VICE C64 Emulator for macOS: Installation and User Manual

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1 Introduction

VICE (Versatile Commodore Emulator) is an open-source emulator for Commodore 8-bit computers. On macOS it allows you to run authentic Commodore 64 (C64) software and to experiment with a virtual C64 even if you do not own the original hardware. VICE emulates the C64, C64DTV, C128, VIC-20, PET, Plus/4, and CBM-II series with high accuracy.

This manual focuses on:

- installing VICE on modern macOS systems (Intel and Apple Silicon),

- configuring the C64 emulator variant (`x64sc`) for comfortable use,

- loading and running software (disk, tape, cartridge, and PRG files),

- basic joystick, keyboard, and performance settings,

- taking snapshots, using the built-in monitor, and troubleshooting.

The compiled PDF of this manual is available at `https://hilpisch.com/vice.pdf`.

2 System Requirements

2.1 Minimum and Recommended Requirements

Before installing VICE it is useful to check that your Mac meets basic requirements and, if possible, slightly exceeds them for smoother emulation.

- macOS 12.0 (Monterey) or later for Intel and Apple Silicon Macs,

- at least 100 MB of disk space for the emulator itself,

- an internet connection for initial download.

For the best experience:

- use a recent macOS release (for example Sonoma or later),

- prefer an Apple Silicon Mac for optimal performance,

- consider a USB game controller if you plan to play games extensively.

3 Installing VICE on macOS

3.1 Method 1: Official Download (Recommended)

This path uses the official binaries maintained by the VICE project and is appropriate for most users who prefer a graphical workflow.

Step 1: Download VICE. Visit the official VICE site at `https://vice-emu.sourceforge.io` and download the macOS package that matches your hardware:

- Apple Silicon Macs (M1, M2, M3, M4): choose the GTK3 build labelled for Apple Silicon and macOS 12+.

- Intel Macs: choose the GTK3 build labelled for Intel and macOS 12+.

The GTK3 variants integrate better with macOS than SDL-only builds.

Step 2: Install the application.

- Locate the downloaded `.dmg` or `.zip` in your Downloads folder.

- Double-click to mount or extract it.

- Drag the resulting VICE folder into your *Applications* folder.

Step 3: Bypass macOS Gatekeeper on first launch. Because VICE is not notarised with an Apple Developer certificate, macOS may initially block it.

- Attempt to open the application once; macOS will display a warning.

- Open *System Settings → Privacy & Security* and look for a message about VICE being blocked.

- Click *Open Anyway*, or right-click the app in Finder and choose *Open*.

Advanced users who understand the security implications can relax Gatekeeper more broadly using tools such as `spctl` and `xattr`, but this manual assumes the standard workflow.

Step 4: Launch the C64 emulator. Once installed:

- open the VICE folder in *Applications*,

- open its `bin` subfolder,

- launch `x64sc` for the cycle-accurate C64 emulator.

Other executables emulate different Commodore models (such as `xvic` for the VIC-20 or `x128` for the C128), but `x64sc` is the main focus for the C64 workbook.

3.2 Method 2: Homebrew Installation

If you already use the Homebrew package manager and are comfortable with Terminal commands, you can install and update VICE like any other package.

- ensure Homebrew is installed (see `https://brew.sh`),

- run `brew install vice` in a Terminal,

- start the C64 emulator with `x64sc`.

Homebrew handles dependencies and places the binaries on your `PATH`, which can be convenient if you prefer Terminal workflows.

4 Initial Configuration

4.1 Selecting the Machine Model

After launching `x64sc`, choose a suitable C64 model:

- open *Settings → Model Settings → Machine Model*,

- pick *C64 PAL* (50 Hz) for most European software, or *C64 NTSC* (60 Hz) for many North American releases,

- variants such as C64C use slightly different chip revisions but behave similarly for most purposes.

4.2 Keyboard Mapping

VICE offers two keyboard modes:

- *Symbolic mapping* (recommended): keys produce the same characters as on your Mac keyboard; quotation marks use the standard " key.

