Initial OS Installation

Friday, January 3, 2025
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1. Use the Raspberry Pi Imager to clone https://www.linuxcnc.org/iso/rpi-5-debian-bookworm-6.1.61-rt15-arm64-ext4-2023-11-17-1520.img.xz to your SD Card.

2. Boot the Pi with keyboard attached (username: cnc password: cnc)

3. Change the device hostname (if needed)
   [*sudo hostnamectl set-hostname "name-here"*]
   Update the hosts file (change any occurances of "old-hostname" to "new-hostname" and save the file.
   [*sudo nano /etc/hosts*]

4. Enable wireless with the following cmd (if needed)
   [*sudo nmcli d wifi connect "ssid_here" password "password_here" ifname wlan0*]

5. Change password (if needed)
   [*passwd*]

6. Run the following to install updates
   [*sudo apt update -y | sudo apt dist-upgrade -y*]

7. Enable the SPI overlay in config.txt (located in /boot/broadcom/)
   change the following line from
   [#dtparam=spi=on]
   to
   [dtparam=spi=on]

   Validate SPI is enabled (after a reboot)
   [ls /dev/spi*]
   If you do not see 3 devices (listed below), something is wrong and you need to troubleshoot enabling SPI
   {spidev0.0 spidev0.1 spidev10.0}

Build MesaFlash (validate card communication)

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Follow the current build instructions:
https://github.com/LinuxCNC/mesaflash

1. Install these dependencies
   [sudo apt install libpci-dev libmd-dev pkg-config build-essential git]

2. Create a directory for sources
   [mkdir sources]

3. Change to the directory
   [cd sources]

4. Clone the repo locally
   [git clone https://github.com/LinuxCNC/mesaflash.git]

5. Change to the mesaflash directory
   [cd mesaflash]

6. Run Make to build the program
   [make]

7. To build and install from source
   [sudo make install]

Validate card communication:
NOTE: Card must be connected via the 40pin GPIO cable (1.5in length, 2" absolute Max length)
NOTE: Card must be powered externally (not via the Pi cable)

1. Run MesaFlash to verify communication to the card (7c80 & 7c81)
   for 7c80:
   [sudo mesaflash --device 7c80 --addr /dev/spidev0.0 --spi --readhmid]
   for 7c81:
   [sudo mesaflash --device 7c81 --addr /dev/spidev0.0 --spi --readhmid]

   You should get output similar to below. If not, stop here and troubleshoot SPI connectivity / driver issues.
   Configuration Name: HOSTMOT2

   General configuration information:

   BoardName : MESA7C80
   FPGA Size: 9 KGates
   FPGA Pins: 144

If this is successful, continue on to the LinuxCNC build steps

Build LinuxCNC from Source

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Current build instructions are located here: https://linuxcnc.org/docs/devel/html/code/building-linuxcnc.html

1. Change directories to the Sources directory that you created earlier
   [cd ~/sources]

2. Clone the github repo:
   [git clone https://github.com/LinuxCNC/linuxcnc.git linuxcnc-source-dir]

3. Install the required build tools
   [sudo apt-get install build-essential]

4. Change to the "linuxcnc-source-dir" sub-directory
   [cd linuxcnc-source-dir/]

5. Run the following to install build dependencies
   [dpkg-checkbuilddeps]

   NOTE: Install any missing packages, keep re-running the previous command to check for missing packages
   [sudo apt build-dep . .]
   Once no missing packages are found, you may continue

6. Set the following variable (for controlling the package build), and build the package.
   Without Docs - [DEB_BUILD_OPTIONS=nodocs,nocheck dpkg-buildpackage -uc -B -j6]

7. Run the following command to install the packages that you just built.
   [sudo dpkg -i ../linuxcnc*.deb]