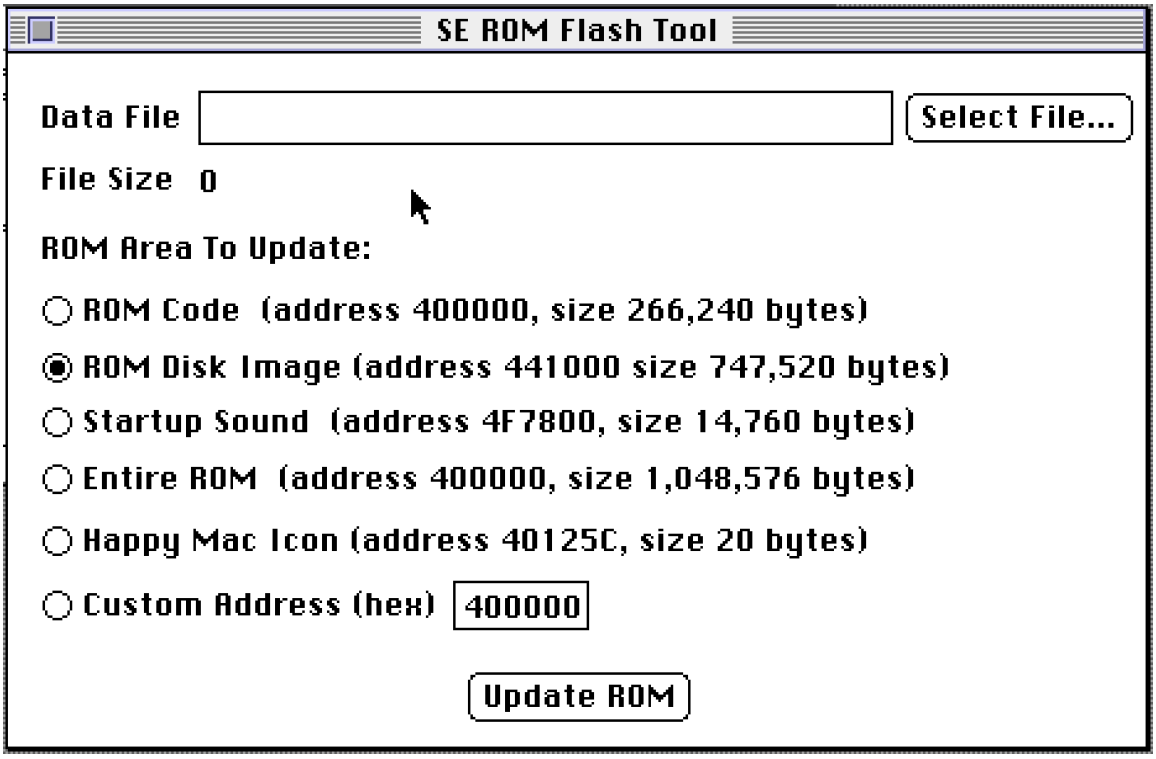
SE ROM Flash Tool

V1.2 User Guide

Reflash the SE ROM-inator from inside the Mac. No chip puller, no programmer.



© Kero's Mac Mods, Infinity Products Co., Ltd.
www.kerosmm.com · en.infinityproducts.co.jp/shop-1

What it is

SE ROM Flash Tool rewrites the flash chips on an SE ROM-inator while they sit in the Mac. You can swap the ROM disk, the startup sound or the Happy Mac face, or put the whole ROM back to stock V1.2. It's built on Steve Chamberlin's Plus ROM Flash Tool (Big Mess o' Wires), with the addresses and sizes changed for the SE and a few fixes on top.

It's for the SE ROM-inator only. The Plus ROM-inator has its own tool (Plus ROM Flash Tool 1.7), and the two aren't interchangeable.

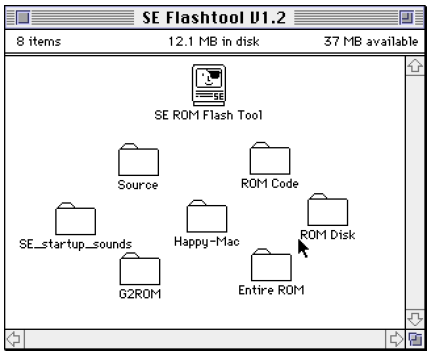
The flash chips it knows are the SST39SF040, the Am29F040 and one more type I've added for newer kits.

Downloads

File	What it is
SE-FLASH-V12.sit mega.nz (SE-FLASH-V12.sit)	The SE Flashtool V1.2 folder as a StuffIt archive. Expand it on the Mac, or on a modern Mac and copy it over.
HD6_SE_FlashTool_608.hda mega.nz (HD6_SE_FlashTool_608.hda)	SCSI disk image. A ready-to-boot System 6.0.8 hard disk with the same folder already on it (plus Plus ROM Flash Tool 1.7). Drop it on a BlueSCSI SD card and boot. The HD6 in the name puts it on SCSI ID 6; rename it if that ID is taken.

