

# Boot from USB on your Raspberry Pi

Booting off of your SD card should be fine in most cases, and there's no speed penalty for doing so or anything, but what if you just wanted to boot off your larger USB connected SSD drive to keep things simple? This is how you can do that.

Just don't have an SD card inserted. By default, the Pi will attempt to boot off of its SD card, and if that fails then it will attempt to boot off of the USB drive. A few things to keep in mind, though:

- Ensure that the Pi can read the drive first before attempting to boot off of it.
- USB hard drives take up a lot of power, much more so than standard USB sticks. You probably won't be able to use a full sized mechanical hard drive. But if you are using a 2.5" mechanical or solid-state drive, ensure that you are using the official power supply appropriate to your Pi model. Even on non-official supplies that are otherwise "high enough", the booting procedure takes the most power of all and a non-official power supply may stutter, causing boot issues (or possibly even data corruption!)
- The Raspberry Pi can only boot on devices up to USB 2.0. Some USB 3.0 drives have been reported as bootable, but the official statement is "the Pi cannot boot with USB 3.0 drives".
- The default timeout for checking bootable USB devices is 2 seconds. Some flash drives and hard disks power up too slowly.
- Some flash drives have a very specific protocol requirement that is not handled by the bootcode and may thus be incompatible.

If you'd rather have the Pi prefer to boot from the USB first, or you want to save the split millisecond it spends checking for an SD card, read on.



You can follow the Raspberry Pi's technical documentation about it for older models at <https://www.raspberrypi.org/documentation/computers/raspberry-pi.html#usb-boot-modes> and for newer models at <https://www.raspberrypi.org/documentation/computers/raspberry-pi.html#usb-mass-storage-boot>



Changes made to the OTP bit **cannot be undone**. Be absolutely sure that you want to do this. This is **not necessary** to boot from USB, this just makes the Pi check the USB drive *first*.

## Raspberry Zero/CM1/CM3/1A/1A+

There is no way to make the Pi check the USB device first, it will always check the SD card followed by the USB.

## Raspberry Pi 2B(v1.2)/3A+/3B

These instructions are abbreviated from [this guide](#) and assume you're running Raspberry Pi OS on the device (though it should work with Batocera running as well).

1. Add the line `program_usb_boot_mode=1` to your `/boot/config.txt` on the SD card and boot your Pi.
  1. To do this in an amazing one-liner: `echo program_usb_boot_mode=1 | sudo tee -a /boot/config.txt`
2. Once booted, you can check that the correct bit has been set by running `vcgencmd otp_dump | grep 17:.` If the output is

```
17:3020000a
```

then you're all set to go.

3. You can remove the `program_usb_boot_mode=1` line from `/boot/config.txt` to prevent the bit from being set every boot (it only needs to be done once).
  1. To do this in an amazing one-liner: `sudo sed -i 's/program_usb_boot_mode=1//g' /boot/config.txt`

## Raspberry Pi 3B+

This is its default behavior. In fact, you'd have to go out of your way to make it check the SD card first.

## Raspberry Pi 4/400

### The I33t hAck3r way

1. Boot up Raspberry Pi OS on the Pi 4/400 and access it [via SSH](#) or use its local terminal emulator.
2. Run `sudo rpi-eeprom-update -a` to update the EEPROM
3. Reboot your Pi 4/400 into Raspberry Pi OS again.
4. Run `sudo rpi-eeprom-config` to open up the EEPROM configuration menu
5. Navigate the menus and select your config → boot
6. Put USB first, SD card second
7. Save to the eeprom, then boot into your Batocera USB drive!

Apparently this is reversible, but I wouldn't know how to get back into Raspberry Pi OS to run these commands again (unless you also install Raspberry Pi OS onto a USB drive).

### The recommended way

The recommended process is flashing your bootloader. You will need a spare SD-card to do it (its data will be wiped in the process!)



If the power is interrupted during this process (such as from using a non-official power supply) your Raspberry Pi might be bricked!

1. Download the [Raspberry Pi Imager](#) and run it.
2. Select Misc utility images under Operating System.
3. Select Bootloader.
4. Select the USB boot-mode.
5. Select SD card and then Write.
6. Insert the card into your Pi (without the USB drive) and boot it.
7. Wait 10 seconds. The green activity LED will blink with a steady pattern and the HDMI display will be green on success.
8. Power off the device.
9. Remove the SD card and insert the USB drive.

Your Pi should now boot from the USB drive first.

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