Ultimate64 Elite 2

Quick Start Manual

GIDEON'S LOGIC

Notice:

This document is not the official documentation. Written by and many thanks to Bart E.

Currently under review; contents may be incomplete or incorrect. Nonetheless, because of its value, it has been made public.

Ultimate64 Elite 2

Quick Start Manual

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Table of Contents

Installing the PCB

The PCB has holes to mount the PCB into old (breadbin and new (C64c) enclosures.

C64c

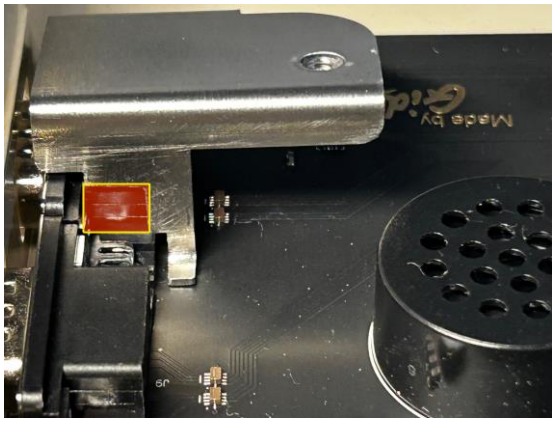
For the C64c additional keyboard riser brackets are required to mount the keyboard.

These can be purchased at icomp.de, for example.

https://icomp.de/shop-icomp/index.php/en/shop/product/c64c-key-mount-kit.html

The left keyboard riser also includes a rubber ring to insulate the PCB from the bracket.

To mount the right keyboard riser, a small corner of approximately 5 x 5 mm needs to be filed off, otherwise it wouldn’t fit or would short-circuit the Control Port 1 (see image)



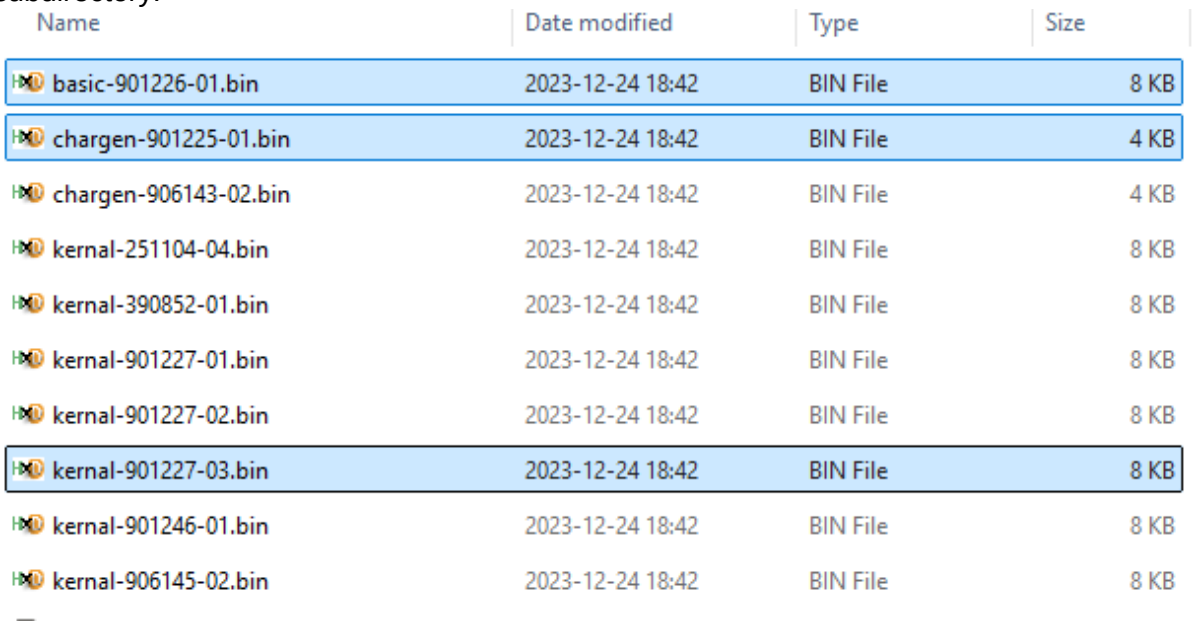
Preparation

ROMs and firmware

Before you power up, we need to create an SD card with the latest firmware, C64 ROMs and, if required, cartridge images and software.

- Download the C64 ROMs and store them on the Micro-SD-Card.
  Required files:
  - basic-901226-01.bin
  - chargen-901225-01.bin
  - kernal-901227-03.bin

  You can download these from several websites, like this one:
  https://www.commodore.ca/manuals/funet/cbm/firmware/computers/c64/index-t.html
  or by installing VICE on a computer and copying the ROMs from the VICE C64-subdirectory:



Name	Date modified	Type	Size
basic-901226-01.bin	2023-12-24 18:42	BIN File	8 KB
chargen-901225-01.bin	2023-12-24 18:42	BIN File	4 KB
chargen-906143-02.bin	2023-12-24 18:42	BIN File	4 KB
kernal-251104-04.bin	2023-12-24 18:42	BIN File	8 KB
kernal-390852-01.bin	2023-12-24 18:42	BIN File	8 KB
kernal-901227-01.bin	2023-12-24 18:42	BIN File	8 KB
kernal-901227-02.bin	2023-12-24 18:42	BIN File	8 KB
kernal-901227-03.bin	2023-12-24 18:42	BIN File	8 KB
kernal-901246-01.bin	2023-12-24 18:42	BIN File	8 KB
kernal-906145-02.bin	2023-12-24 18:42	BIN File	8 KB

- Make sure to have the latest firmware stored on a Micro-SD-Card:
  - Download the current firmware file from GitHub (currently 3.12a from 2025-06-19):
    https://github.com/GideonZ/ultimate_releases/raw/master/ultimate_3.12a.zip
    Check this directory for releases:
    https://github.com/GideonZ/ultimate_releases
  - Unarchive the file for the Ultimate Elite 2 (extension: .ue2) and copy it to the Micro-SD-Card (current file: update_v3.12a-15.**ue2**)

In this example, I created an SD cart with the following folders and data:

- C64c ROM
  - basic-901226-01.bin
  - chargen-901225-01.bin
  - kernal-901227-03.bin
- Cartridges
- Firmware
  - 3.12
    - Update_3.12.ue2
  - 3.12-34
    - Update_3.12-34.ue2
  - 3.12a-15
    - Update_3.12a-15.ue2
- Games

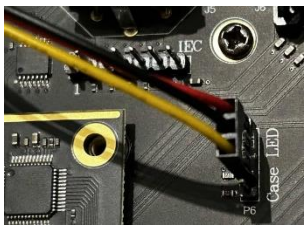
Once the SD-card is prepared, it can be inserted into the Ultimate64 Elite 2 PCB.

The SD card slot is located in the lower left corner of the PCB.

Power LED

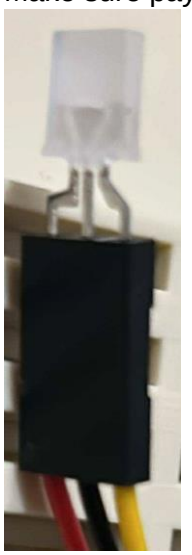
The Power LED is connected to the 4-pin connector in the middle of the board, right of the FPGA-controller board. Currently, the first 3 pins can be used, the 4th may be enabled in a later firmware release.

- Connect a 3 or 4 pin 20-30 cm long cable with a DuPont connector to the UE2 board, like shown here:

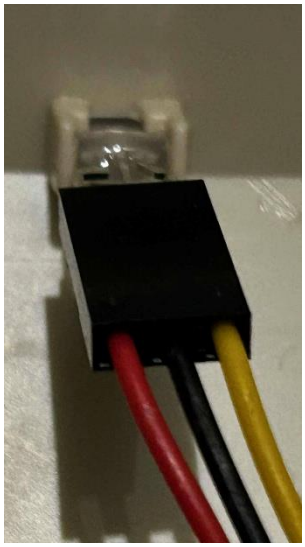


- Get a 2-color LED (red and green)
  Clip the legs shorter, so that it matches the DuPont connector on the other end of the cable.
  Pin-out:
  - Red: longer outside leg
  - Green: shorter outside leg
  - Ground: middle leg

- Insert the LED into the DuPont connector.
  Make sure pay attention to the wire colors.



- Insert the LED into the enclosure,



- Once you can turn on the C64, you can configure the LED activity.
  See chapter “Power up the first time – Configurer the Power LED behavior” for more details.

Additional buttons

On the Ultimate64 board there are 4-pins, labeled

- Right
- Menu
- Left
- GND

You can attach momentary switches to these.

Always connect between one of the three pins and the ground.

The buttons can be used to freeze a cartridge, quickly open the menu and reset the C64.

- Switch “Freeze”
  - PIN 1 (Right)
  - PIN 4 (Gnd)
- Switch “Menu”
  - PIN 2 (Menu)
  - PIN 4 (Gnd)
- Switch “Reset”
  - PIN 3 (Left)
  - PIN 4 (Gnd)

Power Supply Unit

The Ultimate64 Elite II requires a USB-C PD compliant Power Supply Unit that is able to deliver at least 9V, preferably 12V.

When real SID chips are used, the PSU must deliver 12V.

The Ultimate64 Elite II will NOT work with a regular 5V PSU.

There are several PSUs available.

Some PSUs that seem to work well are:

- Anker 735 Nano II
- Raspberry Pi 5 PSU

Power Button and Navigation

The Ultimate64 Elite II comes with three-position power switch.

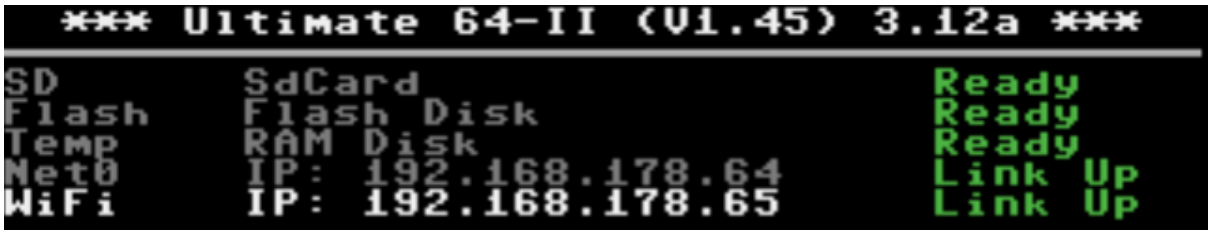
- Power on: flip the switch either upwards or downwards
- Power off: hold the switch downwards for more than 4 seconds
- Freeze: hold the switch downwards for a second
- Menu: hold the switch upwards for a second

When the menu is activated, navigation on the C64 is as follows:

- Enter: enter the menu item
- CRSR up/down: move through the menu items
- CRSR left: go back
- RUN/STOP: go back / leave menu

There are more options, which will be handled later in this document.

When the menu button is pressed, the storage and network connections are displayed.