What's in the folder

Item	What it's for
SE ROM Flash Tool	The app. Run this.
ROM Code	V1_2_ROM_Code.bin (for SE FDHD) and V1_2_early_ROM_Code.bin (for the early 1987 SE).
ROM Disk	ROM-Disk_608SE.dsk, the stock System 6.0.8 ROM disk, and Blank-ROM-Disk_clean.dsk, an empty one to fill with your own files.
SE_startup_sounds	20 ready-made startup sounds, with SE_startup_sounds_index.txt describing each one.
Happy-Mac	Happy Mac faces: Steve's set (HappyMac_Faces_BMOW, used with permission) and mine (HappyMac_Faces_Keros).
G2ROM	V1_2_G2ROM_Boot_Manager.bin and a README. Only needed if you're repairing the Boot Manager.
Entire ROM	The full 1MB V1.2 image, one for FDHD and one for the early SE.
Source	THINK C project and source code.



Before you flash

Read this first
Don't switch the Mac off or reset it while the tool is writing. It works in 128K blocks: it reads a block out of the ROM, erases it and writes it back with your data in it. Even a 20-byte Happy Mac face erases a whole block for a moment. Lose power right then and the Mac won't boot. Getting it back means pulling the chips and writing them with a programmer.
Take any accelerator out before flashing.
Keep copies of your ROM files somewhere other than the Mac you're flashing.

A few other things worth knowing:

• Boot from a floppy or hard disk, not the ROM disk, when you change the ROM disk, ROM Code or Entire ROM. You don't want to rewrite the disk you're running from.
• ROM Code, Entire ROM and any Custom write that touches the bottom of the ROM need about 512K of free memory. The tool holds those blocks in RAM and writes them last.
• The SE ROM-inator chips stay where they are. Nothing needs to be unplugged.

How to use it

1. Copy the file you want to flash onto the Mac.
2. Run SE ROM Flash Tool and click **Select File...** to pick it. Its size shows up under File Size.
3. Pick the area you want to update under ROM Area To Update.
4. Click **Update ROM** and confirm.
5. Wait. For most areas you'll get "ROM update finished successfully". ROM Code, Entire ROM and Custom writes that touch the bottom 384K don't show that message: the Mac restarts by itself when they're done.

If the file is the wrong size for the area you picked, the tool says "File size is not valid for the selected update area" and nothing gets written.

Update areas

Area	Address	Size	Notes
ROM Disk Image	441000	747,520 bytes exactly	A raw 730K disk image, no Disk Copy header.
ROM Code	400000	266,240 bytes exactly	The 256K SE ROM plus the 4K ROM disk driver. Restarts when done.
Startup Sound	4F7800	up to 28,672 bytes	Padded or trimmed to 14,760 bytes. See below.
Entire ROM	400000	1,048,576 bytes exactly	Everything. Restarts when done.
Custom Address	you type it	must fit in the 1MB	Hex, any even address from 400000 to 4FFFFF.
Happy Mac Icon	40125C	20 bytes exactly	The 16×10 face inside the startup icon.

ROM disk

The ROM disk is 730K and the image has to be exactly 747,520 bytes, with no header. ROM-Disk_608SE.dsk is the one the kit ships with.

To make your own, start from Blank-ROM-Disk_clean.dsk. Mount it in Kero's SE WevMac (see Tools on kerosmm.com below), Mini vMac, Basilisk II or Disk Copy, put a System Folder and whatever apps you want on it, then flash it. A bootable System 6.0.8 plus a few small apps fits fine. Don't resize the image, or the tool will refuse it.

ROM Code

There are two, and they're not interchangeable. Use the one that matches the ROM Code box ticked on your packing list:

File	For
V1_2_ROM_Code.bin	SE FDHD (1.4MB floppy) ROM
V1_2_early_ROM_Code.bin	Early 1987 SE ROM (800K floppy)

Honestly, you shouldn't need to touch ROM Code. It's here for repairs. ROM Code and the Boot Manager are a matched pair: if you write one, the other has to be V1.2 too. If you're not sure what state the ROM is in, write the Entire ROM instead.

Entire ROM

V1_2_FDHD_608SE_Entire_ROM.rom and V1_2_Early_608SE_Entire_ROM.rom put the whole chip set back to how it shipped: ROM code, Boot Manager, stock ROM disk and the default startup sound. Anything you changed is overwritten. Pick the one for your ROM type.

