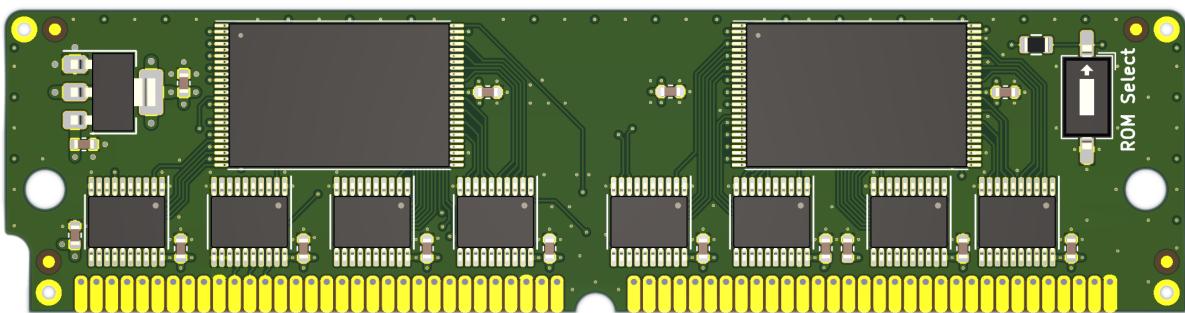


Garrett's Workshop

GW4402A

8MB ROM SIMM for Macintosh SE/30 and Macintosh II-series

User's Guide



GW4402A was designed by Zane Kaminski and Garrett Fellers

Overview

The GW4402A 64-pin ROM SIMM replaces the ROM SIMM of a Macintosh II-series or Macintosh SE/30 computer. GW4402A comes preprogrammed with a customized, 32-bit clean Macintosh ROM. The customized ROM allows your Macintosh to use more than 8MB of RAM and features a 7.5MB bootable ROM disk preloaded with System 7 and several utilities.

Compatibility

GW4402A is compatible with the following Macintosh computers:

- Macintosh IIx
- Macintosh IICx
- Macintosh IICi
- Macintosh IIfx
- Macintosh IIsi
- Macintosh SE/30

Fast Startup

It takes about 10 seconds to boot from the included ROM-based System 7.1, so you can begin working with programs or playing games almost instantly.

ROM Disk Settings

A control panel allows your preferences for the built-in ROM disk to be changed. You can boot from the ROM disk, mount it under another boot disk, or hide it from the desktop completely. Of course, you can always press "R" during startup to boot from ROM independent of your saved preferences.

It's also possible to enable RAM disk mode, which allows writing data to the ROM disk, although data stored is not retained between restarts. The RAM disk is enabled by pressing "A" during startup, or by enabling the corresponding setting in the control panel.

Dual ROM Images

In addition to the customized ROM with the System 7 ROM disk, GW4402A also includes an unmodified Macintosh IIsi ROM image. The desired ROM image can be selected using the DIP switch in the upper right corner of the board. Both ROM images can be rewritten using a ROM SIMM Programmer such as the one from Big Mess o' Wires.

Ecologically Friendly, Gold-Plated PCB

GW4402A features a lead-free, ENIG gold-plated, 4-layer PCB and is fully EU RoHS-compliant. All units are tested extensively before shipment. Only new parts are used to build GW4402A, and all GW4402A ROM SIMM modules are manufactured in our semi-automated facility in Columbus, Ohio, in the United States.

Open-Source Design

GW4402A's design is fully open-source. The schematics, board layouts, and driver software are all freely available for commercial and noncommercial use. To download the design files, visit the Garrett's Workshop GitHub page: <https://github.com/garrettsworkshop>

Installation

The GW4402A ROM SIMM is installed into the ROM SIMM slot on your Macintosh's motherboard. On Macintosh II-series machines, the ROM SIMM socket is accessible by just removing the computer's top cover. On Macintosh SE/30 machines, the computer must be disassembled and the motherboard removed in order to install the SIMM.

Installation Procedure for Macintosh SE/30

To install the GW4402A ROM SIMM in a Macintosh SE/30 computer, disassemble the computer and remove the motherboard. On the motherboard, locate the ROM SIMM socket. Remove the existing ROM SIMM if one is installed, replace it with the new SIMM, then reassemble the computer.

