

# BUILD A HAMCLOCK

## BEFORE YOU BEGIN:

Watch this YouTube step-by-step video:

[https://www.youtube.com/watch?v=ySWbH\\_btzig&t=976s&ab\\_channel=TemporarilyOfflineHamRadio](https://www.youtube.com/watch?v=ySWbH_btzig&t=976s&ab_channel=TemporarilyOfflineHamRadio)

## PARTS NEEDED:

1. Raspberry Pi 4 quad core 1 GB:  
[https://www.amazon.com/dp/B07TD43PDZ/ref=twister\\_B07TN34PCN?encoding=UTF8&psc=1](https://www.amazon.com/dp/B07TD43PDZ/ref=twister_B07TN34PCN?encoding=UTF8&psc=1)
2. 8 Gb or larger micro SD card
3. Micro SD card/USB interface (if you don't have an SD card slot and SD card adapter in your PC/laptop): [https://www.amazon.com/SanDisk-MobileMate-microSD-Card-Reader/dp/B07G5JV2B5/ref=sr\\_1\\_5](https://www.amazon.com/SanDisk-MobileMate-microSD-Card-Reader/dp/B07G5JV2B5/ref=sr_1_5)
4. Power supply for your Pi:  
[https://www.amazon.com/dp/B07TYQRXTK?psc=1&ref=ppx\\_yo2ov\\_dt\\_b\\_product\\_details](https://www.amazon.com/dp/B07TYQRXTK?psc=1&ref=ppx_yo2ov_dt_b_product_details)
5. Thermal case (no fan):  
[https://www.amazon.com/dp/B08LVRTYPD?psc=1&ref=ppx\\_yo2ov\\_dt\\_b\\_product\\_details](https://www.amazon.com/dp/B08LVRTYPD?psc=1&ref=ppx_yo2ov_dt_b_product_details)
6. Micro HDMI to HDMI cable (for display):  
[https://www.amazon.com/dp/B09LHNZLHD?psc=1&ref=ppx\\_yo2ov\\_dt\\_b\\_product\\_details](https://www.amazon.com/dp/B09LHNZLHD?psc=1&ref=ppx_yo2ov_dt_b_product_details)
7. Display of some type (old TV, LED monitor)- **note max display resolution** (Bigger is better for this, believe me!)

## INSTALL PI OPERATING SYSTEM ON MICRO SD CARD:

1. Connect micro SD card to your PC or laptop (via SD card adapter or micro SD card/USB interface)
2. Download Raspberry Pi Imager: <https://www.raspberrypi.com/software/>
  - a. Basic instructions:  
[https://www.youtube.com/watch?v=ntaXWS8Lk34&ab\\_channel=RaspberryPi](https://www.youtube.com/watch?v=ntaXWS8Lk34&ab_channel=RaspberryPi)
3. Install OS:
  - a. Select "Full OS with desktop apps"
  - b. Preconfigure the OS during install for SSH (remote access) and wifi connection at bootup:
    - i. Click gear icon and: Enable SSH
    - ii. Set username and password
    - iii. Configure wireless LAN (SSID and password)
    - iv. Set locale settings
  - c. Select storage- your Micro SD card
  - d. Write OS
4. Once Imager is finished, install Pi board in case, install Micro SD card in slot, and connect power to USB-C power input on Pi board
5. NOTE: Pi should automatically connect to your wifi network at startup based on your previous settings, but to access Pi through SSH for control on another computer on your LAN you need to

know the local IP address assigned to the Pi. Local IP address should be listed on wifi devices connected to your router. If necessary you can connect a display, mouse and keyboard to the Pi board and control directly.

#### CONNECT TO YOUR PI FROM ANOTHER COMPUTER:

1. Open a command prompt terminal in Windows
2. SSH to your Pi at it's IP address: `ssh pi@192.168.1.XX`

#### DOWNLOAD HAMCLOCK SOFTWARE FROM CLEARSKY INSTITUTE:

1. Go to: <https://www.clearskyinstitute.com/ham/HamClock/>
2. On the "Download" tab, right click and copy the link address to the tgz file. Then go to your SSH session on your Pi and type in and paste:
  - a. `wget https://www.clearskyinstitute.com/ham/HamClock/ESPHamClock.tgz`
3. Extract files and build your Hamclock executable with the following commands:
  - a. `tar -xzf ESPHamClock.tgz` (extracts tar file)
  - b. `sudo apt install libx11-dev -y` (installs library files)
  - c. `cd ESPHamclock` (change to HamClock directory)
  - d. `make -j 4 hamclock-800x480` (make executable at 800x480 display resolution)
    - i. **IMPORTANT: HamClock can only display in four levels of resolution: 800x480, 1600x960, 2400x1440, and 3200x1920. When you build the executable, specify the resolution to be either EQUAL or LESS than your monitor's resolution by changing 800x480 in the "make" command to the proper resolution. If your monitor's resolution is greater than your HamClock executable, there is a command you later use via SSH (xrandr) to expand the HamClock to your monitor's size (more on this below).**
  - e. `sudo make install` (install HamClock)

#### INSTALL REALVNC VIEWER ON A REMOTE COMPUTER TO CONTROL YOUR PI

1. Instructions on using RealVNC (included in Pi OS) can be found here: <https://help.realvnc.com/hc/en-us/articles/360002249917-VNC-Connect-and-Raspberry-Pi#setting-up-your-raspberry-pi-0-0>
2. Install RealVNC Viewer on the laptop or PC on your LAN you want to control your Pi from, available at: <https://www.realvnc.com/en/connect/download/viewer/>
3. Add a new connection to RealVNC Viewer using the local IP address of your Pi
4. Connect to your Pi via RealVNC
5. Run HamClock: Upper left corner of Pi Desktop, click "Run" (the paper airplane) and type in "hamclock"

## CONFIGURE YOUR HAMCLOCK:

1. Be ready with your latitude and longitude, callsign, etc. There are six pages of setup to go through. The linked video covers this starting at 16:10. Also, check the HamClock User's Guide for how to select information in the various panels.

## NOTES AND OTHER USEFUL INFO:

1. Access and control HamClock on your Pi via HamClock's built-in web server and your browser:

<http://192.168.1.XX:8081/live.html>

2. HamClock User's Guide:

<https://www.clearskyinstitute.com/ham/HamClock/HamClockKey.pdf>

3. Command (via SSH from remote computer) to stretch screen of HamClock built to 1600x960 to fill monitor resolution of 1920x1080 monitor connected to HDMI-1:

```
xrandr --output HDMI-1 --scale-from 1600x960 --display :0
```

4. Download RealVNC iPhone or Android apps to access HamClock from your phone:

<https://www.realvnc.com/en/connect/download/viewer/ios/>

<https://www.realvnc.com/en/connect/download/viewer/android/>

5. Run HamClock under Windows (via Ubuntu WSL):

<https://w4cae.com/wait-a-hamming-minute-hamclock-and-windows/>