October 2021 - wip - Slackware AArch64 is not yet released !

Installing Slackware on the Pinebook Pro

Document name	inst_sa64_cur_rk3399_pinebookpro
Document purpose	Document the installation of Slackware Linux onto the Hardware Model: Pinebook Pro
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Video Tutorial

This tutorial is also available in video form.

Installation Lifecycle

The Installation consists of nine distinct stages:

1. Acquiring all required hardware
2. Setting up local environment to support the installation over the network
3. Downloading the Slackware assets
4. Writing the Initialisation Bootware to the Micro SD card
5. Setup of the Pinebook Pro hardware
6. Initialising the Pinebook Pro with the Bootware
7. Writing the Slackware Installer to the Micro SD card
8. Booting the Slackware Installer
9. Installing Slackware
10. Completing the installation
11. Booting the Slackware OS

Requirements

Hardware

Item	Specification	Notes
Pinebook Pro	Single specification	The Pinebook Pro laptop
Micro SD Card	2GB **minimum**, fast speed, good quality make	Used as Slackware' /boot partition
USB Multi-Card Reader	Must accept Micro SD cards	Used to write the Bootware on your host Linux computer. This isn't required if your host computer has a Micro SD card reader.
NVME Storage Module	Tested: Kingston A2000 SSD = 250G & 500GB	Contains the Slackware Operating System

Item	Specification	Notes
PINEBOOK Pro NVMe SSD Interface Adapter	The specific model for the Pinebook Pro	Required to house the NVME Storage Module
Serial console adapter	3.5“ audio jack wired version	Optional. This is useful for debugging during development, but its use precludes the ability to enable sound on the laptop. Most users will not use the Serial adapter.
PINEBOOK Pro USB-C Docking Deck	The specific model for the Pinebook Pro	Recommended but optional. The Pinebook Pro has no onboard Ethernet, so this is used during the installer (but the installation media can also be stored on a USB stick). For the Slackware Installer, other USB Ethernet adapters can be used - although this is the only one that has been tested.

Computing / Network Environment

Item	Specification	Notes
Host Computer: an Internet-connected computer running an existing Linux distribution	Preferably a full installation of Slackware x86/64, but any distribution that can provide the required Python environment and HTTP server module. The Host Computer needs approximately **5GB free storage** to download the required software assets. **You must be able to obtain *root* access to this Host computer**.	This will be used to download the Slackware distribution from the Internet, and serve the Pinebook Pro client to install Slackware over the LAN (Local Area Network).

Hardware Setup

In this section we'll prepare the physical aspects of the Pinebook Pro to receive Slackware Linux. There are seven distinct parts to this phase:

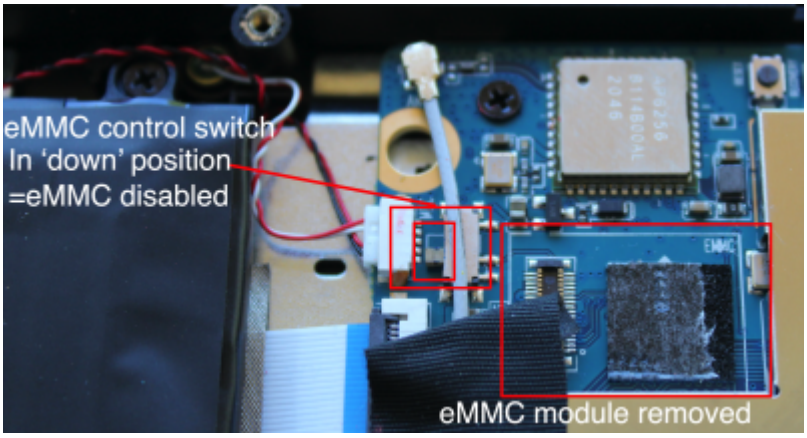
1. Unscrew the case
2. Disable eMMC (and remove storage module)
3. Enable Sound (disabling Serial console)
4. Securely attach NVME to NVME adapter
5. Connect NVME adapter to the main board
6. Securely attach NVME adapter within the Pinebook Pro's case
7. Screw case back together

