BCDClockLite

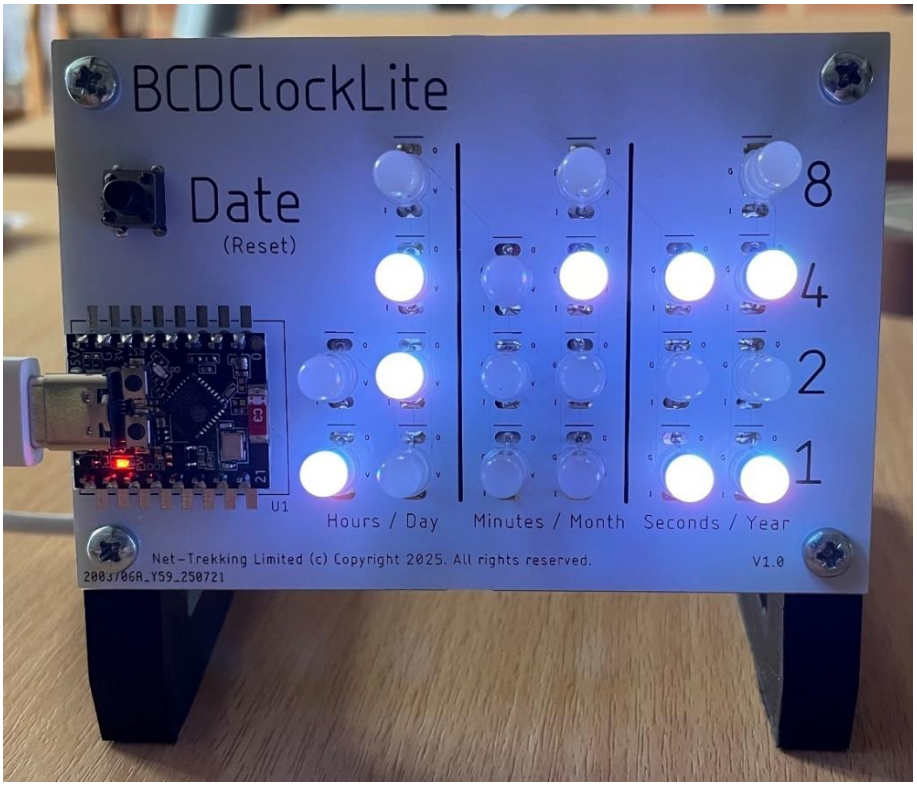
Net-Trekking Limited

Version 1.3 Rev C

http://www.Net-Trekking.com

"Every Geek should have one!"

Simple, easy build kits following a brutalist style that every geek should have.



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Contents

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1. Introduction

BCDCLockLite is Binary Coded Decimal Clock with a minimalistic / brutalist architecture look. The display is comprised of 20 multi-coloured LEDs driven by an ESP32C3 supermini. The clock is configured via a simple web page interface accessible from a PC / Mac / iPhone / Android / etc.

Featuring:

- Configurable via a self-hosted web page.
- Configurable time-zone.
- Configurable LED colours.
- Configurable LED brightness.
- Configurable sunset / sunrise dimming of the LEDs.
- Configurable ships radio room clock mode.
- USB powered.

2. Assembly

Assembly is relatively easy and will probably take no more than an hour.

2.1. Required Tools

To assemble the kit, you will require the following tools:

Tool	Comment
Small soldering iron	
Solder	See safety notes above.
Wire cutters	
Small cross head screwdriver	

