



pico-mac-nano

USER NOTES



Thanks for your interest in pico-mac-nano and we hope enjoy it as much as we enjoyed making it.

Cool, but what is it?

Your pico-mac-nano is a miniature, self contained, functioning replica of the original 1984 Macintosh 128K. The only thing you need to make it boot up is a USB-C charger and cable.

Don't I need a disk?

No. The firmware flashed onto the Pico Zero (the brains of your pico-mac-nano) includes not only the programming to emulate the core Macintosh hardware, add USB support and output the screen image to a tiny LCD panel, it also contains a bootable disk image ... (wait, what??) ...

OK, say you owned a real original Macintosh. To start it up, you would need either a floppy disk or an external hard disk with the Macintosh System on, plus the programs you want to use. A disk image is a copy of such a disk packaged up into a single file in a special format that pico-mac can read. It makes it appear like a real disk to the Macintosh emulator so it appears on your desktop after startup.

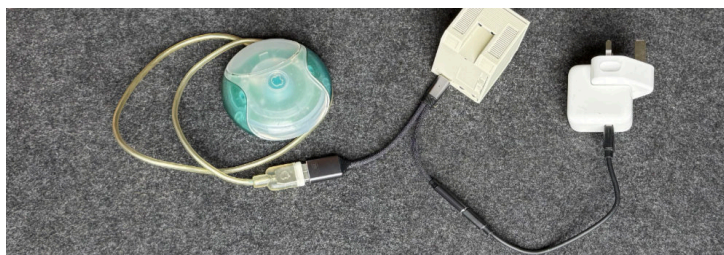
All this just means that your pico-mac-nano can start up and is useable using the built in firmware. The disk image is one Matt Evans put together (the creator of the original pico-mac project) which contains Macintosh System 3.2 plus a small selection of games and utilities.

What if it crashes or I delete something?

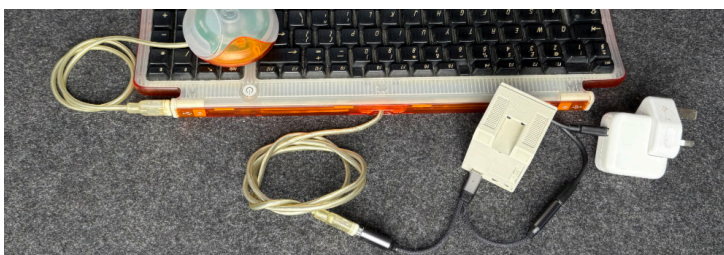
The disk image in firmware is read only which means no matter what you do, just turn it off and on again and it will go back to being exactly as it was before. That's a good thing although it does mean you can't save anything so it's no good for writing your CV.

Controlling pico-mac-nano

To use a USB mouse or keyboard & mouse, plug the OTG (splitter) cable/adaptor you received (you may have received either but they do the same thing) into the USB type-C socket on the back of your pico-mac-nano.



To use just a USB mouse, plug it into the USB type-A socket on the OTG cable/adaptor as shown above.



To use a USB keyboard AND mouse, you need a keyboard that has an integrated USB socket (not every USB keyboard and mouse may work). Plug the keyboard into the OTG cable/adaptor and the mouse into your keyboard as shown above.

Then just plug your USB type-C charger cable into the USB type-C socket on the OTG cable/adaptor and the pico-mac-nano will boot up.

If the keyboard and mouse do not work, try unplugging them from the OTG cable/adaptor while the Mac is still powered on, and plug them back in again. Sometimes pico-mac recognises USB devices plugged in at startup but sometime it needs them plugged in afterwards; I'm currently not sure why!

Limitations

Apart from the pico-mac-nano simply being too small to use for any serious purpose, getting it running on such a low cost microprocessor and fitting it in such a tiny case required some compromises.

It is NOT a fully functional replica of the Macintosh. It does not have a floppy disk drive or any way to connect one. It does not have any of the ports present on the original Macintosh so it cannot be connected to a printer, a network etc.

The built in emulator does not have sound support. Isn't there a speaker module? Well yes, there will be, but this is ONLY so that you can enjoy a facsimile of the original Macintosh beep when you turn it on. That is functionality I added as part of the startup sequence but once running, the Macintosh will output no sound.

The original Macintosh had a screen resolution of 512 x 342 pixels. To be able to get pico-mac-nano anywhere near as small as it is with an available low cost LCD, I had to shave a bit (32 pixels) off the right hand side so it is 480 x 342. It's not just cropping the screen image. The Macintosh ROM file was modified so that it thinks it is driving a 480x342 screen. This means you won't lose important elements of the system interface off the right hand side.

However ... since the Macintosh 128K, 512K, Plus, Classic etc. all had a 512 pixel wide screen, any program that hard codes this rather than requesting the screen size from the system, may have some elements cut off. This typically affects certain games.

Slots

The floppy disk slot on the front of your pico-mac-nano is purely cosmetic. Please don't poke anything into it because the LCD is larger than it looks and extends down behind the floppy disk slot.

The slot on the rear next to the USB-C socket is for a micro-SD card. This is really for geeks only and its use is covered on the original [pico-mac page](#). In case you want to know what you can use it for, here is a quick explanation.

It allows pico-mac-nano to start up from a disk image (remember them from above?) that you, or someone else has put together with a different selection of software on. When pico-mac-nano powers on, it checks to see if it can see a valid disk image file, with a valid Macintosh System, on an inserted micro-SD card. If it does, it boots up from this, otherwise it uses the disk image built into firmware.

This is very cool as it allows other Mac applications, utilities and games from that era to be used on your pico-mac-nano. Unfortunately the process of building a disk image is quite complicated so for the technically challenged. It is documented on the original pico-mac project page.

If you do want to have a crack at a custom disk image, be aware that the original Macintosh only had 128K of memory which was not expandable. Your pico-mac-nano has the same by default, so you can't run later system versions or applications that need more than this.

There was a bit of memory left over after Matt Evans (the pico-mac creator) finished the project. By flashing a modified version of the firmware to your pico-mac-nano, you can make this available to the Macintosh system bringing its available memory up to 208K. Matt reported that this allowed him to run Mac Paint which would otherwise not launch.

For authenticity, we ship all pico-mac-nanos in the original 128K configuration.

How do I take my pico-mac-nano apart?

It is held together by two bolts recessed in the handle recess. The included hex key is for these. The YouTube video on [how to fit the battery module](#) shows how.

Battery Power Module

The custom made circuit board in your pico-mac-nano was designed to take two optional modules. The first is the Battery Power Module (BPM) and what this does is ... OK, that's pretty obvious.

The module can be purchased on 1bitrainbow.com. There is a separate user guide for it and a YouTube video [here](#) on how to fit it if you purchased it separately.



Speaker Module

The second optional add-on is a simple plug-in speaker module which, as of writing, is still in development. As mentioned above, this is ONLY to allow the Mac to beep when it powers on. It produces a 1 second 60Hz tone very similar to the original Macintosh startup beep. The original Macintosh had very primitive sound support but it's weird how this simple beep adds a dimension of life to pico-mac-nano. All pico-mac-nanos have the 2-pin socket on the internal circuit board which the speaker module is plugged into.

More Info

There is an online FAQ for pico-mac-nano [here](#).

If you're interested in how pico-mac-nano came about, see the [project page](#). It is based on the pico-mac project by Matt Evans and you can learn how that came about [here](#).