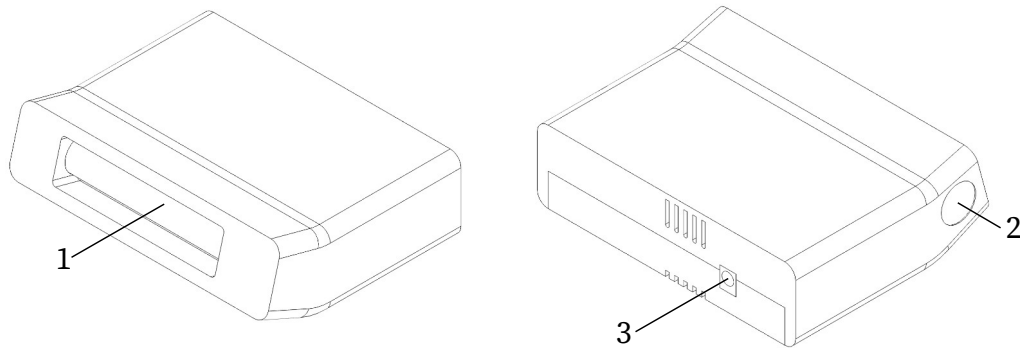# Operating Instructions for Callisto

1.   Features

Callisto is a clock that uses a vintage vacuum fluorescent display (VFD) tube as the indicator.

1. **Vacuum fluorescent display**

   - Glowy!

   - Displays useful info!

   - Auto-dims based on ambient light conditions!

2. **Touch pad**

   - Tap to display the date during normal operation.

   - Momentarily wake up Callisto and display the time during night mode.

   - Tap and hold to enter configuration mode.

3. **DC power jack**

   Use a 9V AC to DC wall adapter to power the clock.

2.   Initial Setup

1. Plug in Callisto using a 9V AC to DC wall adapter.

2. The display should show ConnECt. Callisto is ready to be connected to WiFi.

3. Using a PC or smartphone, connect to the WiFi access point named `callisto_config`. Use the password `12345678` to connect.

4. A web browser should open up automatically. Enter your home WiFi details so that Callisto can retrieve the current time.

   Note: Callisto can only connect to 2.4 GHz WiFi networks.

5. Click on "save and reboot". If Callisto does not reboot, and display still shows `ConnEct`, try refreshing the browser window to resend the data. If that does not work, go back to step 3.

6. Callisto should now synchronize and show the time. All settings, including WiFi credentials will remain, even when unplugged!

   Note: Check 4. Configuration to see how to change timezone settings or set the display format for time and date.

3.   Display Modes

Mode	Display	Notes
Synchronizing time	`CALL 1StO`	Callisto has successfully connected to WiFi, and is syncing the clock.
Time	`12 34 56`	The current time.
Date	`12242020`	The current date. To show the date, tap the touch pad. The date will display for 5 seconds before returning to the time.
Configuration	`123`	See 4. Configuration for steps to configure Callisto. In configuration mode, Callisto will display the last digit of your IP address.
WiFi error	`nEt Err`	Callisto was unable to connect to WiFi. See 5. Troubleshooting for details.
Initial setup	`ConnECt`	Callisto needs to be set up. See 2. Initial Setup for details.

4.   Configuration

1. To enter configuration mode, tap and hold on the touch pad for 10 seconds.

2. If successful, the display should no longer display the time, and instead show a 2 or 3 digit number. This number is the last digit of Callisto's IP address.

3. Using a PC or smartphone connected to the same network as Callisto, enter `192.168.0.XXX` in the address bar, replacing the `XXX` with the number displayed on Callisto.
   Note: This will not work if you've changed your default gateway address. If you've done that, you probably know what you're doing.

4. You can use the page to change display settings for Callisto.

   Note: Callisto isn't very fast, and may run into issues showing you the configuration page. If it doesn't work, try refreshing your browser.

5. Use the buttons at the bottom of the page to save, cancel, or reset to factory settings. If Callisto is still showing the IP address, and hasn't rebooted or gone back to displaying the time, try re-sending the data by refreshing the browser window.

4.1. Configuration Details

Network

- **WiFi SSID**

  The name of the network Callisto is connected to.

- **WiFi password**

  Password for the WiFi network.

Time Display

- **Hour format**

  How AM/PM is displayed

Setting	Display
12 hour (PM dot)	`˙3 34 56`
12 hour (no PM dot)	`3 34 56`
24 hour	`15 34 56`

- **Padding**

  Show/hide leading zero.

Setting	Display
No pad	3 34 56
Zero pad	03 34 56

- **Dividers**

  Display symbols between digits

Setting	Display
Space	3 34 56
Hyphen	3-34-56

Date Display

- **Display format**

  Day/month/year order

Setting	Display
Month, Day, Year	12242020
Day, Month, Year	24 122020

- **Padding**

  Show/hide leading zero.

Setting	Display
No pad	1 12020
Zero pad	0 10 12020

- **Dividers**

  Display symbols between digits

Setting	Display
Dot, full year	12.24.2020
Hyphen	12-24-20
Space	12 24 20

Brightness

Callisto will automatically adjust display brightness based on ambient light.

Note: Allow 24 hours after booting for Callisto to learn how bright/dark it gets in your room.

Night Mode

The display turns off at night in order to extend the tube's life. Default night hours are from midnight to 6 AM, but can be configured here.

Time Zone

The time zone for Callisto is specified using the POSIX format. Click on the link to see some common time zones.

Factory Reset

This will reset everything to factory defaults, including WiFi credentials, and *cannot be undone*!

5.   Troubleshooting

Callisto was designed by someone who wasn't quite sure if they were doing the right things. Configuration can especially be wonky. When using Callisto, be patient, and if in doubt, *don't burn your house down*!

When troubleshooting, first try rebooting Callisto by unplugging and plugging it back in. If that doesn't work, check the table below potential solutions.

Problem	Solution
The display is blank	• Check if Callisto is plugged in • Display will initially be blank while Callisto boots and connects to WiFi. Wait for 10 seconds to see if anything shows up. • Callisto will turn off the display at night to extend the tube's life. Default night hours are from midnight to 6 AM.
Display shows nEt Err	• Callisto timed out while trying to connect to WiFi. Try rebooting it first. • If problem persists, the WiFi credentials may be incorrect. With Callisto plugged in and displaying nEt Err, use a PC or smartphone, search for the WiFi access point named `callisto_config`, and use the password `12345678` to connect. A browser window should open automatically. Re-enter your WiFi credentials and save.
Display is stuck showing CALL IStO	• Callisto has successfully connected to WiFi, but may be having trouble syncing the time. Wait for 5 minutes to see if the issue resolves itself.
The time and/or date is incorrect	• Check to see if the timezone has been configured correctly. See 4. Configuration for details.

If none of the above work, Callisto may be broken! But do not fret, just contact me, and I will see what I can do!

6.   Miscellaneous

- See source code, get hardware specifications, and contact me at GitHub
  https://github.com/thekakkun/Callisto

- Heavily inspired by the following projects, so thank you!

  ○ Ice Tube Clock by Lady Ada

  ○ Flora-ESP8266 by mcer12