2.2. Parts List

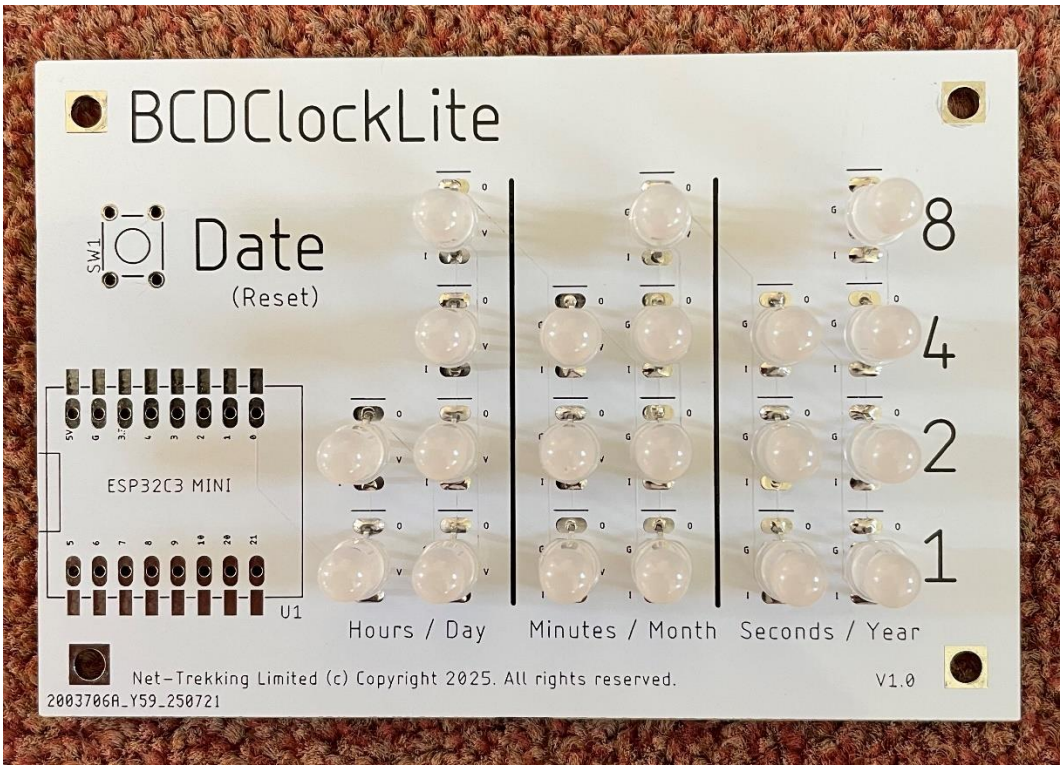
Part	Quantity	Comment
ESP32 C3 SUPER MINI	1	
LEDs WS2812B APA106-	20	
PCB	1	
Tactile Switch	1	
Stand – Right hand Side	1	
Stand – Left hand side	1	
M3 12MM BOLT	4	
M3 NUT	4	

USB A – USB C cable	1	

2.3. Assembly Steps

2.3.1. LED Array

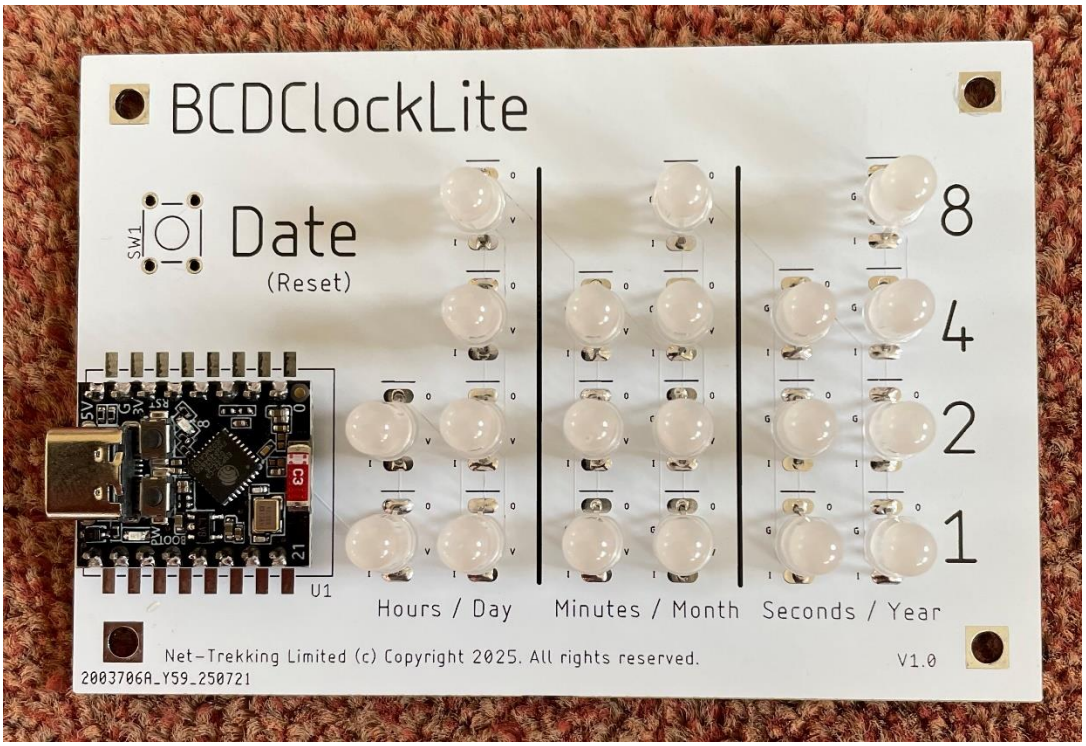
The LED array needs to look smart; all the LEDs need to be set at the same hight and form pleasing rows and columns when viewed from the side. To achieve this, it is recommended to insert all LEDs into the PCB. The flat edge of each LED should be at the top paired with the small horizonal line on the PCB. Then solder the top pin of each LED. Once complete recheck the LED hights, row, and column alignment. Make any required adjustments and then solder the bottom pin of each LED. Check the alignments and make any adjustments before finally soldering all the LED pins. Once complete the PCB will look like:



2.3.2. ESP32 C3 Header Pins and ESP32

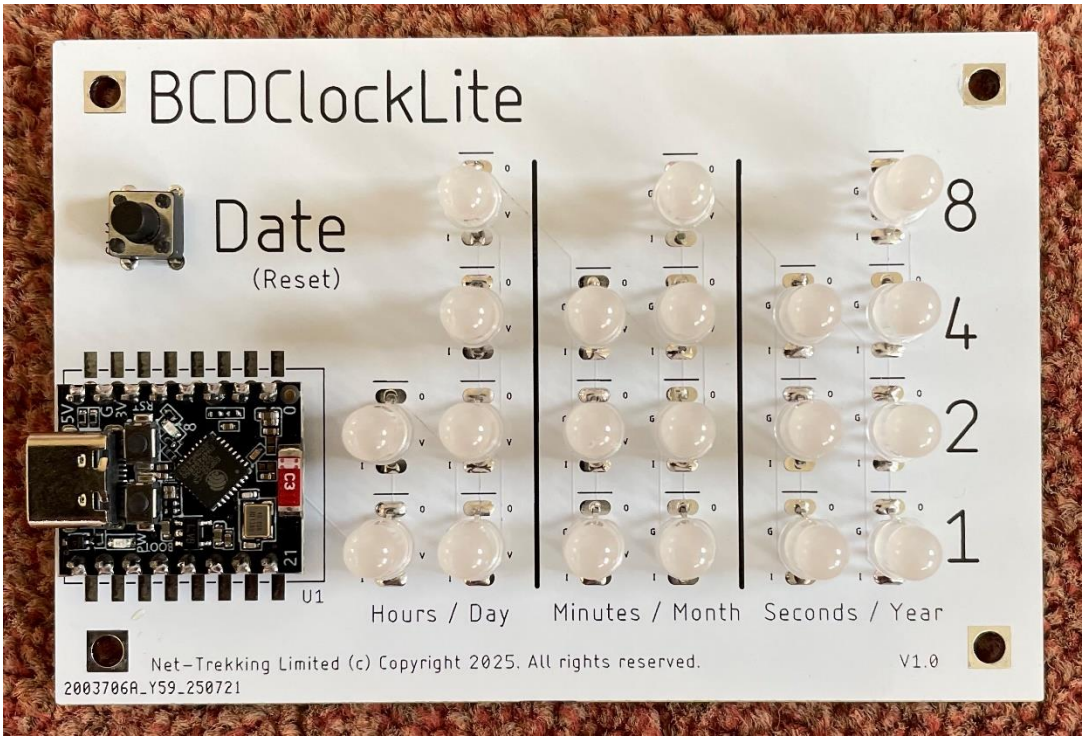
Next insert the two rows of header pins for the ESP32 C3 and solder them home. Solder one pin of each strip and make sure the pins are flat against the PCB before completing all the soldering. The long pins go through the PCB. Place the ESP32 C3 on the pins and apply solder. Once complete the PCB will look like:

BCDClockLite



2.3.3. Tactile Switch

Insert the tactile switch and apply solder. Once complete the PCB will look like:



2.3.4. Attach the Stand

Each side of the stand is attached with two 12mm bolts. Before attaching to the PCB put each bolt in a hole, apply the nut, and tighten up. This should pull the but into the leg so that it sits flush with the leg surface. The right-hand side has the cutout / cable restraint in the lower limb.