- *Positional mapping*: keys mimic the original C64's physical layout; more authentic but requires learning the old positions.

To adjust this:

- open *Settings → Keyboard Settings*,

- select *Symbolic* or *Positional* mapping as desired.

4.3 ROMs and Built-in Components

The C64 needs three ROMs:

- the KERNAL ROM (system routines),

- the BASIC ROM (interpreter),

- the character ROM (font data).

Standard VICE distributions ship with suitable ROM images, so you can start without extra configuration. If you later install alternative ROMs (for example JiffyDOS), configure their locations via *Settings → Machine Settings → ROM Settings*.

5 Loading and Running Software

5.1 Common File Formats

Before loading programs, it helps to know which file types you are looking at and how VICE interprets them. VICE understands several C64 file formats:

- disk images: `.d64`, `.g64`,

- tape images: `.t64`, `.tap`,

- program files: `.prg`, `.p00`,

- cartridge images: `.crt`.

5.2 Smart Attach and Autostart

Smart Attach.

- Use *File → Smart Attach Disk/Tape/Cartridge*.

- Select your image; VICE detects the type and attaches it automatically.

Autostart.

- Use *File → Autostart Disk/Tape Image*.

- Choose a `.d64`, `.t64`, or `.tap` file.

- The emulator loads and runs the first program on the medium.

5.3 Traditional Disk and Tape Loading

If you prefer to mimic the traditional C64 workflow, or when automatic methods fail, you can load disks and tapes manually.

Disk loading.

- Attach a disk image via *File → Attach Disk Image → Drive 8*.

- At the C64 prompt, list the directory:

```
LOAD"$",8
LIST
```

- Load a specific program:

```
LOAD"PROGRAMNAME",8
RUN
```

- Shortcut for the first program:

```
LOAD"*",8,1
RUN
```

Tape loading.

- Attach a tape image via *File → Attach Tape Image.*

- At the prompt, type:

```
LOAD
```

- When prompted to "PRESS PLAY ON TAPE", use the *Datasette* menu to press play.

6 Joystick and Controller Setup

6.1 Joystick Ports and Keyboard Joystick

The C64 has two logical joystick ports; most games use port 2 by default. In VICE, the simplest default is to emulate a joystick on the keyboard and treat physical controllers as optional extras.

- Open *Settings → Joystick Settings.*

- Assign *Joystick #2* to a keyset (for example Keyset A).

- Configure the keyset with your preferred keys for directions and fire.

6.2 Using USB Controllers

In addition to keyboard emulation, you can map real USB gamepads or joysticks to the C64 joystick ports.

- Connect your USB controller before launching VICE.

- In *Settings → Input Devices → Joystick*, select the controller for *Joystick 1* or *Joystick 2*.

- Use the *Swap Joysticks* command or `Alt+J` / `Meta+J` if a game expects input on the other port.

7 Essential Shortcuts and Warp Mode

7.1 Core Hotkeys

On macOS, VICE assigns many actions to combinations with `Alt` or `Meta`:

- `Alt+W`: toggle Warp Mode (run as fast as possible),

- `Alt+D`: toggle fullscreen,

- `Alt+P`: pause/resume emulation,

- `Alt+R`: soft reset,

- `Alt+Shift+R`: hard reset,

- `Alt+Q`: quit.

7.2 Warp Mode

Warp Mode removes speed limits and is particularly useful when:

- fast-forwarding through long loading sequences,

- skipping ahead in demos or intros.

Toggle it on and off with `Alt+W` or via *Settings → Warp Mode*. Be aware that sound output may be degraded or disabled in Warp Mode to maximise speed.

8 Snapshots, Audio, and Video

8.1 Saving and Restoring Snapshots

Snapshots let you freeze the entire emulator state and resume later, which is especially handy when experimenting with low-level code or games that are hard to reach.

- Use *Snapshot → Save Snapshot Image* to save a `.vsf` file capturing the entire emulator state.