From here, there are two other menus that can be opened:

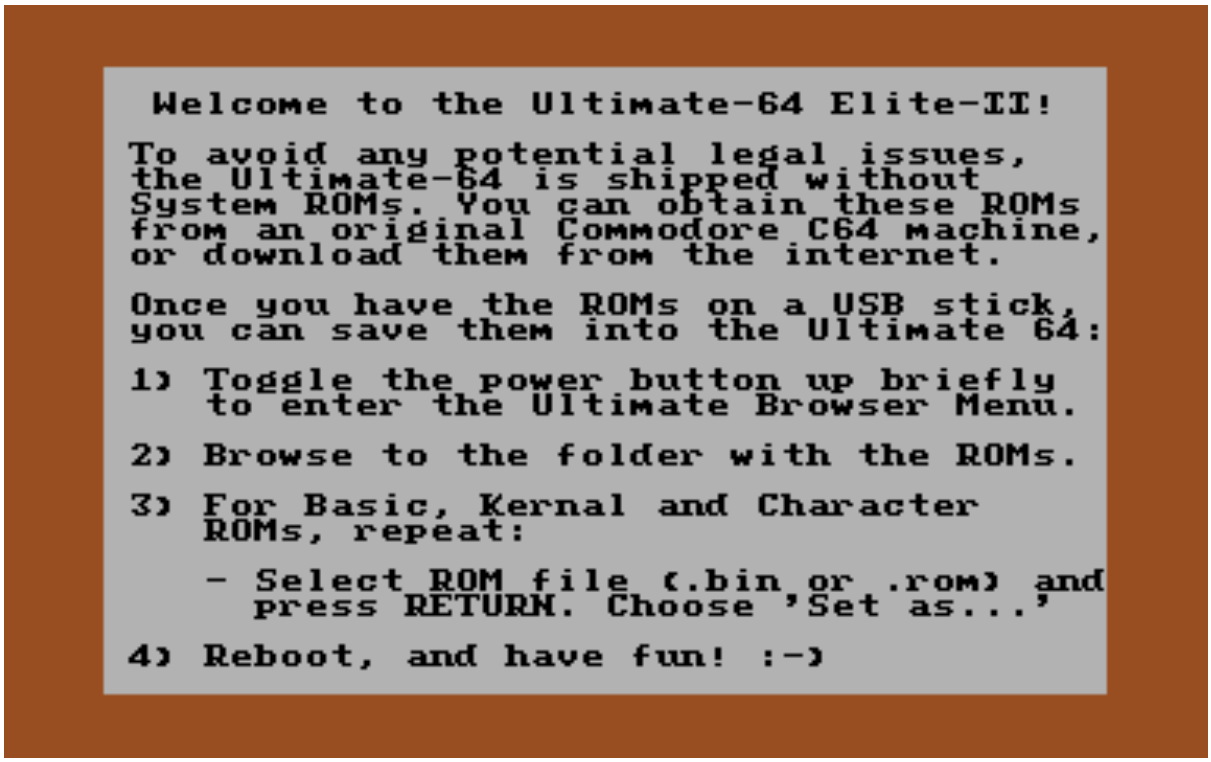
- F2: Setup menu

- F5: Action menu

Also, once configuration changes have been made, don’t forget to go back until you’re prompted to save the changes to the flash drive:

Power up the first time

When you power up the first time, you'll see the following screen:



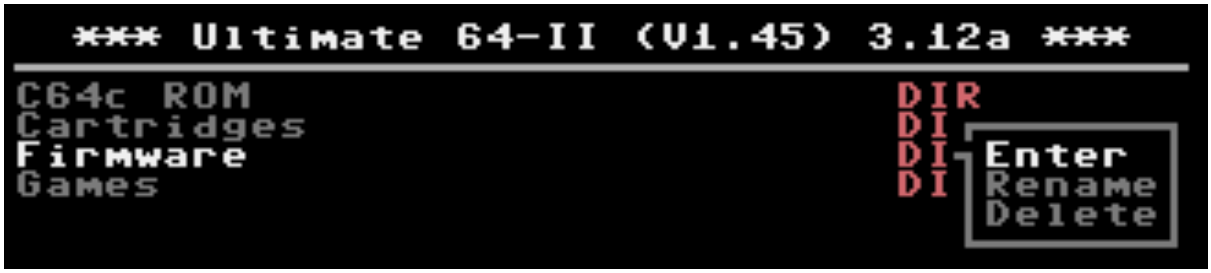
The Ultimate64 board is not shipped with C64 ROMs, so you'll need to download these and provide them to the system, But first, make sure that the currently installed firmware is up-to-date.

Flashing the firmware

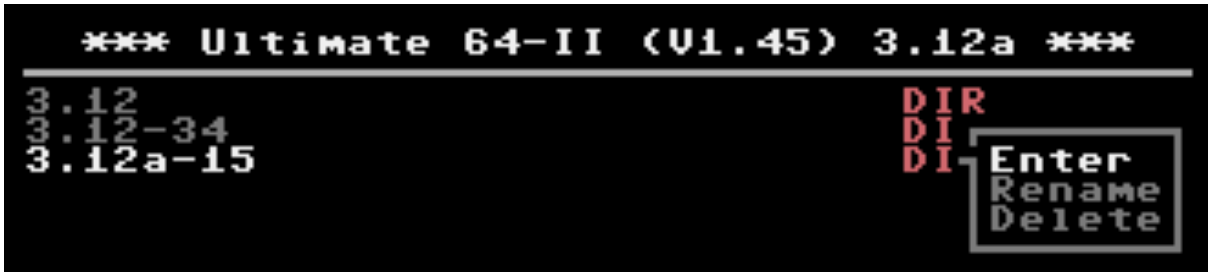
You can access the ROMs stored on the SD card or USB stick by pressing the menu (Power Button UP or pressing the additional menu button).

Go to the place where you stored the ROMs and firmware (SD or USB drive):

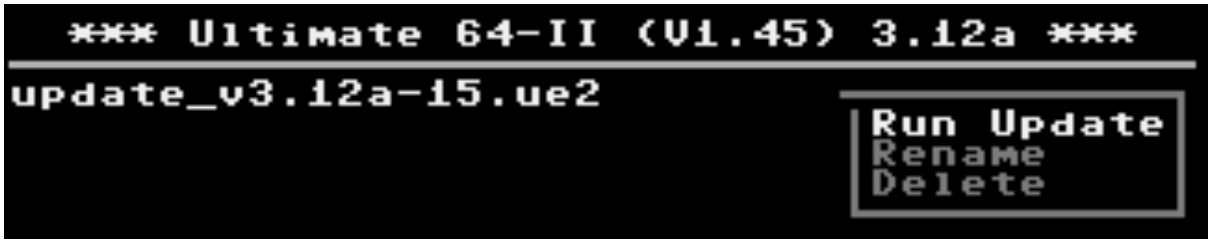
Enter the firmware folder



Enter the 3.12a-15 folder

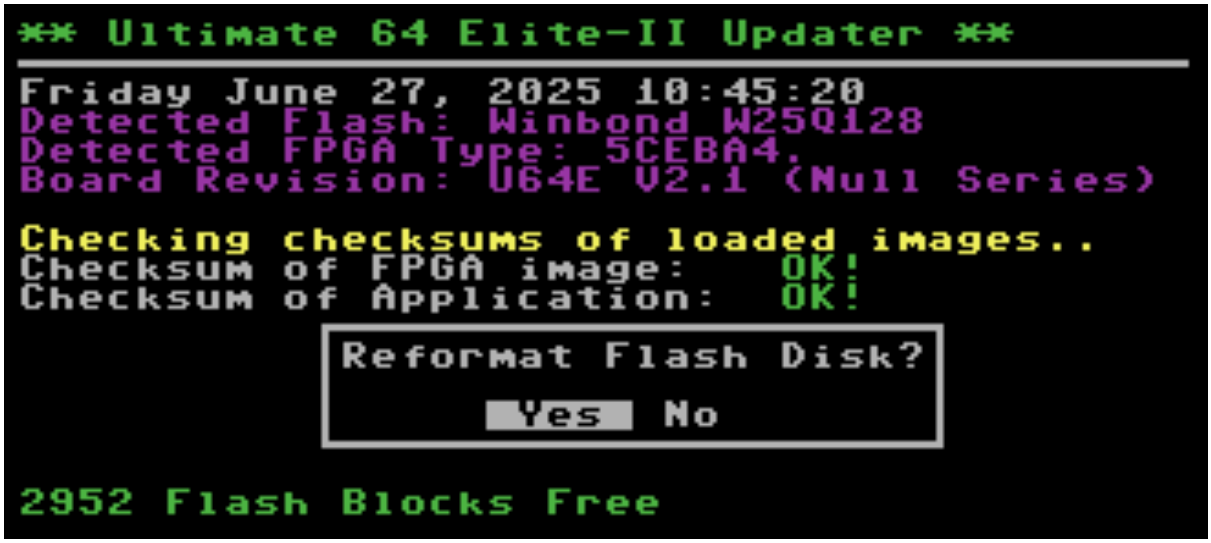


Press enter on the firmware file and press enter again to run the update



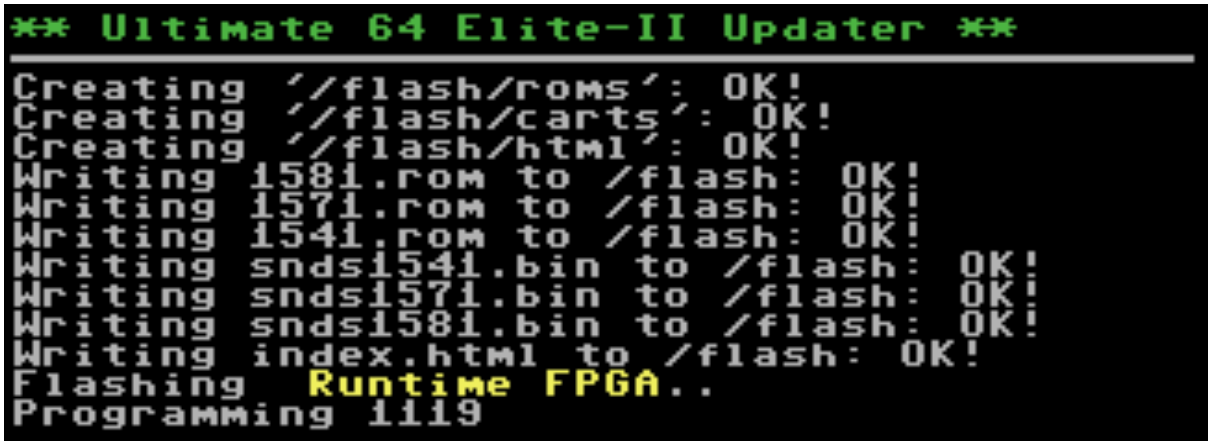
After a few seconds, the following screen appears:

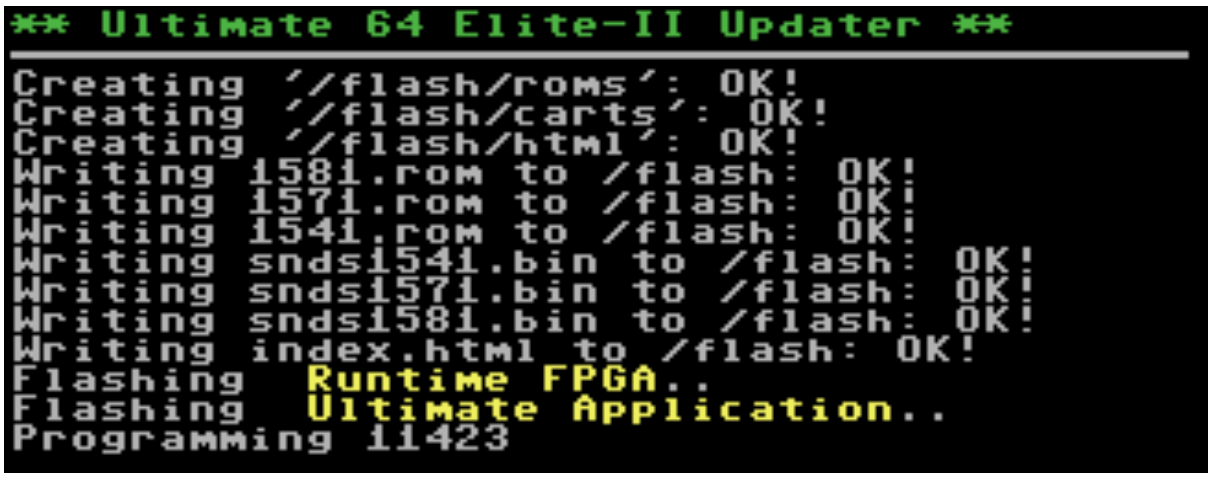
Press “Yes” to reformat the Flash Disk.



Press enter again to continue the update

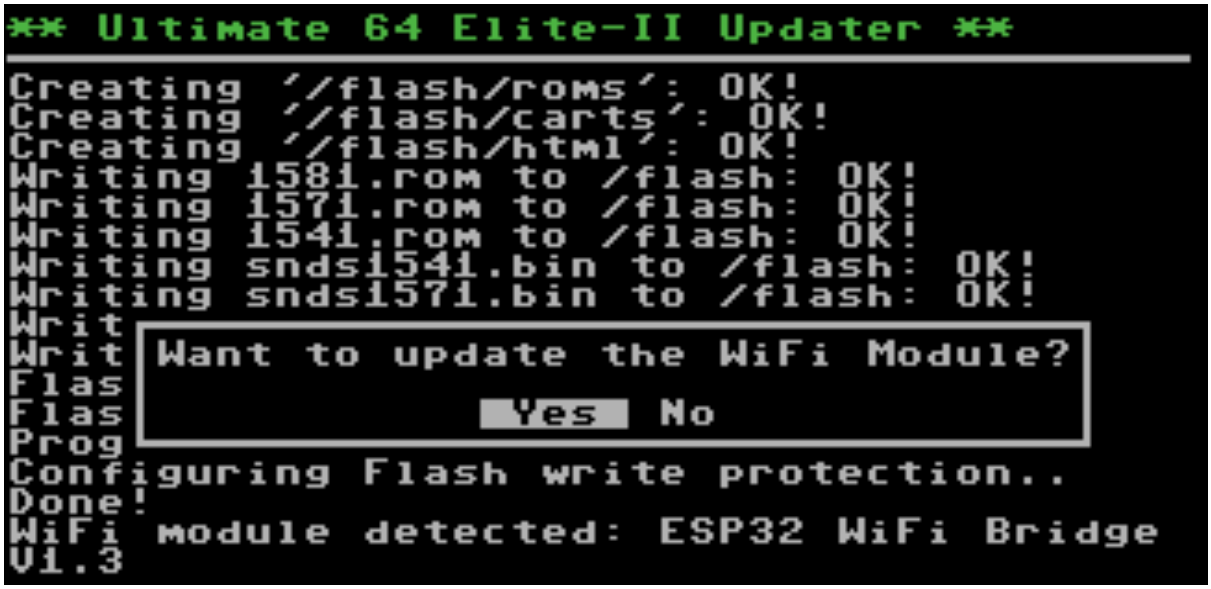
The update will show the progress:

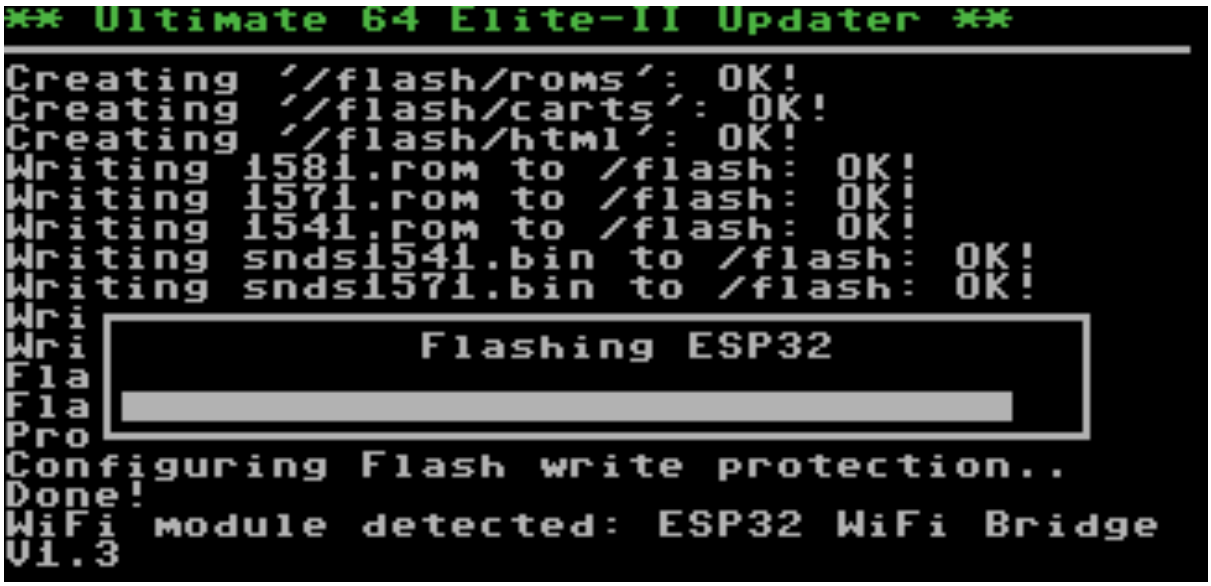




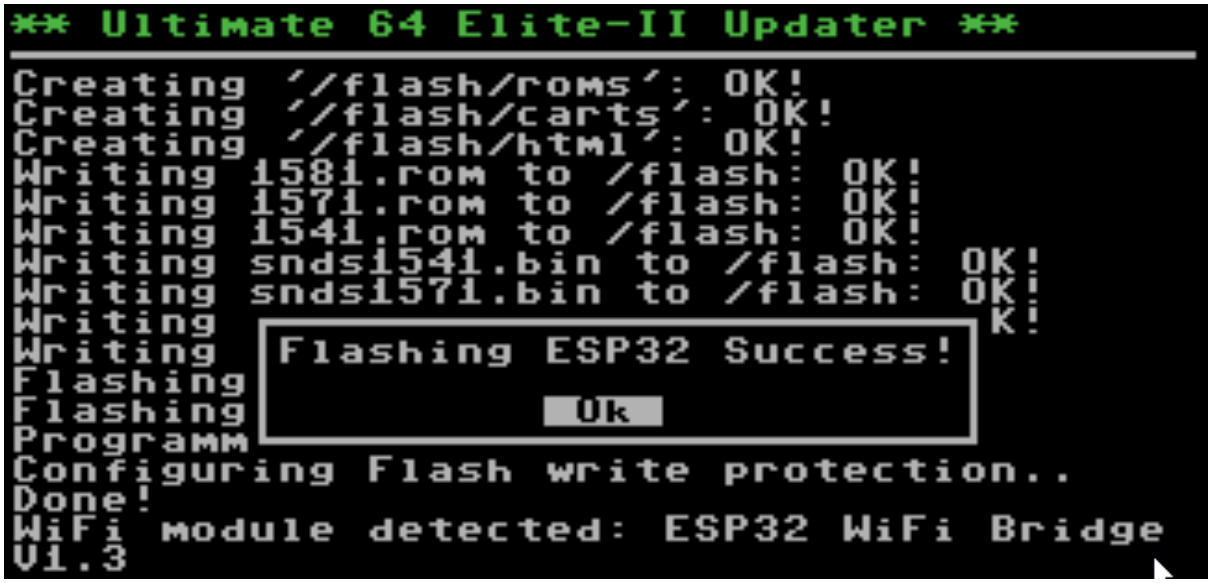
Press enter to reset the configuration

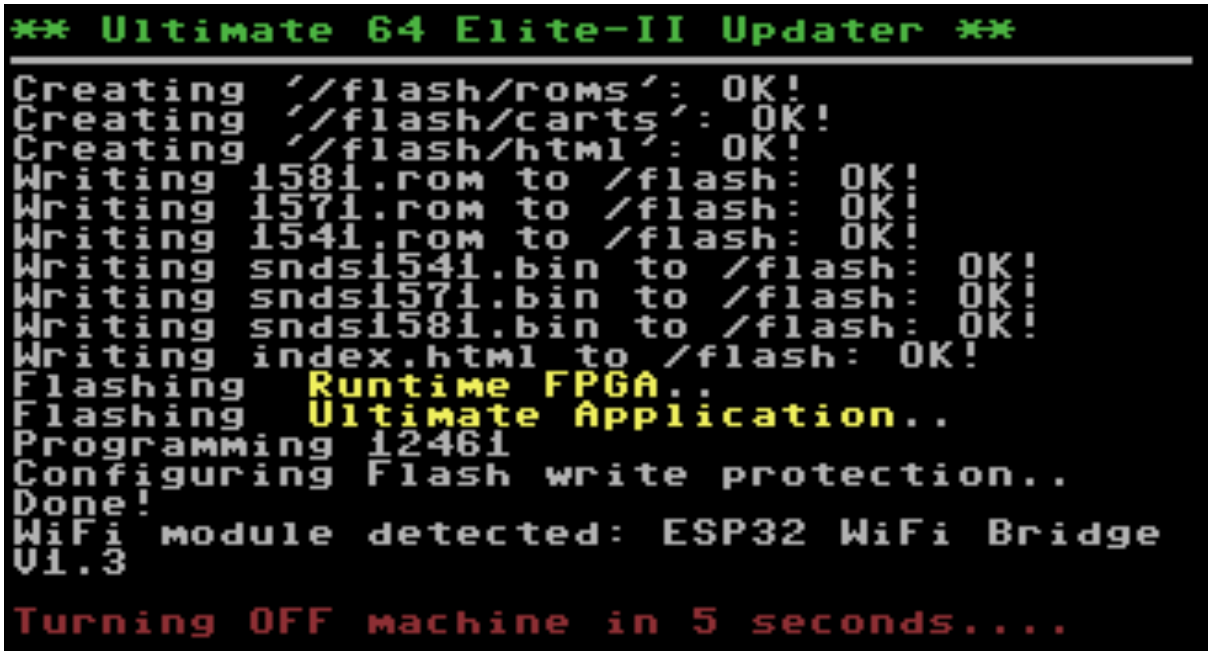
Press enter to update the WiFi Module firmware:



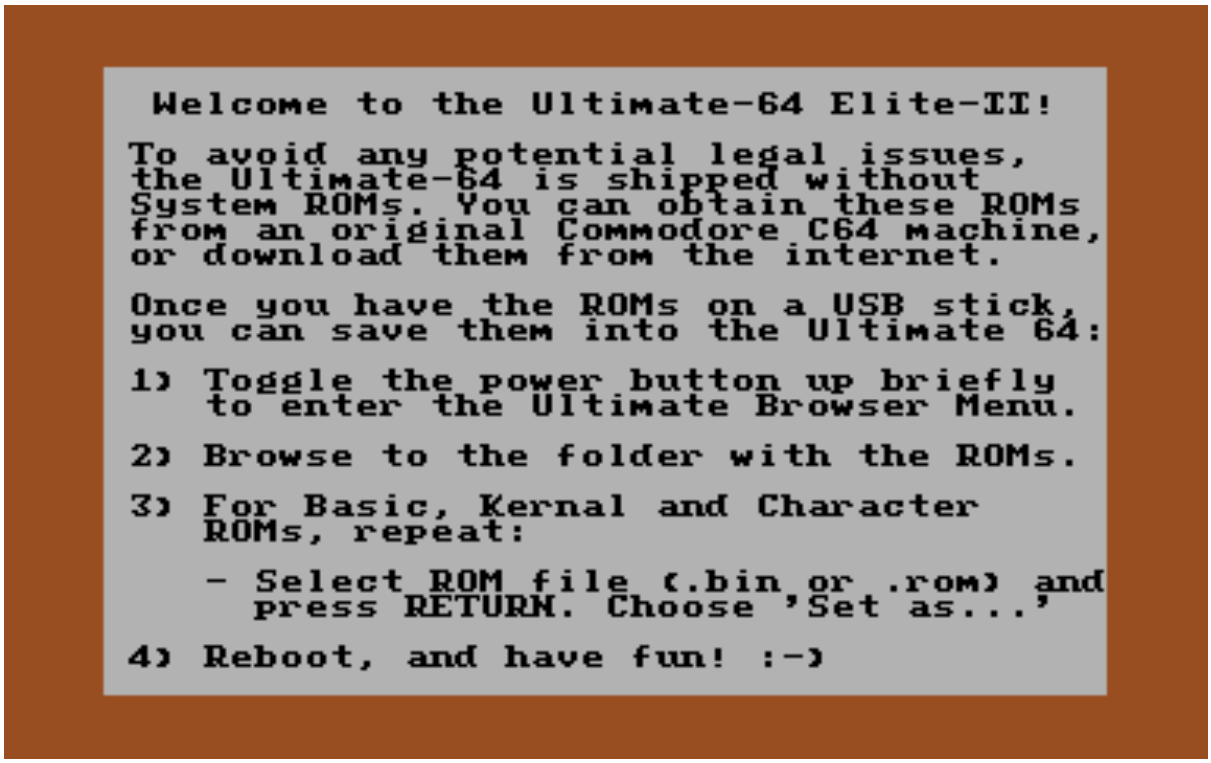


Press enter to finalize the update


** Ultimate 64 Elite-II Updater **
Creating '/flash/roms': OK!
Creating '/flash/carts': OK!
Creating '/flash/html': OK!
Writing 1581.rom to /flash: OK!
Writing 1571.rom to /flash: OK!
Writing 1541.rom to /flash: OK!
Writing sndsi541.bin to /flash: OK!
Writing sndsi571.bin to /flash: OK!
Writing
Writing
Flashing
Flashing
Programm
K!
Flashing ESP32 Success!
Ok
Configuring Flash write protection..
Done!
WiFi module detected: ESP32 WiFi Bridge V1.3

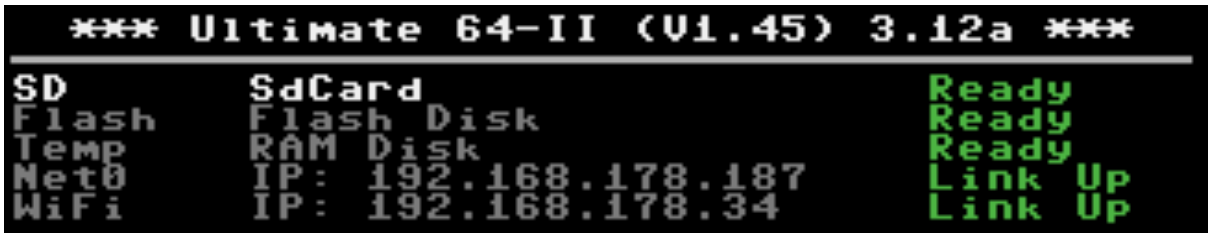

** Ultimate 64 Elite-II Updater **
Creating '/flash/roms': OK!
Creating '/flash/carts': OK!
Creating '/flash/html': OK!
Writing 1581.rom to /flash: OK!
Writing 1571.rom to /flash: OK!
Writing 1541.rom to /flash: OK!
Writing sndsi541.bin to /flash: OK!
Writing sndsi571.bin to /flash: OK!
Writing sndsi581.bin to /flash: OK!
Writing index.html to /flash: OK!
Flashing Runtime FPGA..
Flashing Ultimate Application..
Programming i2461
Configuring Flash write protection..
Done!
WiFi module detected: ESP32 WiFi Bridge V1.3
Turning OFF machine in 5 seconds....

Turn the machine on again.



Enter the menu to confirm the firmware has been updated.

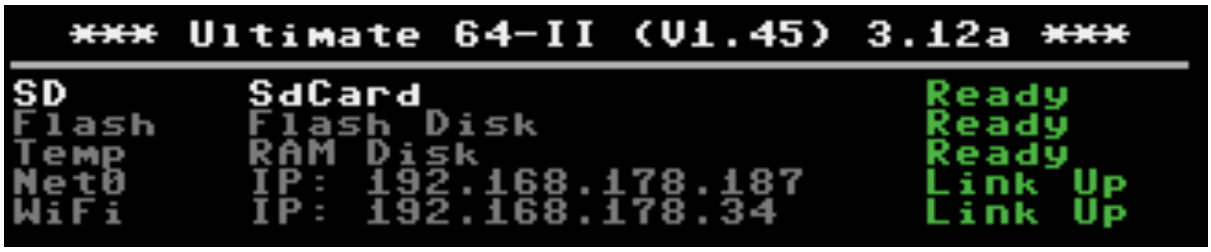
The firmware version is visible in the top of the menu.



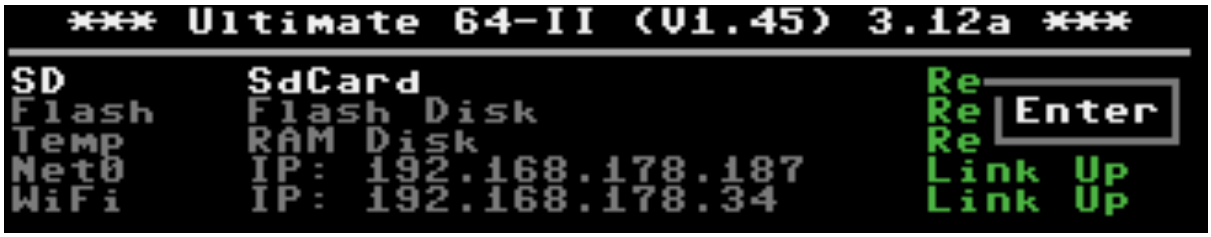
Installing the C64 ROMs

Now that the firmware is up to date, we can now set the C64 ROMs.

Open the menu.



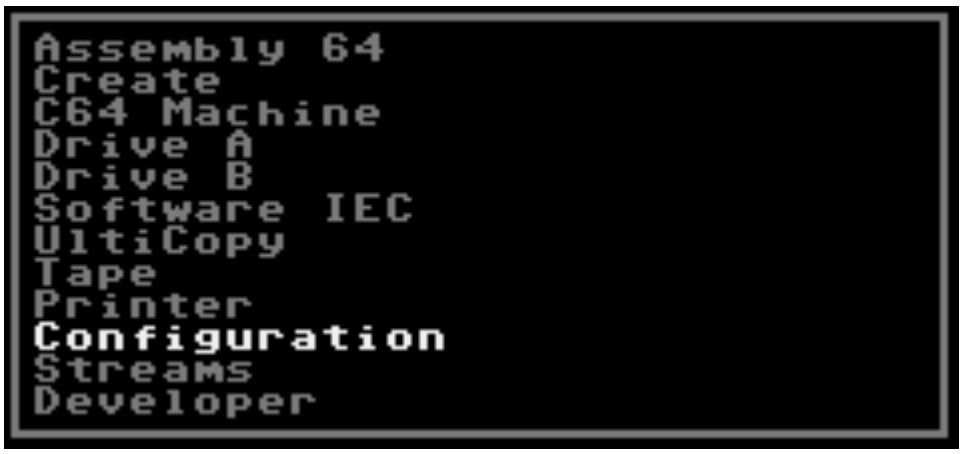
Open the SD card again.



Open the folder with the C64 ROMs

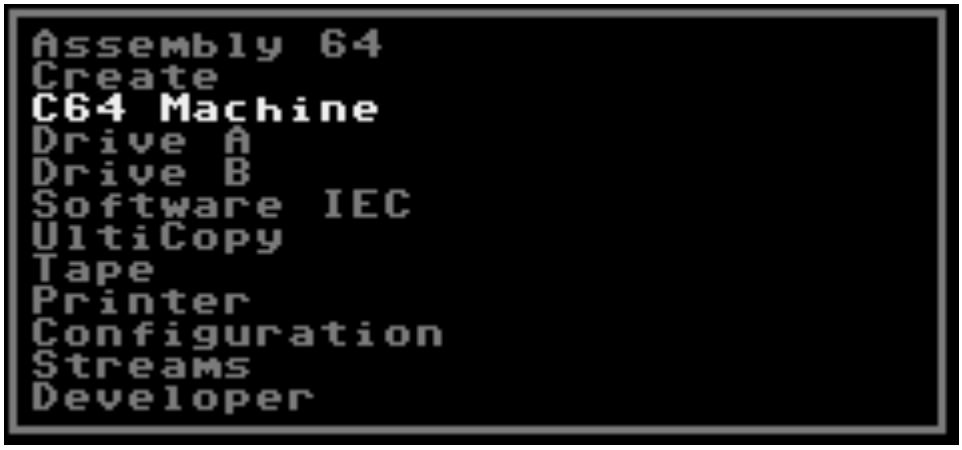
On each of the ROM files, press enter and select which type of ROM it is (look closely at the names):

Press F5 and go to Configuration



Save to Flash

Press F5 again and go to C64 Machine



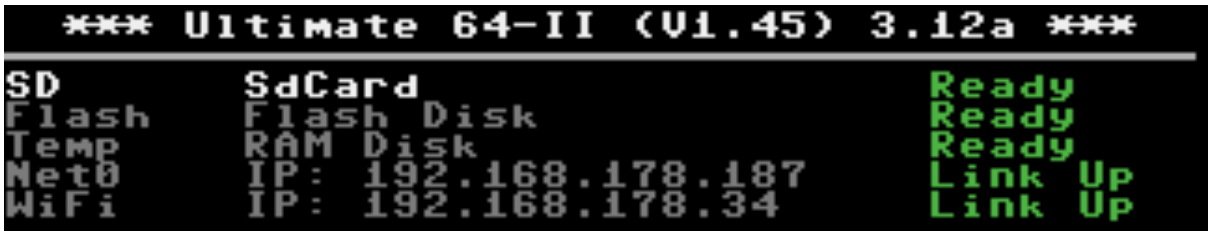
Reset the C64

And we’re ready to get started:

Configure the Power LED behavior

If you installed a dual color LED, you can configure how the LED lights up during certain conditions.