3. Settings

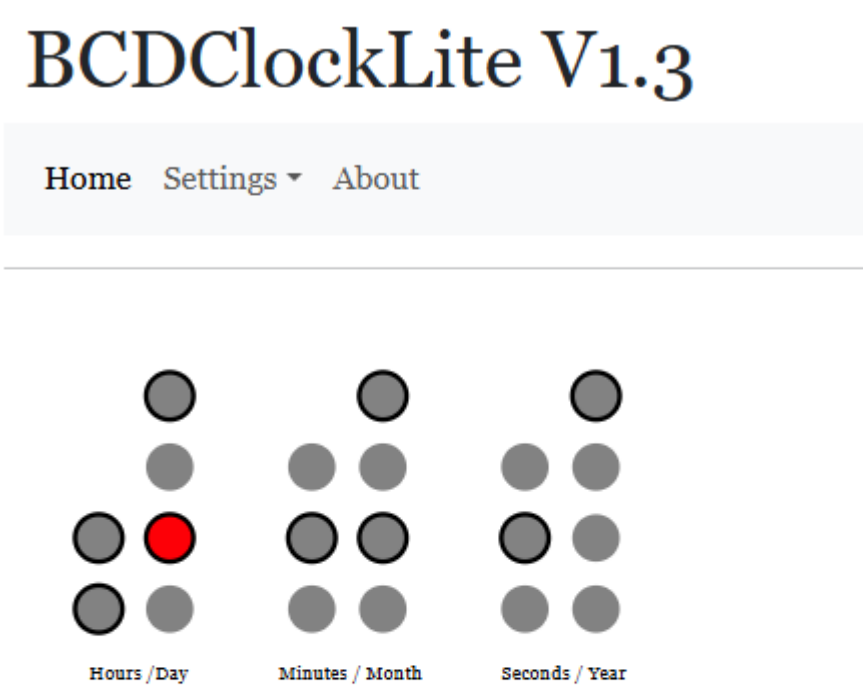
3.4. Basic Settings

Settings are changed via a simple webpage served up by the ESP32 C3. Insert the USB cable and plug the device into a power source. The LEDs will cycle through a power up sequence and then display a diagnostic pattern – see below for complete list. At this point, an access point called BCDClockLite should be visible to a phone or Wi-Fi enabled personal computer. Connect to the access point and browse to:

http://192.168.4.1

You will see the following page:

BCDClockLite



When configured correctly this page will reflect the active state of the LED array. Though not purposely designed as an alternate interface to BCDClockLite, it may be used as one.

Clicking on the Settings | Wi-Fi Settings menu option will take you to the following page:

The main fields of interest here are the Wi-Fi SSID and Wi-Fi Passwords fields. These must be populated to allow the device to connect to a Wi-Fi connected to the Internet.

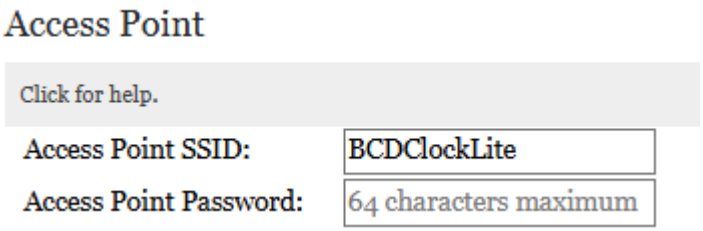
When complete, hit the update button located at the bottom of the screen.

There may be a short delay after which the device will start to display the current time. The access point may be dropped at this point and re-connection to the access point may be required.

3.5. Advanced Settings

Selecting Settings | Clock Settings takes to page where further options may be configured.

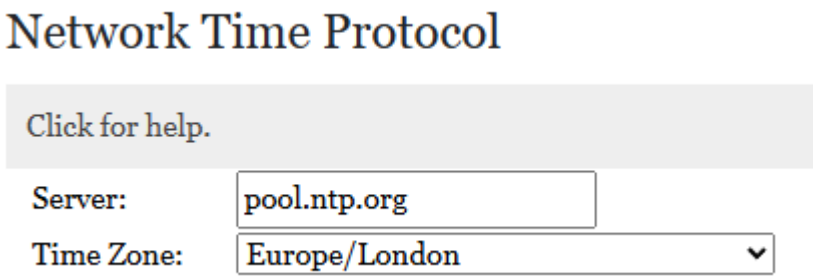
3.5.1. Access Point



The access point related controls can be used to control the following:

- Access Point SSID - The SSID associated with this device. If multiple BCDClockLite devices exists on the same network, then it be necessary to give each device aa unique name.
- Access Point Password - The password associated with the device SSID. The field can be left blank if password access is not required.

