-<second>-.RAW

Input_type: 0 = mic, 1 = line

Gain_level: 0 = 40db or 0.24 Vpp, 1 = 20db or 1.33 Vpp, 2 = 30db or 0.56 Vpp, 3 = 0db or 3.12 Vpp

Issues

- When the teensy is in the low power sleep state it can only be brought out of the sleep state in one of two ways. First the normal method of the RTC timer expiring. Second is to short the "On/Off" pin on the teensy to ground(GND).