- Later, *Snapshot → Load Snapshot Image* restores that exact state.

- Configure preferred snapshot directories in the *Snapshot* menu.

8.2 Audio Settings

Sound settings control both audio quality and CPU load.

- Adjust *Settings → Sound Settings* for sample rate and buffer size.

- Choose a SID emulation engine in *Settings → SID Settings* (for example FastSID vs ReSID) depending on your CPU budget and accuracy needs.

8.3 Video Settings

Video settings determine how the C64 screen is scaled and rendered on your Mac display.

- Use *Settings → Video Settings* to control scaling, aspect ratio, and PAL emulation.

- Toggle fullscreen with `Alt+D` or via the same menu.

9 Drive Emulation and Cartridges

9.1 True Drive Emulation

- *True Drive Emulation* simulates the original 1541 drive more faithfully, improving compatibility with some copy-protected or timing-sensitive software.

- Enable it in *Settings → Drive Settings* when you encounter loading issues.

9.2 Cartridge Images

- Attach cartridge files (`.crt`) via *File → Attach Cartridge Image.*

- Detach cartridges via the same menu when returning to disk- or tape-based software.

10 The Built-in Monitor

VICE includes a machine-language monitor for debugging and exploring low-level behaviour.

- Activate it via *Machine → Activate Monitor.*

- Use commands like `r` (registers), `d` (disassemble), `m` (memory), and `break` (set breakpoints).

- `exit` or `x` returns to normal emulation.

The monitor is especially useful when following along with assembly examples in the C64 workbook and in Chapter **??** of the main book.

11 Configuration Files and Troubleshooting

11.1 Configuration Files

- On macOS, VICE typically stores settings in `~/.config/vice/vicerc` or (for older versions) `~/.vicerc`.

- Use *Settings → Save Settings* or *Save Settings on Exit* to persist your configuration.

11.2 Common Issues and Fixes

- *Application blocked:* use the *Open Anyway* option in macOS *Privacy & Security* settings, or right-click and choose *Open.*

- *No sound:* check sound settings, disable Warp Mode, and ensure the correct audio device is selected.

- *Games do not load:* try different loading methods, switch PAL/NTSC model, or enable True Drive Emulation.

- *Joystick or controller issues:* confirm device selection, swap joystick ports, or fall back to keyboard keysets.

- *Keyboard mapping oddities:* verify symbolic vs positional mode and disable conflicting macOS shortcuts if needed.

12 Where to Find Software and More Information

12.1 Finding C64 Software

- Look for legal sources offering freeware or public-domain titles, and only download software you are entitled to use.

- Modern homebrew sites and curated archives often provide ready-to-run disk images.

12.2 Official Documentation and Communities

- Official VICE documentation: `https://vice-emu.sourceforge.io/vice_toc.html`.

- Community forums and chat: long-running C64 communities and VICE-specific channels provide up-to-date tips and troubleshooting help.

13 Quick Reference Card

Task	Action
Start C64 emulator	Launch `x64sc`
Load and run first program from disk	Attach image, then `LOAD"*",8,1` and `RUN`
Toggle Warp Mode	`Alt+W`
Toggle fullscreen	`Alt+D`
Reset	`Alt+R` (soft), `Alt+Shift+R` (hard)
Swap joysticks	`Alt+J`
Save snapshot	*Snapshot → Save Snapshot Image*
Open monitor	*Machine → Activate Monitor*
Quit	`Alt+Q`

References

This manual condenses information from the official VICE documentation and several community resources:

- Official VICE project site and manual: `https://vice-emu.sourceforge.io`

- VICE macOS notes and release news for version 3.9

- Homebrew formula details for `vice` at `https://formulae.brew.sh/formula/vice`

- Community guides and discussions on platforms such as Lemon64, RetroPie, and Reddit's `/r/c64` and `/r/retrocomputing`, which document practical tips for macOS users.

For the most current and detailed information, always cross-check with the latest official VICE documentation and release notes.