Installation Procedure for Macintosh IIcx and IIci

To install the GW4402A ROM SIMM in a Macintosh IIcx or Macintosh IIci computer, open the machine's top cover and locate the ROM SIMM socket as well as the jumper labeled "W1."

Remove the "W1" jumper, install the ROM SIMM in the ROM SIMM socket, replacing any ROM SIMM already in the socket, then reassemble the computer.

Installation Procedure for Macintosh IIsi

To install the GW4402A ROM SIMM in a Macintosh IIsi computer, open the machine's top cover and locate the ROM SIMM socket as well as the jumper labeled "W1." **Install** the "W1" jumper, install the ROM SIMM in the ROM SIMM socket, replacing any ROM SIMM already in the socket, then reassemble the computer.

Installation Procedure for Macintosh IIx and IIfx

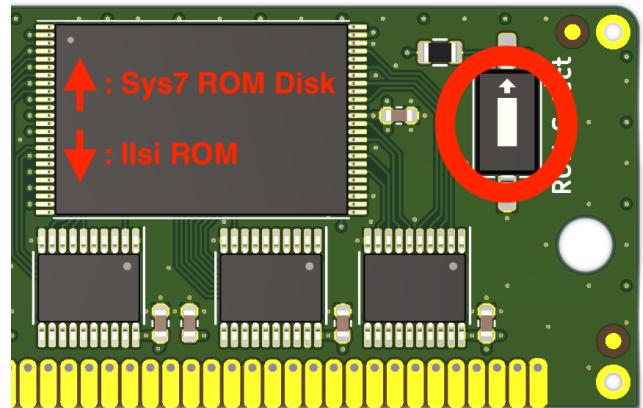
To install the GW4402A ROM SIMM in a Macintosh IIx or Macintosh IIfx computer, open the machine's top cover and locate the ROM SIMM socket. Remove the existing ROM SIMM if one is installed, replace it with the new SIMM, then reassemble the computer.

ROM Select DIP Switch

The "ROM Select" DIP switch allows you to select between the customized ROM with ROM disk and an unmodified Macintosh IIsi ROM. To enable the ROM disk, set the switch to the upper position. To use the unmodified Macintosh IIsi ROM, set the switch to the lower position.

Reinforcing Clips for ROM SIMM Sockets

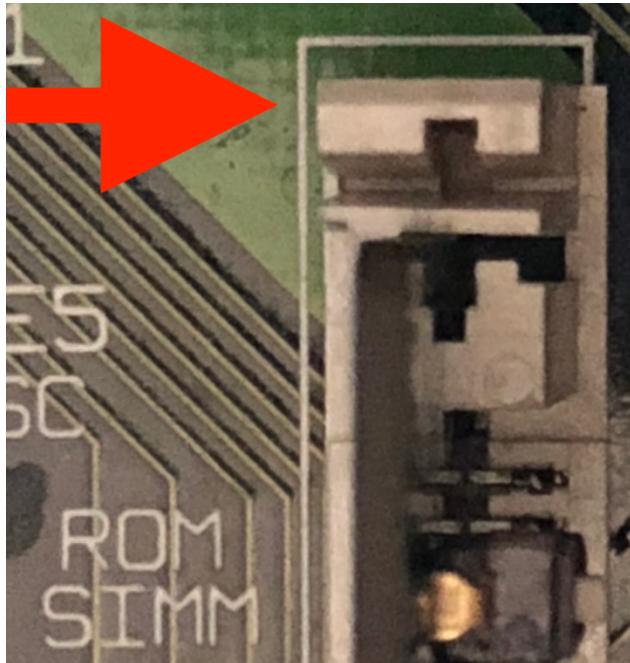
Many Macintosh models made before 1991 use a ROM SIMM socket with plastic retaining clips. Over time, these clips tend to weaken and may no longer hold a ROM SIMM in proper contact with the contact pins in the socket. To address this problem, plastic reinforcing clips are included with the ROM SIMM. These fit over the sides of the ROM SIMM socket and brace the SIMM, ensuring good electrical contact. Later Macintosh models have a ROM SIMM socket with metal clips and do not require any extra reinforcement. If your Macintosh's ROM SIMM socket has metal clips on the sides, you do not need to install the reinforcing clips. However, if your