Startup sound

The SE plays 14,760 bytes at startup, about two thirds of a second. The format is:

```
8-bit unsigned PCM, mono, 22,050 Hz, raw, no header
```

Your file doesn't have to be exactly that size. The tool fixes it:
• Shorter: the end fades out over 30 ms and the rest is filled with silence.
• Longer: it's cut at 14,760 bytes, with a 30 ms fade at the cut so it doesn't click.
• Exactly 14,760 bytes: written as is.
The finished message tells you if it padded or trimmed. Files over 28,672 bytes are refused, and so are WAV and AIFF files, because their header would play as noise.

The 20 sounds in SE_startup_sounds are already the right size. The five BMOW_ ones are Steve's, from the Plus ROM-inator.

To make your own, the easiest way is the Startup Sound Editor on my site (see Tools on kerosmm.com below). If you'd rather use Audacity: set the project to mono and 22,050 Hz, then export as "Other uncompressed files" with Header: RAW (header-less) and Encoding: Unsigned 8-bit PCM.

The startup sound always plays at full volume, whatever the volume setting is.

Happy Mac face

Happy Mac Icon replaces just the face inside the Happy Mac you see at startup: 16×10 pixels, 20 bytes. The Mac outline stays the same. There are faces in the Happy-Mac folder to try. To draw your own, use the Happy Mac Face Editor (see Tools on kerosmm.com below).

Tools on kerosmm.com

These free tools on my site go well with SE ROM Flash Tool. They run in a modern web browser with nothing to install. The two editors save files at the exact size and format the tool wants.

Startup Sound Editor

www.kerosmm.com/startup-sound-editor

Open a WAV, MP3 or M4A file (other formats work if your browser can play them). Drag on the waveform or nudge the start point in 1 ms or 10 ms steps, or let Find start pick it. The shaded part is what the SE will play, 0.66 seconds from the start point. The editor mixes it to mono, resamples it to 22 kHz, brings it up to full volume without clipping and fades out the last 30 ms. You can play it back against the original before you save. Save sound gives you a 14,760-byte raw file for the Startup Sound area.

Happy Mac Face Editor

www.kerosmm.com/happy-mac-face-editor

Draw the 16×10 face by clicking or dragging inside the Happy Mac's screen, with a live preview at actual size, 2× and 4×. Clear, Fill black, Invert, Flip and the arrow buttons help with quick edits. There's a set of ready-made faces to start from, and you can open a face file or paste its 20 bytes of hex. Save face gives you a 20-byte file for the Happy Mac Icon area.

Kero's SE WevMac

www.kerosmm.com/se-wevmac

A Mac SE emulator in your browser, built on Mini vMac with the stock SE FDHD ROM. It's the handy place to build a ROM disk: insert Blank-ROM-Disk_clean.dsk, boot from a disk image of your own, copy what you want onto the ROM disk, then download the edited image and flash it. It takes .dsk and .hda images, the same ones BlueSCSI uses. There's also a Mac app version, SE vMac Desktop, on the same page.

Custom Address and the Boot Manager

Custom Address writes a file anywhere in the flash. Type the start address in hex. Only use it if you know exactly what lives at that address.

The one place you might need it is the Boot Manager. If it ever gets damaged, flash V1_2_G2ROM_Boot_Manager.bin with Custom Address **4FB1D0**. It's the same file for FDHD and the early SE. The tool reads back the rest of that block before erasing it, so the startup sound next to it survives.

If something goes wrong

Message	What it means
File size is not valid for the selected update area	Wrong file, or the right file for a different area. Nothing was written.
Looks like a WAV or AIFF file...	Convert it to raw 8-bit unsigned PCM first (see Startup sound).
Not enough memory for this update. It needs about 512K free.	Quit other apps, or turn off a RAM disk or cache, and try again.
Error: Flash ID ... did not match any known device ID	The tool couldn't talk to the flash chips. Check that both chips sit the right way round in PCB A, that the J1–J2 cable is in, and that the 16V8 on PCB B is seated. If an accelerator is fitted, take it out.
ROM update failed, sector erase did not begin / did not complete	The chips didn't respond in time. The ROM may be half written. If the Mac still runs, don't restart. Try the same update again first.
ROM update failed, byte programming did not complete	Same as above.

If the Mac won't boot after a failed update, pull the HI and LO chips and write the Entire ROM files back with a programmer. The Entire ROM image is 1MB; split it into HI and LO bytes (even bytes to HI, odd bytes to LO) for the two chips.

Credits

SE ROM Flash Tool is based on Plus ROM Flash Tool by Steve Chamberlin, Big Mess o' Wires. Steve helped me a lot getting it working on the SE. The ROM disk idea goes back to bbraun. SE changes and V1.2 by Kay Koba, Kero's Mac Mods.

Steve Chamberlin, Mac ROM-inator: www.bigmessowires.com/mac-rom
bbraun, 68k Mac ROM boot disk: synack.net/~bbraun/macromboot.html

Questions or problems: www.kerosmm.com