1. Remove the base cover from the Pinebook Pro

Turn the Pinebook Pro over, and remove all screws

Turn the Pinebook Pro back over to reveal the motherboard and interior

Disable booting from eMMC and remove the eMMC storage module



From the factory, the Pinebook Pro will be provided with an eMMC storage module configured to be enabled. During the development of Slackware AArch64, it was found that the life span of these storage modules is short which makes them inappropriate for housing an Operating System. Whilst

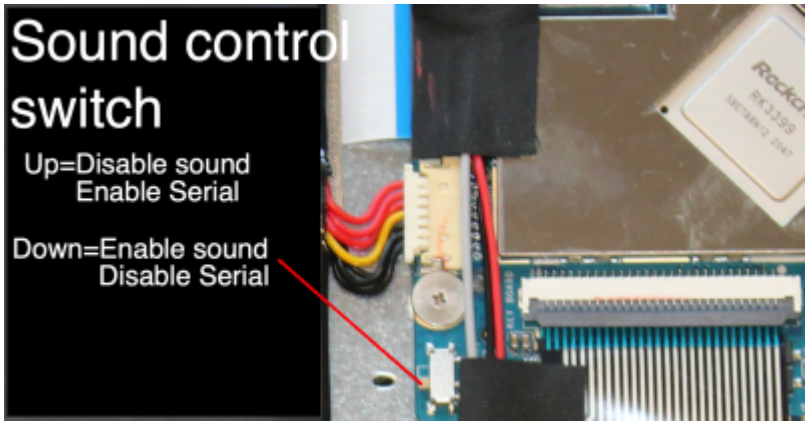
it's possible to use eMMC with Slackware, this documented installation process does not provide a supported path and the eMMC must be disabled.

Move the eMMC control switch into the **down** position.

It's recommended to remove the eMMC storage module (as can be seen in the image) as it won't be used for Slackware and may become loose over time. It's also recommended to retain the eMMC with the original Linux distribution should you require it at some point in the future. If you prefer to keep the eMMC storage here, it **must** be *disabled*.

To remove it, gently lift it up and out with your fingers.

Ensure Sound is enabled



This control switch dictates the usage of the 3.5” audio jack port. However, if you are debugging or developing, you may wish to use the Serial adapter - in which case, set this switch into the 'up' position.

Since this is a laptop, most people will want to enable sound: ensure that the switch is in the **'down' position** (as shown in the image)

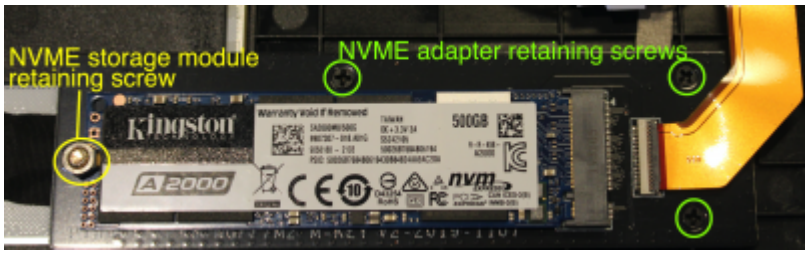
Assemble the NVME adapter and storage module

Connect the ribbon cable to the NVME adapter.