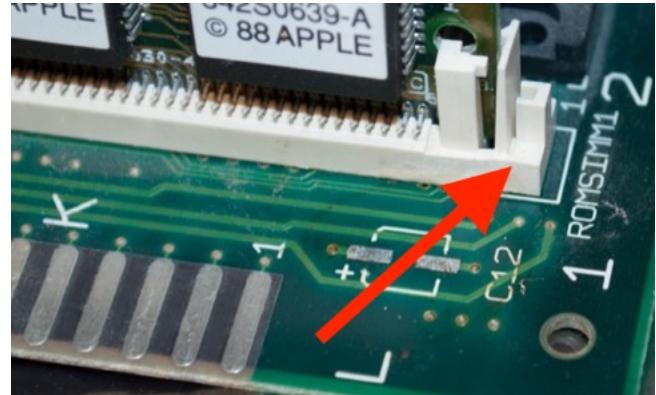
Macintosh's ROM SIMM socket has plastic clips on the sides, we recommend installing the reinforcing clips.

Two sets of two clips are included with the ROM SIMM, corresponding to the two types of ROM SIMM socket with plastic clips used on Macintosh II-series and SE/30 motherboards. Before installing the reinforcing clips, you must determine the type of ROM SIMM socket used on your Macintosh.

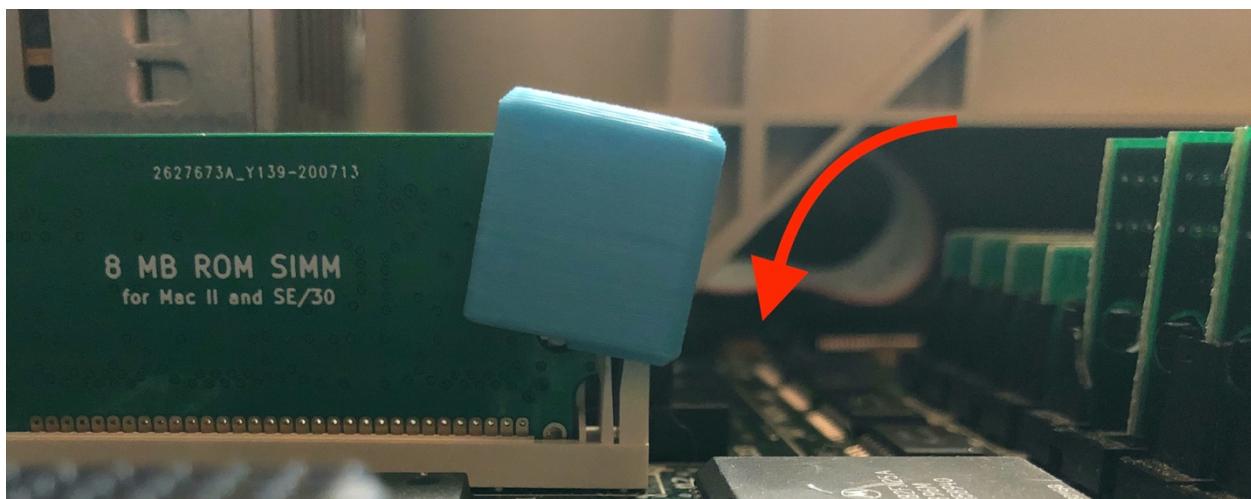
Some sockets have a flat edge:



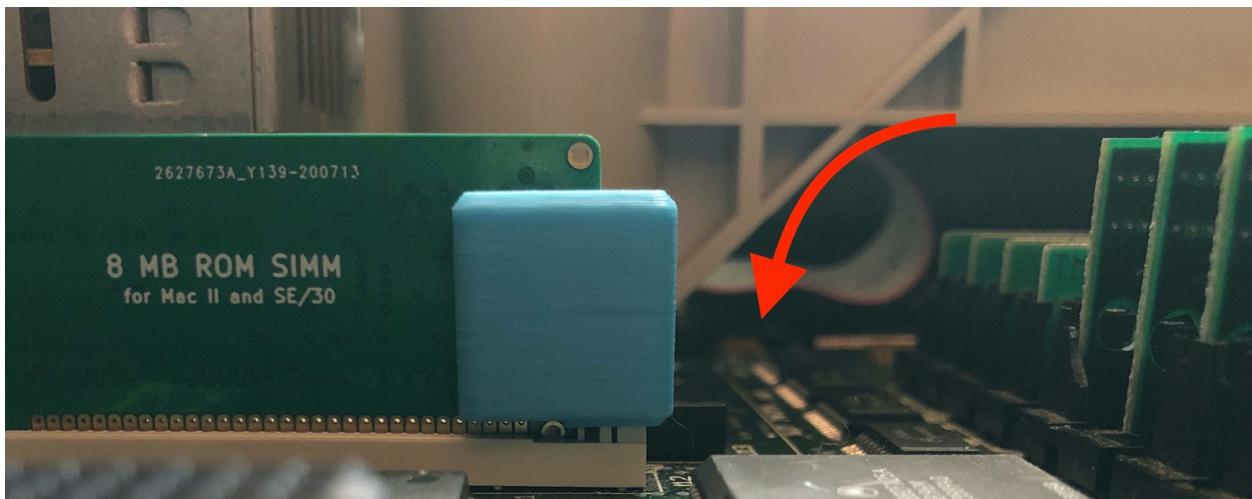
Other sockets have a cross-shaped edge:



After identifying the type of ROM socket in your machine using the pictures above, select the correct set of reinforcing clips. If your ROM SIMM socket has metal tabs, you do not need to install the reinforcing clips. After installing the ROM SIMM itself into the socket, slide the correct type of clip over the edge of the ROM SIMM socket. First you may have to angle the reinforcing clip onto the side of the socket like so:



Then push down to slide the clip downward until the clip is fully seated on the SIMM socket:



Booting from the ROM Disk

To boot from the ROM disk, ensure the “ROM Select” DIP switch is set to the upper position and press “R” repeatedly while powering up the Macintosh, until the “Welcome to Macintosh” screen appears. If you require a writable boot disk, for example to use AppleTalk, you can repeatedly press “A” instead and the system will boot from ROM but copy the contents of the ROM disk into RAM. The RAM disk function allows the boot volume to be modified temporarily but requires at least 16 MB of RAM memory.

Mounting the ROM Disk

By default, when booting from a volume other than the ROM disk, the ROM disk volume is mounted on the desktop as would be any other drive. This functionality can be disabled using the GW ROM Disk control panel.

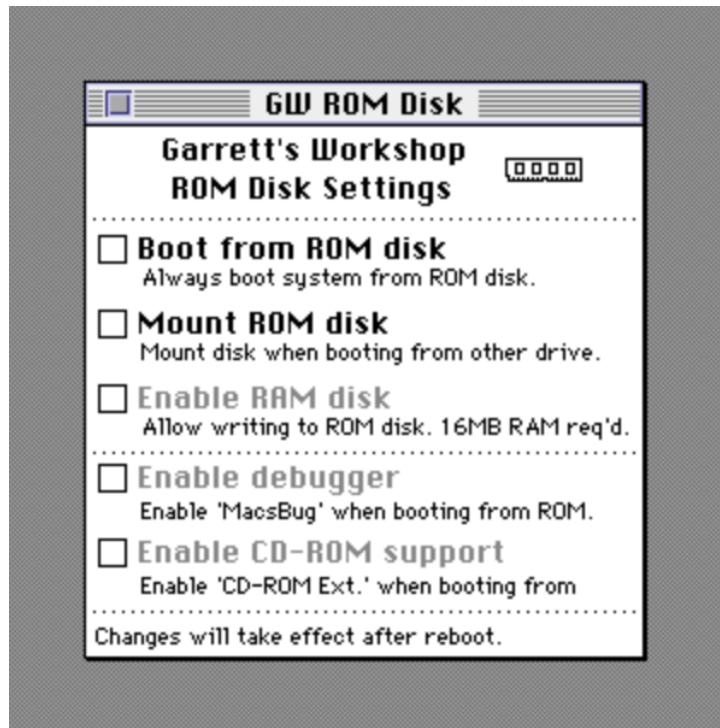
Changing Default Settings Using the GW ROM Disk Control Panel

The GW ROM Disk control panel allows various ROM disk settings to be changed. Settings are stored in PRAM and can be reset by “zapping” the PRAM at boot using the Cmd+Opt+P+R key combination.

The control panel allows selection of the default boot settings, including whether the machine should always boot from ROM rather than an internal SCSI disk. It’s also possible to enable or disable mounting of the ROM disk volume under another boot disk. The control panel also allows MacsBug and the Apple CD-ROM extension to be enabled and disabled.

Pressing “R” or “A” to boot from ROM disk always overrides the defaults set in the control panel and causes MacsBug and Apple CD-ROM to be disabled.