3.5.2. Network Time Protocol

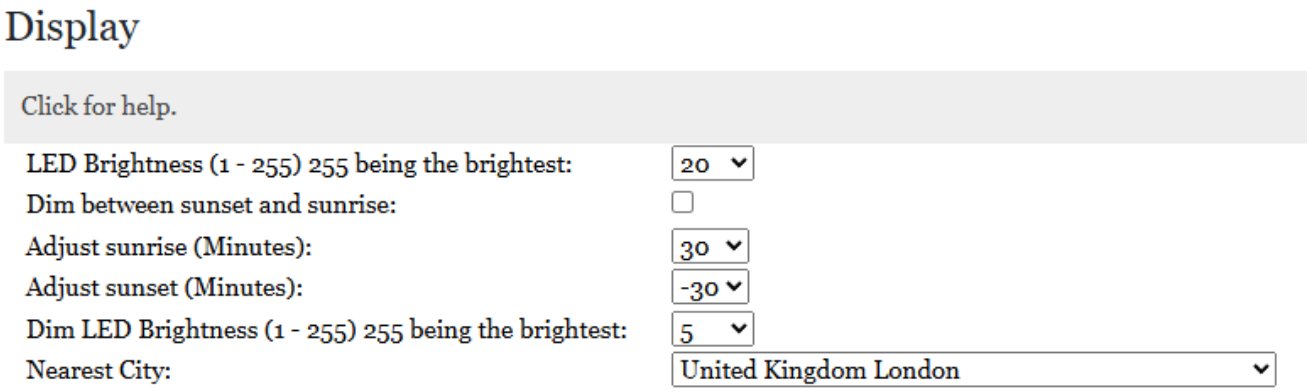


The network time protocol related controls can be used to control the following:

- Server - The URL, or IP address, of the NTP server to be used.
- Time Zone - Set to the time zone where the device resides.

3.5.3. Display

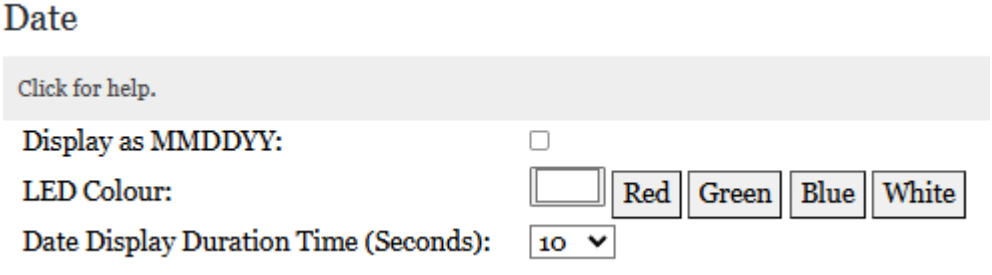
BCDClockLite



The display controls can be used to control the following:

- LED Brightness - This controls the brightness of the LED display. This ranges from 1 to 255 with 255 being the brightest. Note that higher values have a higher current drain from the USB power supply. Some USB sockets, mainly older ones, may not be able to provide the necessary power and may cause off behaviour.
- Dim between sunset and sunrise - This controls the brightness of the LED display during hours of darkness.
- Adjust sunrise (Minutes) - This allows a few minutes to be added to the sunrise time so that the display brightens a few minutes after sunrise.
- Adjust sunset (Minutes) - This allows a few minutes to be subtracted from the sunset time so that the display dims a few minutes before sunrise.
- Dim LED Brightness - This controls the brightness of the LED display while dim. This ranges from 1 to 255 with 255 being the brightest.
- Nearest City - A latitude and longitude are required in order to calculate sunrise and sunset times. This control provides a list of major cities around the World from which the latitude and longitude is derived.