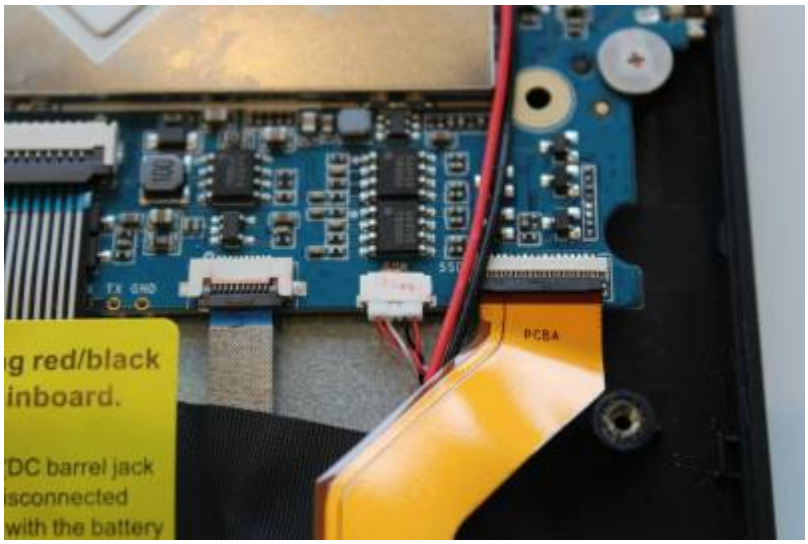
Insert the NVME storage module into the adapter interface:

Secure the NVME storage module to the adapter with a nut and bolt (ensure that the nut and bolt do not exceed the height of the storage module, otherwise the case won't close!)

Secure the NVME adapter within the Pinebook Pro's case using the three screws:



Connect the NVME adapter ribbon to the Pinebook Pro's motherboard:



The hardware set up is now complete and should look like this:

Note that in this image you can see the eMMC module is *disabled* but is physically present. As explained above, if you have somewhere safe to keep it, it's recommended to remove the eMMC module to avoid it becoming loose during use.

Finally, screw the Pinebook Pro's case back together.

The hardware setup is complete.

Software and Network Environment Setup

In this section, we'll prepare the Linux Host Computer to receive and download the Slackware assets required for the installation.

1. Downloading the Slackware Linux AArch64 Distribution and Installation Assets

The '$' prefixes in the commands indicates the shell prompt - it's not to be typed/copied

Open a shell on the Linux Host Computer.

Determine where you are within the Host Computer's Filesystem

```
$ cd
$ pwd
/home/mozes/slackware
```

Note the directory location returned - you'll need this later

Prepare a directory to hold and serve the Slackware Distribution

We'll download the Slackware Linux distribution into a directory named 'slackware'.

The contents of this directory will be served via an HTTP server to the LAN (Local Area Network), so only place the Slackware assets here.

```
$ mkdir slackware
$ cd slackware
```

Installing the Slackware ARM GPG key

The Slackware ARM GPG key will be used to verify the Bootware and Slackware Installation images.

```
$ curl -sSL https://www.slackware.com/infra/keys/arm/GPG-KEY | gpg --import
-
```

Set the version of Slackware AArch64 to download

At the time of writing, the only version available is 'current'.

```
$ SLKVER=current
```

Set the distribution server

If you are using a mirror server rather than the master Slackware ARM server, set it here. The format

is: <hostname>::<rsync module name>

```
$ SLKSRV=ftp.arm.slackware.com::slackwarearm
```

Download the Bootware

Note the period/full stop after the rsync commands - this instructs rsync to download to the current directory (it's not punctuation!)

The U-Boot Boot Loader that will be installed onto the SPI flash:

```
rsync -PavL $SLKSRV/platform/aarch64/bootware/recovery/rk3399/flash-spi-
pinebookpro.img.xz .
```

The Bootware (recovery/initialisation) images are approximately 400KBytes in size.

The Slackware Linux installer for the RK3399 AArch64 platform:

```
rsync -PavL $SLKSRV/platform/aarch64/bootware/installer/slackwareaarch64-
${SLKVER}/rk3399_generic.sdimg_latest.img.xz .
```

The Slackware Installer images are approximately 300MBytes in size.