Go to the menu



Press F2 and go to U64 Specific Settings

I installed a dual color LED, which is a LED enclosure with 2 LEDs inside:

- LED 1: red
- LED 2: green

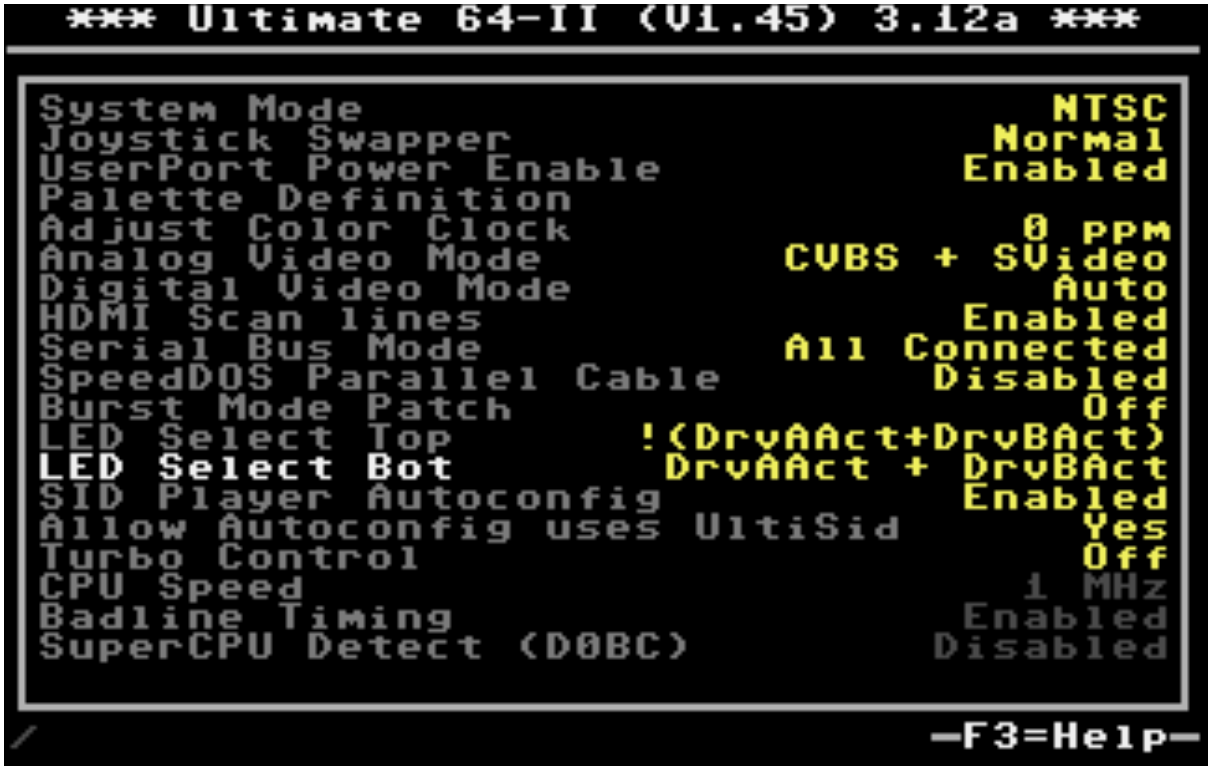
The C64c has a red power LED, so in my configuration, I set the red LED to always on, except when there is drive activity.

The drive activity is assigned to the green LED.

If I would keep the red LED always on, like a regular power LED, the LED would light yellowish orange when there is drive activity, since then both red and green lights will be on.

So,

- the red LED is set NOT to light when there is drive activity on drive 8 and 9.
- the green LED is set to light when there is drive activity on drive 8 and 9.

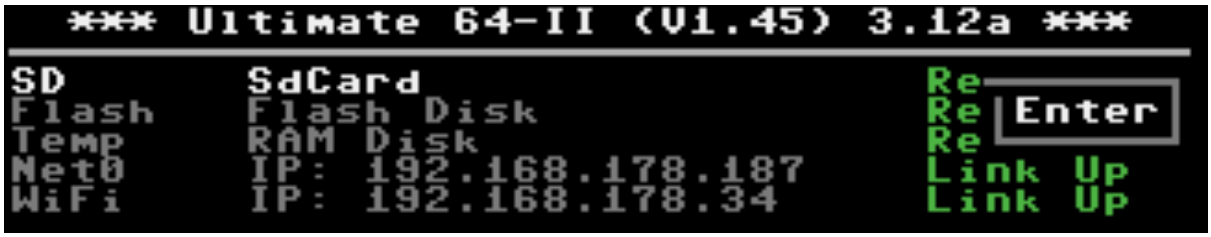


This behavior is a bit like the Commodore Amiga 500, but using a single LED unit:

Mounting cartridges

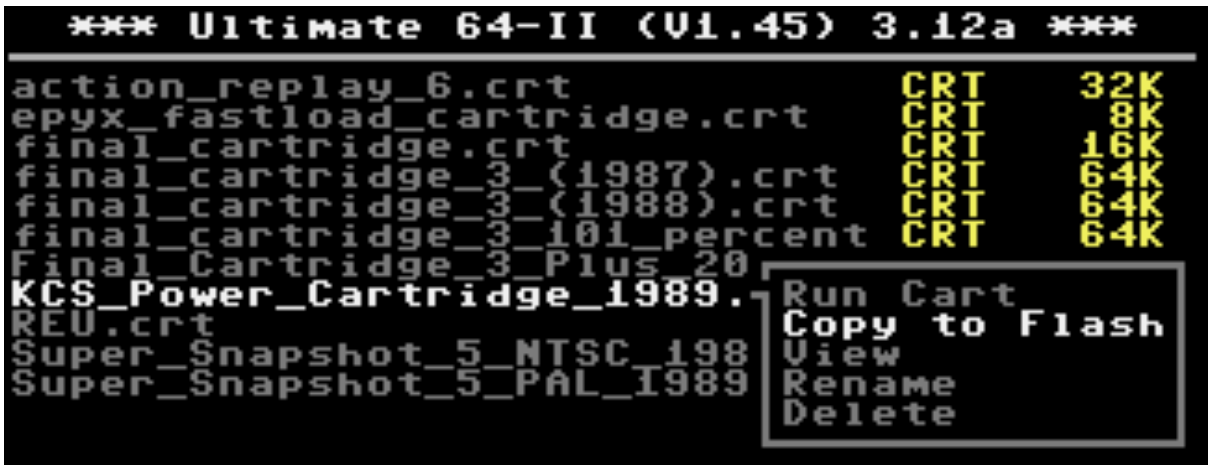
Copy cartridges to Flash Memory

Open the location where your cartridge image is stored



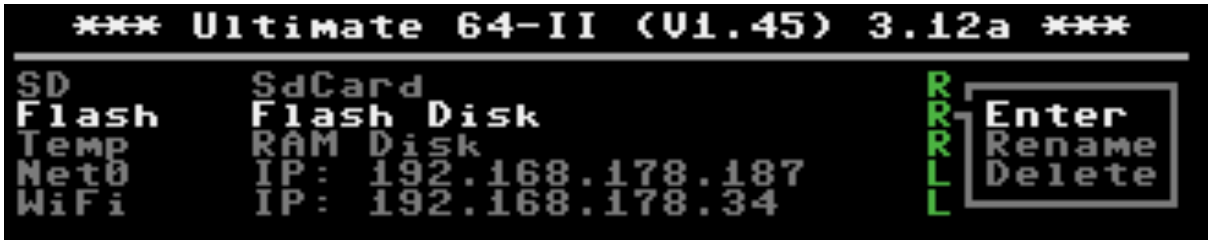
Select the cartridge you want to use and press enter.

Select “copy to flash” and press enter.



Mount the cartridge

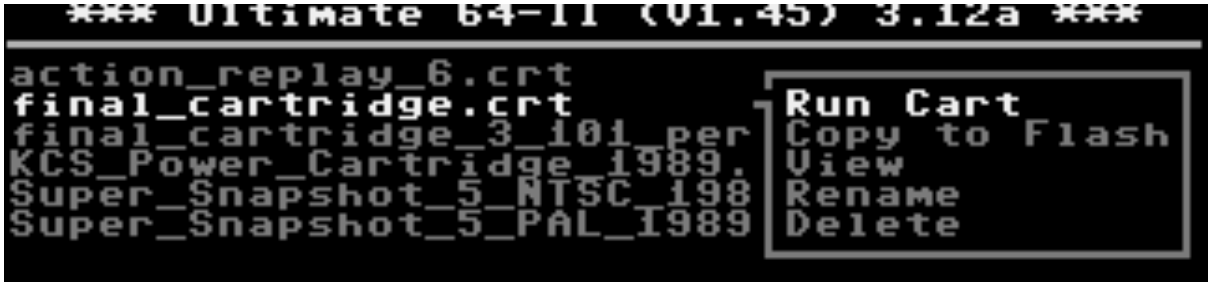
Open the flash disk



Go to carts

Select the cartridge image and press enter.

Select “Run Cart” and press enter.

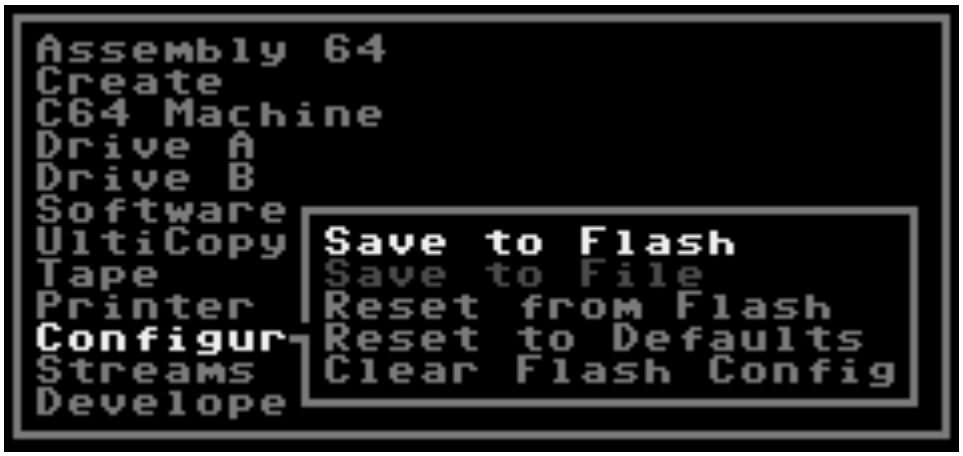


The computer will now reset and the cartridge is mounted.