MacsBug requires 32 MB RAM when enabled in conjunction with the RAM disk. CD-ROM support slows booting substantially when a CD-ROM drive is not present and should be disabled unless a CD-ROM drive is installed.



Updating the ROM Image (for advanced users)

The GW4402A ROM SIMM can be flashed using a SIMM programmer. Currently the only supported SIMM programmers are the Big Mess o' Wires ROM SIMM Programmer and the dougg3 ROM SIMM Programmer.

Programmer Firmware Update

In order to program GW4402A using one of these programmers, the programmer firmware must be updated with a special firmware supporting the Garrett's Workshop ROM SIMM. The same firmware is compatible with the BMoW as well as dougg3 programmers and can be applied using the ROM SIMM Programmer utility's "update firmware..." function located in the "advanced" menu. Ensure that your computer remains on and connected to the programmer board during the firmware update, and only apply valid update files to the programmer board, otherwise the programmer may be rendered inoperable. Be aware that with the Garrett's Workshop firmware, the programmer is only able to flash the GW4402-series ROM SIMM. To program another ROM SIMM, the original firmware must be restored to the programmer board. All the required files, including the programmer firmware update and well as the ROM SIMM ROM images, are available on our website: <http://garrettsworkshop.com>

Programming a ROM to Each Switch Position

Two ROM images can be flashed to the GW4402A ROM SIMM, with some caveats. One of the ROM images flashed to the SIMM can be as large as 8 MB in size, while the other ROM image must be 2 MB or smaller. With that exception, any ROM can be flashed to either of the "ROM select" switch positions. The larger ROM image must be flashed to the SIMM first using the "erase/write entire SIMM" option and with the switch set to the desired position for the image. The smaller ROM can then be flashed using the "only erase first ..." option with the switch set to the opposite position.

Creating a ROM Image (for advanced users)

Users can create a ROM image which includes a custom ROM disk image. To create a ROM image, concatenate the ROM disk driver-equipped base ROM (available on the Garrett's Workshop website) with a disk image of up to 7.5 MB (7864320 bytes). The base ROM contains a table which configures the debugger and CD-ROM extension patches accessible through control panel. Data contained in the table indicates where the ROM must be patched and what value must be substituted in order to disable the debugger and CD-ROM extension. These fields must be completed for your ROM image. The layout of the table is given below:

| ROM Offset | Data Type (Size) | Description |
|------------|------------------|--|
| 0x51DA0 | char* (4 bytes) | Address of 'Macsbug' / debugger name Pascal string |
| 0x51D98 | uint32 (4 bytes) | ROM disk offset at which to disable debugger |
| 0x51DA8 | char (1 byte) | Byte to patch at above offset to disable debugger |
| 0x51DA4 | char* (4 bytes) | Address of 'Apple CD-ROM Ext.' / CD-ROM ext. Pascal string |
| 0x51D9C | uint32 (4 bytes) | ROM disk offset at which to disable CD-ROM extension |
| 0x51DA9 | char (1 byte) | Byte to patch at above offset to disable CD-ROM extension |

Technical Specifications

Physical Dimensions

| Parameter | Value |
|-----------|------------------------|
| Height | 25.019 mm \pm 0.2 mm |
| Width | 97.79 mm \pm 0.2 mm |
| Thickness | < 10 mm |
| Weight | < 28 g |

Electrical Specifications

Specifications are valid over temperature range of 0 °C – 85 °C and V_{CC} = 4.5 V – 5.5 V.

| Parameter | Value | Conditions |
|------------------|----------------------|---|
| $V_{IH\min}$ | 2.0 V | |
| $V_{IL\max}$ | 0.8 V | |
| $V_{OH\min}$ | 2.5 V | $I_{OH} = -4 \text{ mA}$ |
| $V_{OL\max}$ | 0.5 V | $I_{OL} = 4 \text{ mA}$ |
| Output Slew Rate | < 1.5 V/ns | |
| $I_{I\max}$ | $\pm 20 \mu\text{A}$ | $V_{in} = 0 \text{ V} - 5.5 \text{ V}$ |
| $C_{IO\max}$ | 20 pF | data bus D[31:0] address bus A[22:0], nCS, nOE, nWE |
| $I_{CC\max}$ | 80 mA | $V_{cc} = 5 \text{ V}$ |