3.5.4. Date



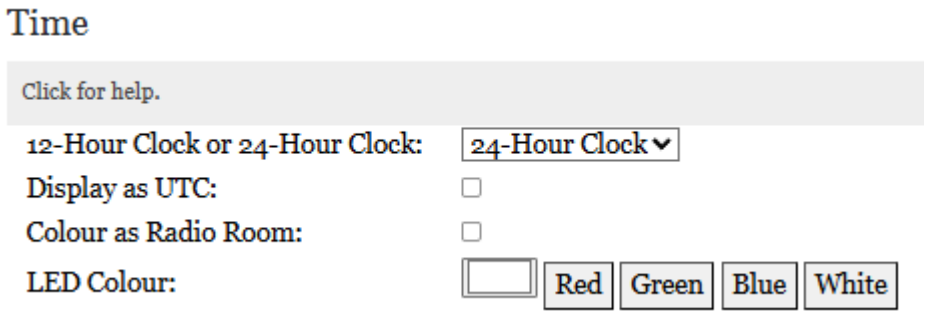
The date related controls can be used to control the following:

- Display as MMDDYY - controls the format of dates. When check the date will be displayed as MMDDYY. The default is DDMMYY. Note that the year is limited to 2079. Beyond this point the year will be displayed incorrectly.

- LED Colour - controls the colour of the LED's used to display the date. The default is white. Simple colours red, green, blue, or white can be selected by simply clicking on the button. The chosen colour will be displayed in the box at the start of the line. If the box is clicked on, then the browser built-in colour picker will be displayed to allow any desired colour to be chosen.

- Date Display Duration Time - controls how long, in seconds, the date is displayed for before returning to displaying the time. The default is 10 seconds.

3.5.5. Time

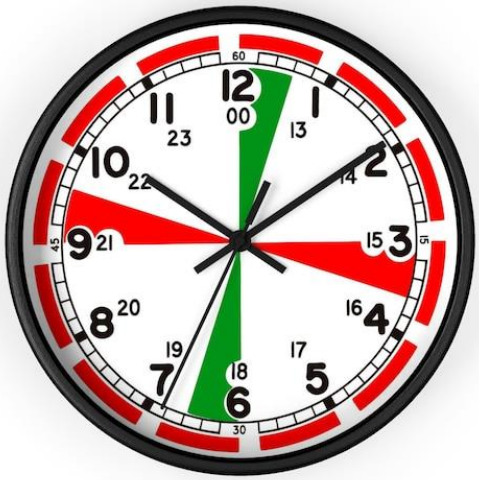


The time related controls can be used to control the following:

- 12-Hour Clock or 24-Hour Clock - This controls whether time is displayed is 12-Hour clock format or 24-Hour clock format. The default is 24-Hour clock format.

- Display as UTC - If true the device will always show UTC time. The default is false.

- Colour as Radio Room – Radio room clocks are specialized clocks used on ships, featuring a classical design with green and red radio sectors on the dial. These colours indicate specific time periods when only emergency radio messages are permitted, contributing to safe and efficient maritime communication. The clocks are designed to support international maritime regulations for radio communication protocols. The clocks typically look like that below. When checked the colour used to time display the time will reflect the pattern shown – green for the minutes 0 – 4, 30 – 34, and red for minutes 15 – 18, 45 – 48.



- LED Colour - controls the colour of the LED's used to display the time. The default is white. Simple colours red, green, blue, or white can be selected by simply clicking on the button. The chosen colour will be displayed in the box at the start of the line. If the box is clicked on, then the browser built-in colour picker will be displayed to allow any desired colour to be chosen.

4. Update

Software updates are made available via the website http://www.Net-Trekking.com. Simple follow the Download menu option and chose the product for which the update is required.

You will need to download the esptool.exe and the binary (.bin) file for the latest software. Place both files in the same folder and open a command window and move into that folder.

Plug the device plugged into a USB port.

The ESP32C3 needs to be in Bootloader mode. To enter this mode, you will need to locate the boot switch and reset switch on the ESP32C3. These are simple momentary push switches located to the right is the USB socket. The boot switch is the lower of the two. Push and hold the boot switch, push and release the reset switch, and then release the boot switch.

Now execute the following command in the command window.

./esptool.exe --chip esp32c3 --baud 921600 --before default_reset write_flash 0x0 CWSprintLite_V0.2_PCB_V1.0.bin

Ensure that the name of the .bin file matches that of the one just downloaded.

Once completed momentarily press the reset button. The device will then do a normal startup.

Contact support at Support@Net-Trekking.com is this fails.

5. Diagnostic Patterns

The device may display the following diagnostic patterns:

5.6. Single Red Led Cycling Clockwise

When displayed this indicates that the device has failed to connect to the Internet. Check the settings to ensure that the Wi-Fi SSID and Wi-Fi Password are correct.