Pressing the power button down for a second will activate the cartridge freezer.

Alternatively, a separate button can be mounted to the PCB to activate the freezer. See the chapter “Preparation - Additional buttons”.

To save the settings, open the menu, press F5 and go to Configuration.



Set the video output (PAL / NTSC)

By setting the video output, the internal speed of the system also changes.

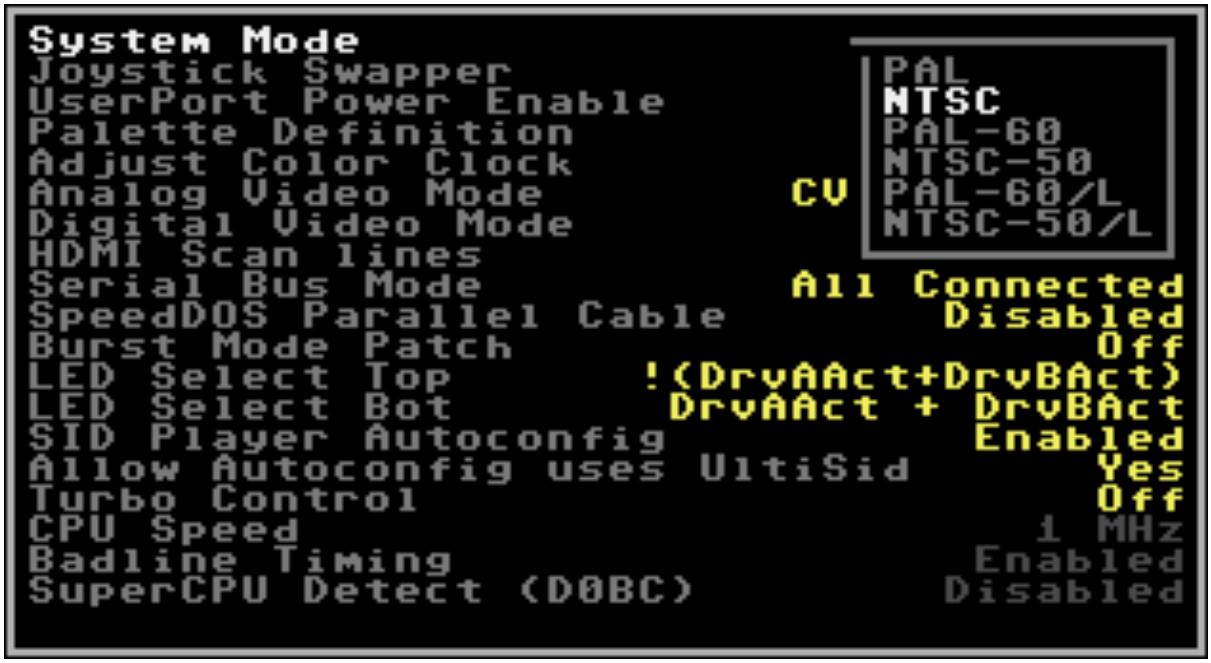
There are a few additional modes, because of this:

Open the menu and press F2.

Go to U64 Specific Settings.

Set the video output and speed to what's applicable:

- PAL
- NTSC
- PAL-60 (PAL at 60Hz)
- NTSC-50 (NTSC at 50 Hz)
- PAL-60/L (PAL at 60Hz)
- NTSC-50/L (NTSC at 50 Hz)


System Mode
Joystick Swapper
UserPort Power Enable
Palette Definition
Adjust Color Clock
Analog Video Mode
Digital Video Mode
HDMI Scan lines
Serial Bus Mode
SpeedDOS Parallel Cable
Burst Mode Patch
LED Select Top
LED Select Bot
SID Player Autoconfig
Allow Autoconfig uses UltiSid
Turbo Control
CPU Speed
Badline Timing
SuperCPU Detect (D0BC)
CV
PAL
NTSC
PAL-60
NTSC-50
PAL-60/L
NTSC-50/L
All Connected
Disabled
Off
!(DrvAAct+DrvBAct)
DrvAAct + DrvBAct
Enabled
Yes
Off
1 MHz
Enabled
Disabled

Disk Drives

The Ultimate64 has the ability to use up to 2 virtual disk drives.

By default, only the first disk drive is attached as a 1541 (single-sided 5¼”) floppy drive to bus ID 8, the other disk drive is not connected.

To reconfigure this, open the menu and press F2.

Then select either Drive A Settings or Drive B Settings, depending on which disk drive you want to configure.

In this menu, you can select the disk drive type (1541, 1571 or 1581) and the rom associated with it.

Note: the ROM versions are as follows:

- 1541.rom: dos1541-325302-01+901229-05.bin
- 1571.rom: dos1571-310654-05.bin
- 1581.rom: dos1581-318045-02.bin

Hint: it is possible to use the ROM file dos1541ii-251968-03.bin to simulate a 1541-II, but take caution, as some software, particularly games with speedloaders, may not work properly with this ROM.

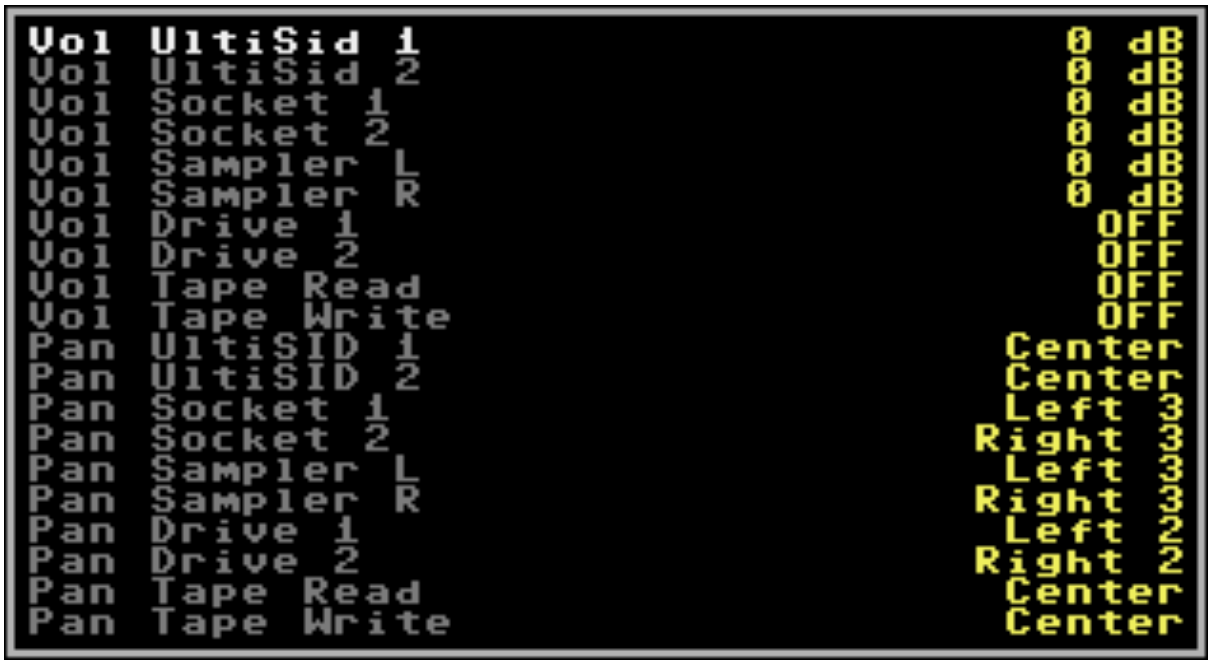
Configure the sound output

By default, all sounds are set to output through the audio output and through the internal speaker.

Audio mixer

Open the menu and press F2, then go to Audio Mixer and set the decided volumes:

For the audio output, you could choose to output all but the drive and tape sounds:



Speaker mixer

Open the menu and press F2, then go to Speaker Mixer and set the decided volumes:

For the speaker, you could choose to just output the drive and tape sounds:

Save changes

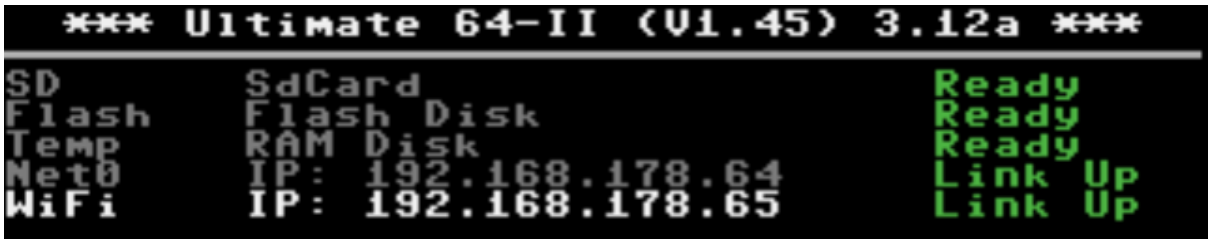
After making changes, don’t forget to go back and save the changes to the flash drive:

Configure the Network Connection

Network settings

Open the menu

If the network interfaces are not connected, the MAC address instead of the IP address is displayed. Make note of these MAC addresses.

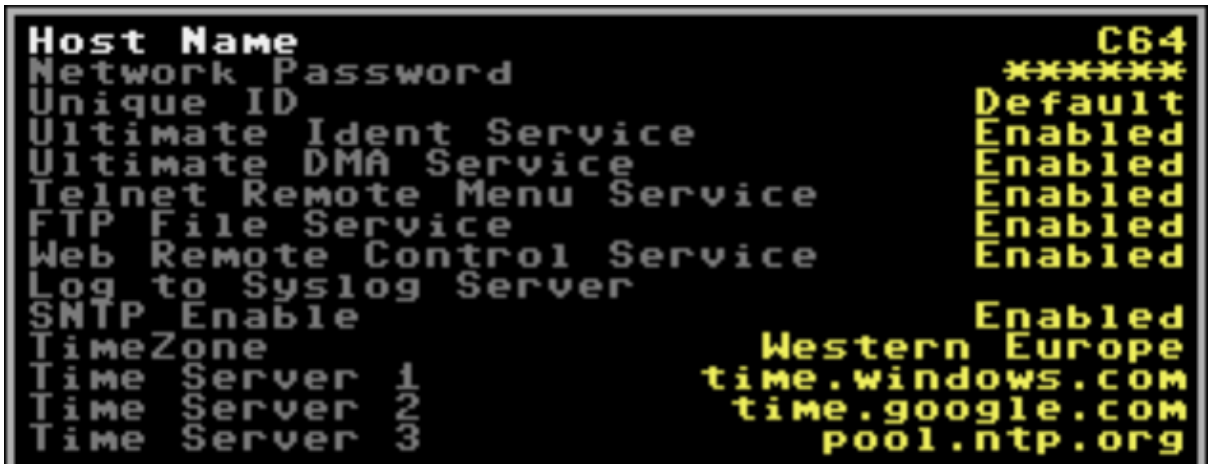


Press F2 to open the configuration menu.