Verify the assets

Verify the digital signature of the Slackware Installer:

```
$ gpg2 --verify rk3399_generic-sdimg_*.img.xz.asc
```

Verify the digital signature of the Boot Loader:

```
$ gpg2 --verify flash-spi-pinebookpro.img.xz.asc
```

The output will be similar to this. You are looking for 'Good signature from Slackware ARM...'

```
gpg: assuming signed data in 'rk3399_generic-sdimg_5.14.14_1.img.xz'
gpg: Signature made Mon 25 Oct 2021 06:07:44 PM BST
gpg:                using RSA key F7ABB8691623FC33
gpg: Good signature from "Slackware ARM (Slackware ARM Linux Project)
<mozes@slackware.com>" [unknown]
gpg: WARNING: This key is not certified with a trusted signature!
gpg:          There is no indication that the signature belongs to the
owner.
Primary key fingerprint: 36D3 7609 2F12 9B6B 3D59  A517 F7AB B869 1623 FC33
```

Download the Slackware AArch64 tree

You will now download the Slackware distribution. This contains all of the software included within Slackware.

```
rsync \
   --exclude '*/source/*' \
   --delete -Prlvv \
   $SLKSRV/slackwareaarch64-${SLKVER} .
```

The Slackware distribution is approximately 4.5GBytes in size.

Write the Initialisation Bootware to the SD Card

Slackware stores the U-Boot Boot Loader firmware within the SPI flash of the Hardware Models that use the RK3399 SoC (including the Pinebook Pro, RockPro64 et al).

In this step, we'll write the Boot Loader firmware to the same Micro SD card that will later be used to contain the Slackware Installer, and subsequently the Slackware OS' /boot partition. If you have multiple Micro SD cards available, you may prefer to use separate SD cards; but this document assumes the availability of a single Micro SD card.

Elevate yourself to root

On your Host computer, obtain root:

The # prefix indicates that you're using the **root** user

```
$ su -   ## Note the hyphen - it's required
```

Check what block devices are present

Prior to inserting the Micro SD Card into the USB adapter, we need to see what's already present within the OS so that we can easily locate our Micro SD card:

```
# lsblk
NAME   MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
sda      8:0    0 465.8G  0 disk
├─sda1   8:1    0     8G  0 part [SWAP]
└─sda2   8:2    0 457.7G  0 part /
```

As you can see, this Host Computer there is a single storage device - *sda*.

Now insert the Micro SD card into your USB Card Reader and connect the adapter to a free USB port

on the Host Computer.

Run lsblk again:

```
# lsblk
NAME   MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
sda      8:0    0 465.8G  0 disk
├─sda1   8:1    0     8G  0 part [SWAP]
└─sda2   8:2    0 457.7G  0 part /
sdc      8:32   1    58G  0 disk
sdd      8:48   1     0B  0 disk
```

As you can see, *sdc* is 58GBytes in size. This is the Micro SD card (in this example, it's labeled as '64GB' on the exterior of Micro SD card).

If your Micro SD card has existing partitions, you will see them surfaced in this list also.

You'll also observe the presence of *sdd* - often the USB adapter itself obtains a block device. You can ignore this as it's 0Bytes.

Write the Bootware Initialisation Image to the Micro SD Card

Still as the **root** user, we'll switch to the directory to which the the Slackware assets have been downloaded (see earlier steps):

```
# cd /home/mozes/slackware/
```

Write the Bootware Initialisation Image to the device identified as our Micro SD card. You'll then exit the root shell, returning to your usual standard user environment:

All data on this Micro SD Card will be erased! Ensure you have inserted the correct card!

```
# xzcat flash-spi-pinebookpro.img.xz > /dev/sdc  ## Replace /dev/sdc with
the correct block device (presented above by the lsblk tool) on your Host
Computer
# sync
# exit
```

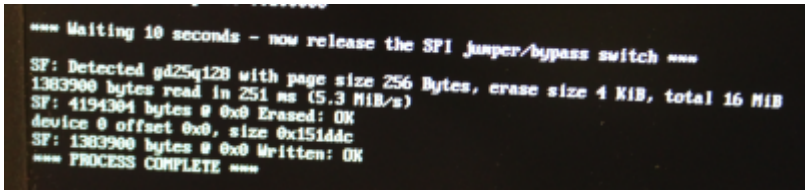
The Bootware Initialisation image is now ready to boot on the Pinebook Pro. You are ready to move into the Hardware Initialisation setup.

