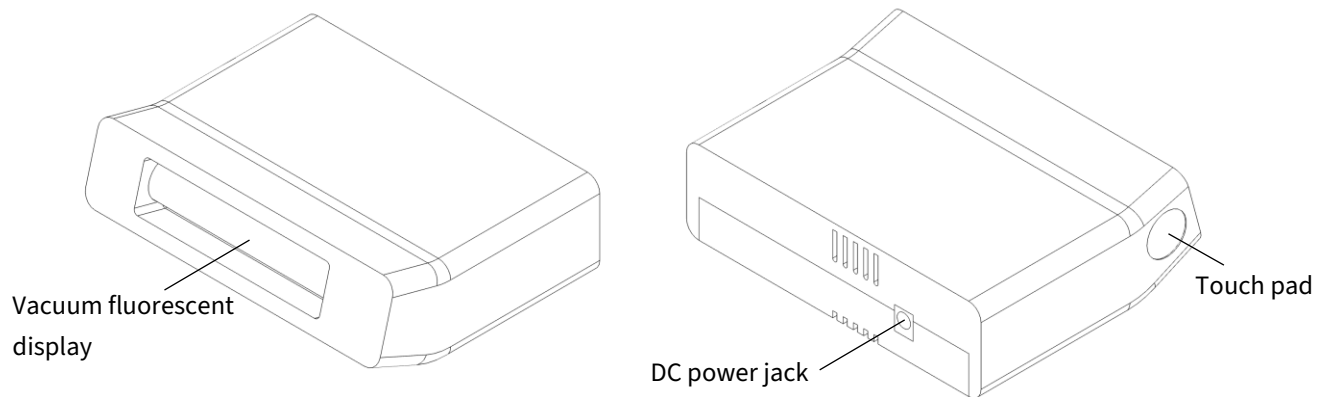


# OPERATING INSTRUCTIONS FOR CALLISTO

## 1. Features

Callisto is a clock that uses a Russian IV-18 vacuum fluorescent display (VFD) tube as the indicator.



- **Vacuum fluorescent display**
  - Glowy!
  - Displays the time!
  - Auto-dims based on ambient light conditions.
- **DC power jack**
  - Use a 9V AC to DC wall adapter to power the clock.
- **Touch pad**
  - During normal operation, tap to display the time.
  - During night mode, tap to momentarily wake up Callisto and display the time.
  - Tap and hold to enter configuration mode.
- **Other Features**
  - Time sync: Connects to Wi-Fi to retrieve the time. Automatically adjusts for daylight saving time.
  - Night mode: Turns off from 12 midnight to 6 AM to conserve energy and prolong tube life.

## 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 Wi-Fi.
3. Using a PC or smartphone, connect to the Wi-Fi access point named **callisto\_config**. Use the password **12345678** to connect.
4. A web browser should open automatically. Enter the Wi-Fi details for the network you want Callisto to use.  
**Note:** Callisto can only connect to 2.4 GHz Wi-Fi 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 connect to Wi-Fi and synchronize and the time.  
**Note:** All settings, including Wi-Fi credentials will remain saved, even when unplugged.
7. To change time zone settings or other display format options, continue to [4. Configuration](#).

## 3. Display Modes

Mode	Display	Notes
Synchronizing time	<b>CALL 15:00</b>	Callisto has successfully connected to Wi-Fi and is syncing the clock.
Time	<b>12 34 56</b>	The current time.
Date	<b>12/24/2021</b>	The current date. To show the date, tap the touch pad. The date will display for 5 seconds before returning to the time.
Configuration	<b>123</b>	See <a href="#">4. Configuration</a> for steps to configure Callisto. In configuration mode, a 2- or 3-digit number will be shown, indicating the last digits of Callisto’s IP address.
Wi-Fi error	<b>net Err</b>	Callisto was unable to connect to Wi-Fi. See <a href="#">5. Troubleshooting</a> for details.
Initial setup	<b>CONNECT</b>	Callisto needs to be set up. See <a href="#">2. Initial Setup</a> for details.

## 4. Configuration

1. To enter configuration mode, tap and hold the touch pad for 10 seconds.  
**Note:** If in night mode (by default from midnight to 6 AM), tap to wake Callisto. Once the time is displayed, release the touch pad, and hold down 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.

- Using a PC or smartphone connected to the same network as Callisto, open a browser and 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 to something other than 192.168.0.1. If you've done that, you can probably figure out what needs to be done here.

- 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 the page doesn't load, try refreshing your browser.

- Use the buttons at the bottom of the page to save, cancel, or reset to factory settings. The browser window should show a message, indicating success.

**Note:** If Callisto is still showing the IP address after saving, cancelling, or resetting, try re-sending the data by refreshing the browser window.

## 4.1. Configuration Details

### Network

#### *Wi-Fi SSID*

The name of the network Callisto is connected to.

#### *Wi-Fi password*

Password for the Wi-Fi 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
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## Date Display

*Display format*

Day/month/year order.

Setting	Display
Month, Day, Year	12242021
Day, Month, Year	24122021

*Padding*

Show/hide leading zero.

Setting	Display
No pad	112021
Zero pad	01012021

*Dividers*

Display symbols between digits.

Setting	Display
Dot, full year	12242021
Hyphen	12-24-21
Space	12 24 21

## 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 to extend the tube's life. Default night hours are from midnight to 6 AM but can be configured here.

**Note:** Wake-up time and the time displayed when tapping the touch pad during night mode hours may be inaccurate by several minutes. This is because Callisto will enter deep sleep mode during night hours and will use a less accurate time-keeping method. Expect time to be a few minutes off during night mode hours. Time will be re-synced once night mode ends.

## 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 Wi-Fi credentials, and cannot be undone!

## 5. Troubleshooting

Callisto was designed by someone who wasn't quite sure if they were doing the right things. When using Callisto, be patient!

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	<ul style="list-style-type: none"><li>• Check if Callisto is plugged in. You should be able to see a red LED inside the case, from the back vents.</li><li>• Display will initially be blank while Callisto boots and connects to Wi-Fi. Wait for 10 seconds to see if anything shows up.</li><li>• Callisto will turn off the display at night to extend the tube's life. Default night hours are from 12 midnight to 6 AM.</li></ul>
Display shows <code>nEt Err</code>	<ul style="list-style-type: none"><li>• Callisto timed out while trying to connect to Wi-Fi. Try rebooting it first.</li><li>• If problem persists, the Wi-Fi credentials may be incorrect. With Callisto plugged in and displaying <code>nEt Err</code>, use a PC or smartphone, search for the Wi-Fi access point named <code>callisto_config</code>, and use the password <code>12345678</code> to connect. A browser window should open automatically. Re-enter your Wi-Fi credentials and save.</li></ul>
Display is stuck showing <code>[ALL 15:00]</code>	<ul style="list-style-type: none"><li>• Callisto has successfully connected to Wi-Fi but may be having trouble syncing the time. Wait for 5 minutes to see if the issue resolves itself.</li></ul>
The time and/or date is incorrect	<ul style="list-style-type: none"><li>• Check to see if the time zone has been configured correctly. See <a href="#">4. Configuration</a> for details.</li><li>• Callisto will use a less accurate time-keeping method during night mode hours. Expect time to be off by several minutes during night mode. Time will automatically re-sync once night mode ends.</li></ul>

If none of the above work, Callisto may be broken! Please send in any issues you find to Callisto's GitHub page: <https://github.com/thekakkun/Callisto/issues>.

## 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](#)