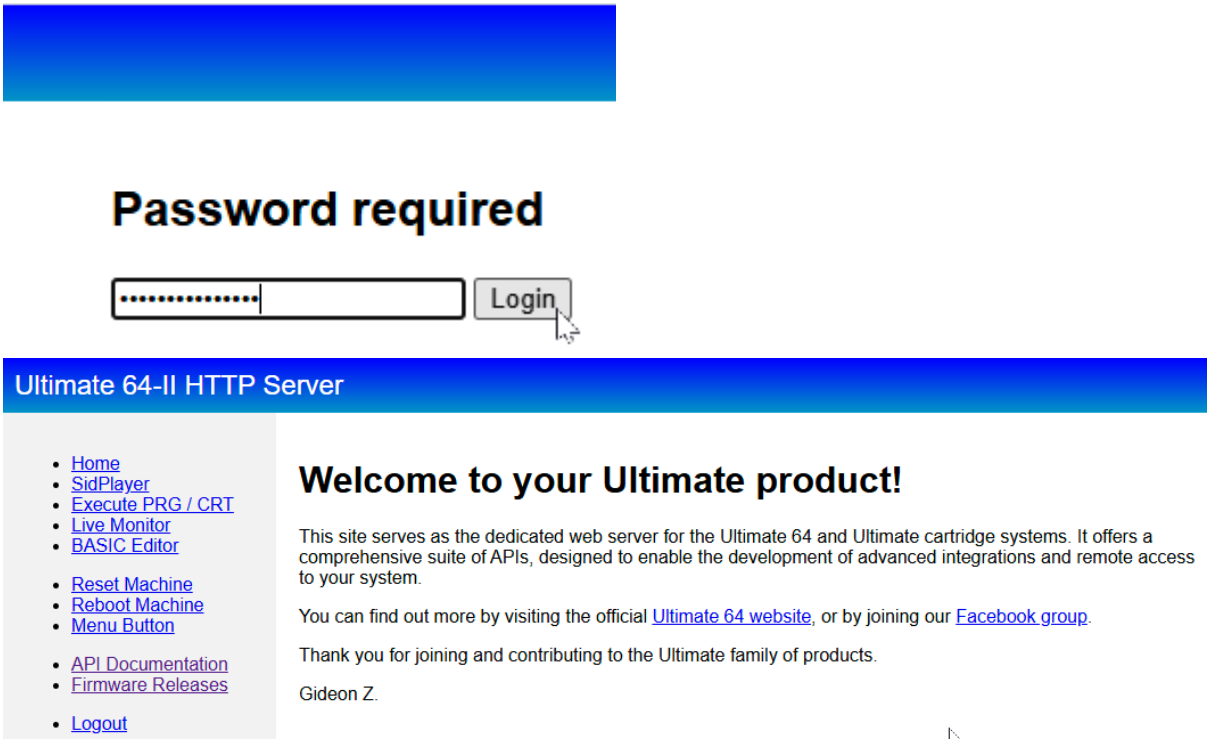
There are four options for the network settings here:

- Network Settings
- Ethernet Settings
- Data Streams
- WiFi Settings

Network Settings



- Host Name
  The name of the C64 on your network: other systems can use this name to connect to it, instead of the IP address
- Network Password
  The password you need to use to connect to the C64 remotely, like when using FTP
- Unique ID
- Ultimate Ident Service
- Ultimate DMA Service
- Telnet Remote Menu Service
- FTP File Service
  Allows you to transfer files to the C64, using the FTP protocol
- Web Remote Control Service
  You can manage the SidPlayer from here, for example

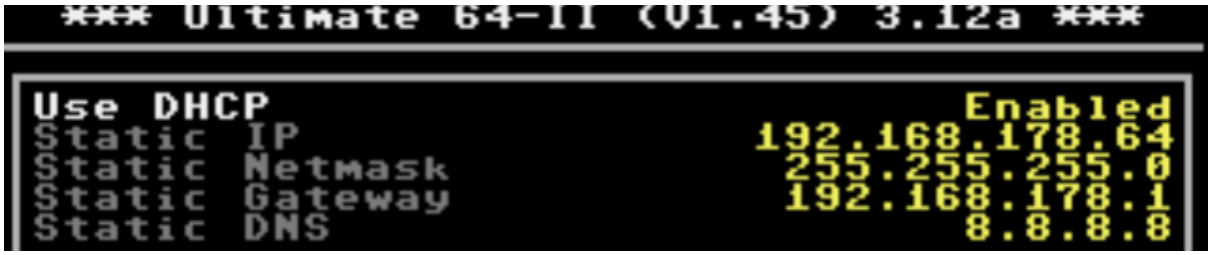


- Log on to Syslog Server
- SNTP Enable

- TimeZone
- Time Server 1
- Time Server 2
- Time Server 3

You can leave most settings as they are, but it's recommended to set the Host Name and Network Password.

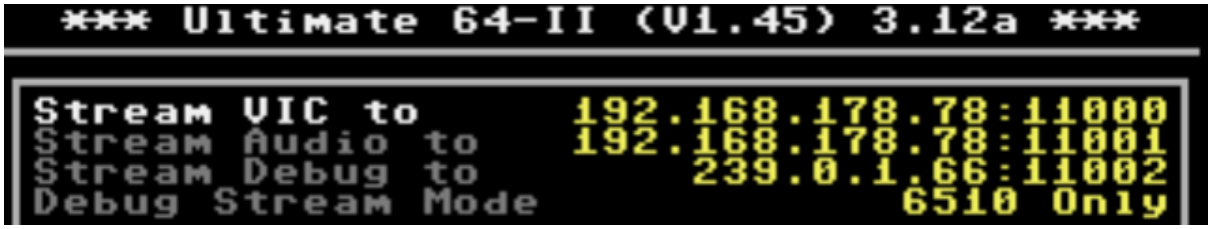
Ethernet Settings



- Use DHCP
  This will use the DHCP service of your router to automatically assign an IP address, subnet mark, gateway IP address and DNS server.
- Static IP
- Static Netmask
- Static Gateway
- Static DNS

  Set the static values to correct values for your network, in case the DHCP service in your network fails.

Data Streams



- Stream VIC to
  Assign an IP-address or host name and a port (default: 11000) on your local network to stream the video signal of the VIC chip to
- Stream Audio to
  Assign an IP-address or host name and a port (default: 11001) on your local network to stream the audio signal of the SID chip to
- Stream Debug to (optional)

- Debug Stream Mode (optional)

WiFi Settings

These settings are similar to the Ethernet Settings, with the additional option of turning the WiFi on or off (WiFi Enabled).

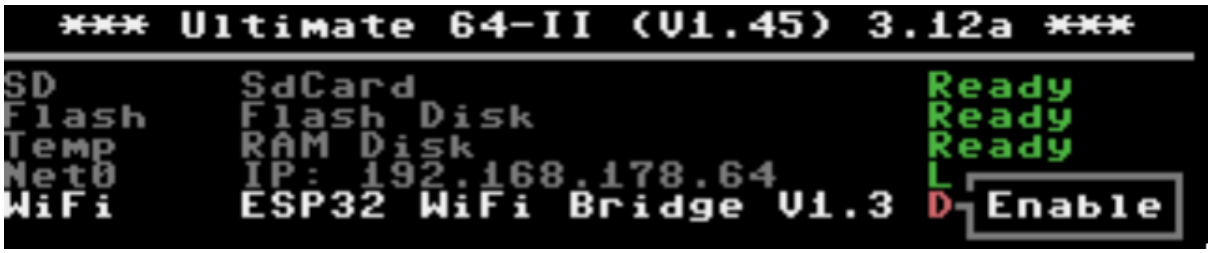
LAN

Once the network settings are complete, simply connect a LAN cable to the C64 and it should work as expected.

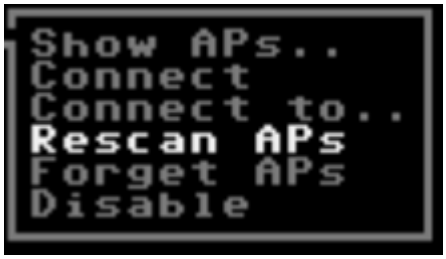
As long as the LAN network interface doesn't have a connection, the menu will show the MAC address instead of an IP address. It's sometimes necessary to enter the MAC address on a router to allow network access or to assign a fixed IP address.

WiFi

To configure the WiFi connection, go to the main menu, select the WiFi adapter and press enter.



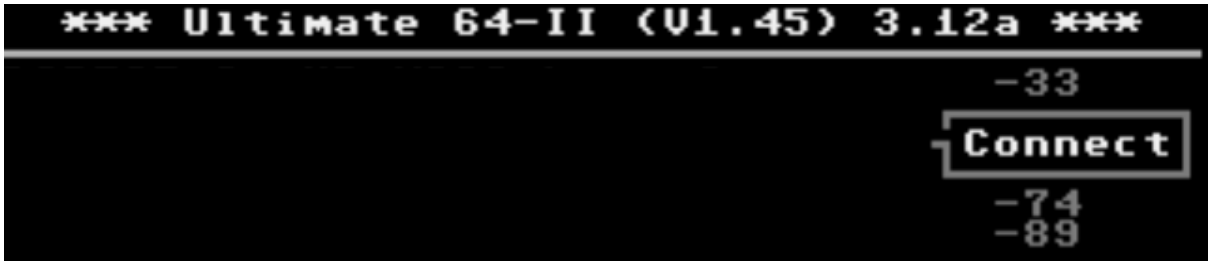
Select Rescan Aps (rescan access points) and press enter.



Now click on Show APs.. to connect to the AP you want to use.

Keep in mind that the Ultimate64 board only supports 2.4 GHz WiFi signals.

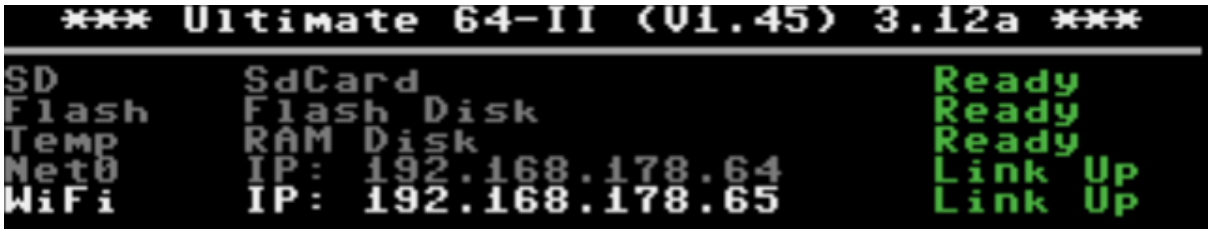
Select the Access Point and press enter,
Then press enter again to connect.