Installing the Boot Loader to SPI flash

You need to perform this one-time step to flash a Slackware version of the U-Boot Boot Loader to the SPI flash of the Pinebook Pro.

If you reinstall Slackware you do **not** need to repeat this step, as long as the Slackware version of U-Boot remains within the SPI flash.

1. Connect the power to the Pinebook Pro
2. Disconnect any peripherals (including the Pinebook Pro docking station) from the Pinebook Pro.
3. Insert the Micro SD card into the Pinebook Pro's Micro SD slot (right hand side, below the 3.5“ audio jack port)
4. Open the lid
5. Power on the Pinebook Pro: hold down the Power button (top right of keyboard) for 3 seconds



After a few seconds, you should see a message appearing on the screen - instructing you that the process will begin in 10 seconds' time, and to release the SPI jumper. In most cases you can simply wait until the process begins.

Once the process completes, **power off** the Pinebook Pro : *hold the power button for approximately **8 seconds***.

Any issues with installing to SPI flash

Even if there's an existing distribution that has installed a Boot Loader to the SPI flash, the Slackware Micro SD card Recovery/Initialisation image should boot and work as described above.

However, if not there is a 'Recovery' button on the Pinebook Pro's main board (requires dissassembling) that will 'mask out' the SPI flash to prevent any Boot Loader stored on the SPI flash from being loaded and executed.

The process of masking out the SPI flash is as follows (taken from here):

1. Insert the Slackware Recovery/Initialisation Micro SD card into the Pinebook Pro's Micro SD slot
2. Press and hold 'recovery' button.
3. Quickly press 'reset' button.
4. Release 'recovery' button after about 3 seconds

If this doesn't work, you may need to try a few times. There are other methods also outlined on the Pine64 wiki.

Installation Method: Installing Slackware

Write the Slackware Installer to the Micro SD card. Start the HTTP server on the Linux Host Computer Power on the Pinebook Pro Ensure power is connected throughout the installation process.

Connect the Pinebook Pro docking station (or USB Ethernet adapter if not using the docking station)

Setting screen font for PineBook Pro in post installation screens

*** COLD BOOT - hold down for about 8 seconds after installer

Disconnect any USB devices that aren't required for the OS installation

Start the HTTP server on the Linux Host Computer

As your normal (not root) user on your Linux Host Computer, within the 'slackware' directory you created earlier:

Determine the Linux Host Computer's IP address

We will direct the Slackware Installer to download the packages from your Linux Host Computer, thus require its IP address.

For most basic installations, the following command will provide the correct IP. If your Linux Host Computer has a more complex setup, you'll need to determine the IP address yourself using *ifconfig* or one of the other tools.

```
$ hostname -I
192.168.1.15
```

In this example, the IP address of the Linux Host Computer is 192.168.1.15

Start the HTTP server

On the Linux Host Computer, enter the Slackware distribution tree and start the HTTP web server.

```
$ cd slackwareaarch64-*/
$ python3 -m http.server
```

The HTTP server will remain in the foreground - you may now leave it. We will return to close it post installation.

Installing Slackware

The date on your system may be incorrect:

```
ntpdate clock.akamai.com
hwclock -w
```

Pick option '*5 - Install from FTP/HTTP server*'

```
URL: http://192.168.1.15:8000
Directory: /
```

Pre first boot tweaks

Updating the Operating System Initial RAM Disk. Video tutorial. USing os-initrd-mgr tool. chroot

Post installation tweaks

rc.local ? LCD brightness

```
echo 4000 > /sys/class/backlight/edp-backlight/brightness
```

screen font? Rockpro?

For Rock Pro - fAN

Using the Serial adapter

=====References

```
  https://wiki.pine64.org/wiki/Pinebook_Pro
```

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