Enter the passkay

There is no confirmation.

Go back and check if the link is up and an IP address has been assigned:



Data Streams

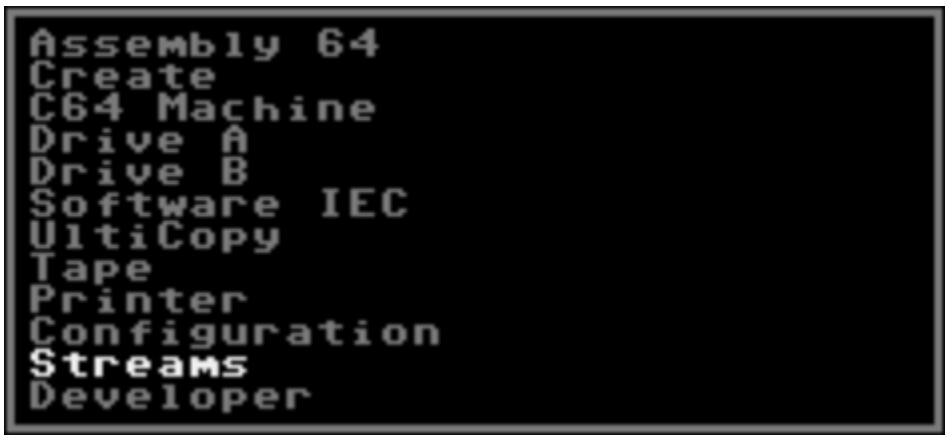
Data Streams allow video and audio output to be streamed to a remote computer within the LAN.

Currently it only works over a LAN connection, not a WiFi connection.

Once the network settings, including the Data Stream IP-address have been configured, the Data Streams can be activated.

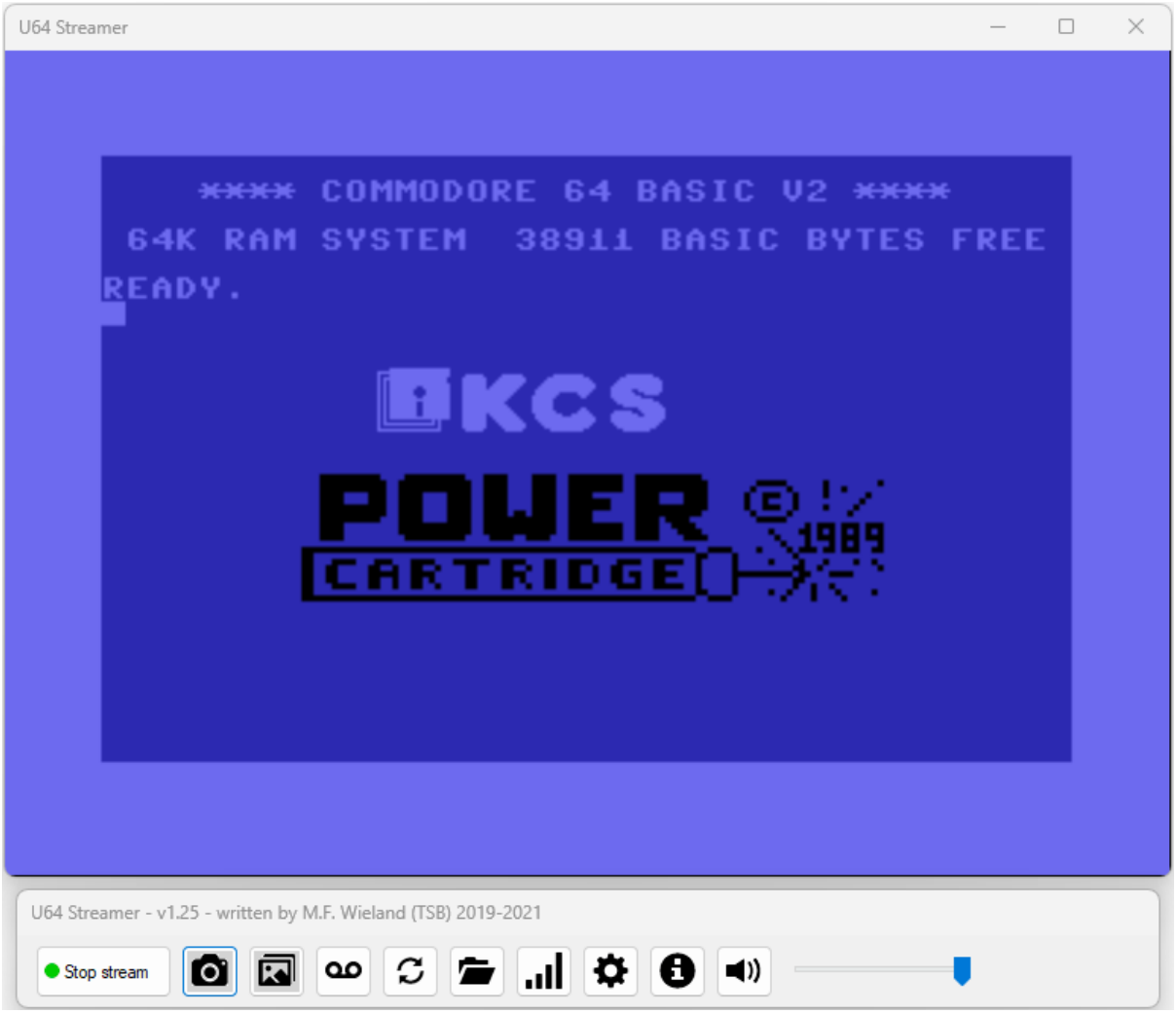
To do this, press the F5 button.

Go to Streams and press enter.



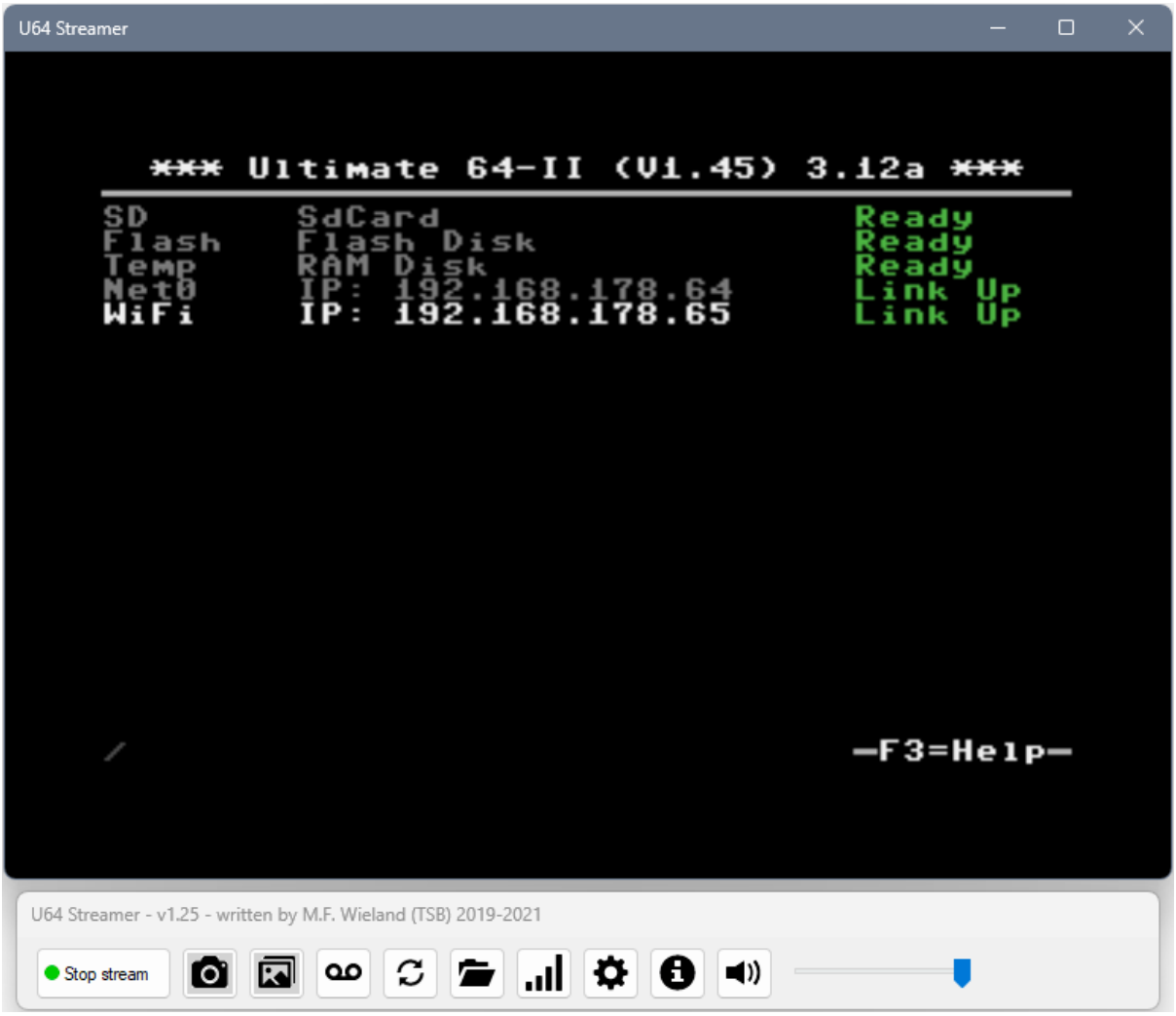
Enable the Streams you want to use.

To see/hear the data streams, use a client, like the U64 Streamer.



The C64 sends audio and video signal to the configured IP-address and port.

To also see the menu through a Data Stream, configure this in the menu:



Press F2 to open the Action menu, then go to User Interface Settings

Go to Interface Type and set it to Freeze.

Overlay on HDMI creates a separate menu next to the C64 windows, but this is only visible on wide screen displays and not in a Data Stream.

Menu structure

F2 menu

- Network Settings
- Ethernet Settings
- LED Strip Settings
- Data Streams
- Audio Mixer
- Speaker Mixer
- SID Sockets Configuration
- UltiSID Configuration\
- SID Addressing
- U64 Specific Settings
- C64 and Cartridge Settings
- WiFi Settings
- SoftIEC Drive Settings
- Printer Settings
- Modem Settings
- User Interface Settings
- Tape Settings
- Drive A Settings
- Drive B Settings

F5 Menu

- Assembly 64
    - New Search
- Create
- C64 Machine
- Drive A
- Drive B
- Software IEC
- UltiCopy
- Tape
- Printer
- Configuration
- Streams
    - VIC Stream (turn VIC Stream on/off)
    - Audio Stream (turn Audio Stream on/off)
- Developer
    - Debug Stream
    - Clear Debug Log
    - Save Debug Log
    - Save EDID to file