RAMX GS

Apple IIGS

Installation and User Guide

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JD MICRO

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Thank You!

Firstly, thank you for supporting JD Micro by purchasing a RAMX[GS] card! It means a lot to us. RAMX[GS] is our first RAM expansion product for the Apple IIGS and we hope that you enjoy using it in your system.



We will be sharing tools and related documentation at jdmicro.com – be sure to check the site regularly for updates.

Before removing your RAMX[GS] card from the ESD compliant packaging, please study the ESD Prevention section of this guide, then read the Hardware Introduction to familiarise yourself with the RAMX[GS] hardware before installation.

ESD Prevention

Whenever you open an Apple II or other electrical device, you are exposing its internal components to potential damage from the static electricity that builds up in your body through normal activity. Electrostatic discharge (ESD) occurs when static electricity is discharged from one conductor (such as your finger) to another conductor (such as an integrated circuit).

Ideally, installation should be carried out on a static-safe surface such as a grounded anti-static mat, while wearing an anti-static wristband. If you have these available, be sure to use them.

Following the guidelines below will reduce the risk of ESD damage to both your computer and the RAMX^{GS} card at installation time:

- Leave the RAMX^{GS} card in the ESD-compliant packaging until you are ready to install it.
- Ensure that the computer is turned off but leave the power cord connected to a grounded outlet. Even with the power turned off, the power cord acts as a ground for the computer system, protecting it from static electricity.
- Before removing the card from the ESD-compliant packaging, touch the metal case of the Apple II power supply to discharge static electricity that may have accumulated on your body.
- When handling RAMX^{GS} cards, avoid touching any components on the PCB, or the gold “fingers” of the edge connector.
- If you must remove/replace any RAM or ROM chips during the installation procedure, handle the chip by the ends of the package – avoid touching the pins.

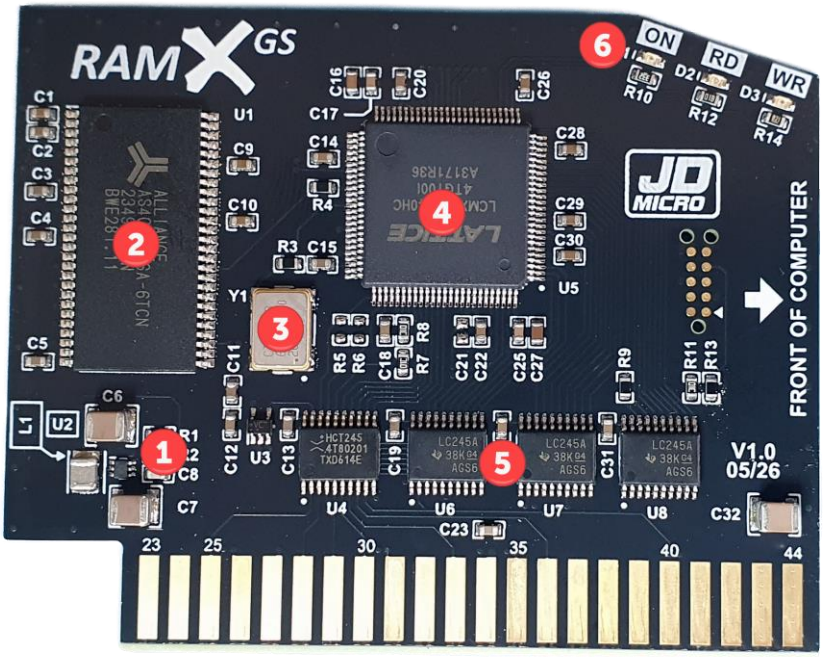
RAMX^GS Hardware Introduction

RAMX^GS is a plug-in RAM card based on the RAM2GS by Zane Kaminski and Garrett Fellers, with some customisations by JD Micro.

It boosts the Apple IIGS fast RAM to 8MB, however due to Apple IIGS hardware limitations only the first 4 MB is DMA-compatible. Memory above that cannot be accessed by DMA peripherals.

RAMX^GS lets you choose between a fully DMA-compatible 4 MB configuration or an 8 MB configuration in which only the first 4 MB is DMA-compatible. You can apply the setting temporarily or save it in non-volatile memory using the RAMX^GS utility disk available from our website.

Major components of RAMX^GS are as follows:



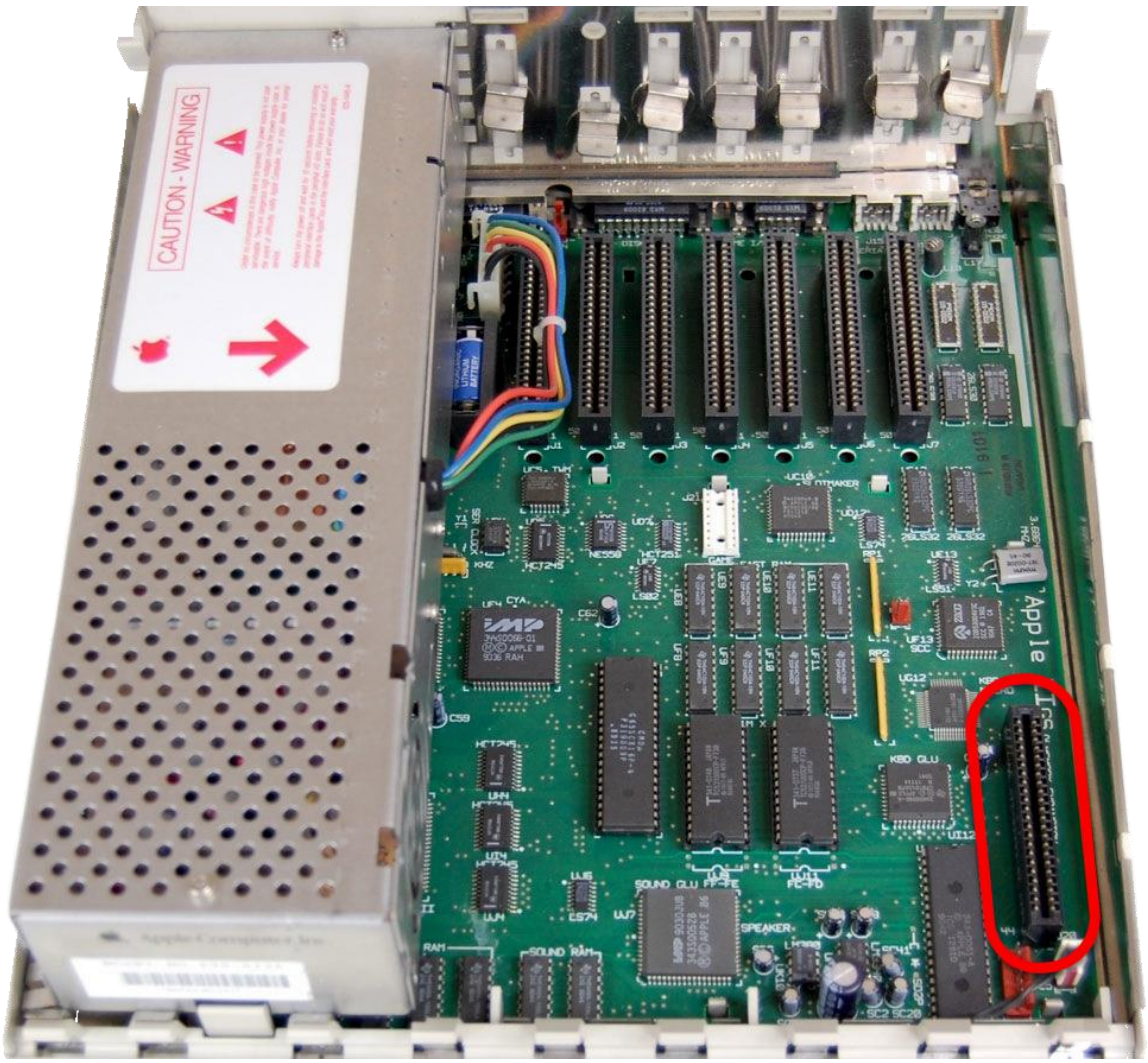
1. Switch mode power supply – efficiently producing the 3.3V required for the CPLD and RAM from 5V supply rail on the RAM slot connector.
2. 8MB SDRAM.
3. 60MHz oscillator.
4. CPLD (Complex Programmable Logic Device).
5. Bus transceivers – translates Apple 5V bus to 3.3V signals for the CPLD. For the data bus the 3V3 CPLD levels are translated back to 5V levels on the Apple slot connector.
6. Indicator LEDs:
   - ON = amber ready indicator which is lit when CPLD is ready.
   - RD = Green read data indicator – lit with read access to the RAM.
   - WR = Red write data indicator – lit with write access to the RAM.

   The LEDs are enabled by default but can be disabled using the RAMX^GS Utility Disk.

RAMX^{GS} Installation

Installing the RAMX^{GS} card is a simple task of opening the case, plugging the card into the memory expansion slot, and then testing the card before closing up the case.

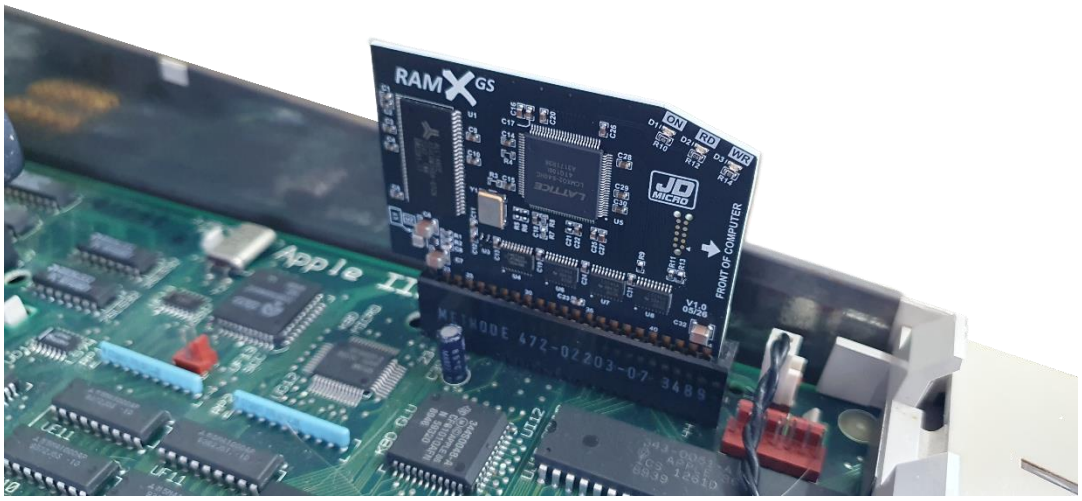
1. Switch off the computer and remove the top of the case.
2. Identify the memory expansion slot positioned at the front right corner of the motherboard as highlighted in red below:



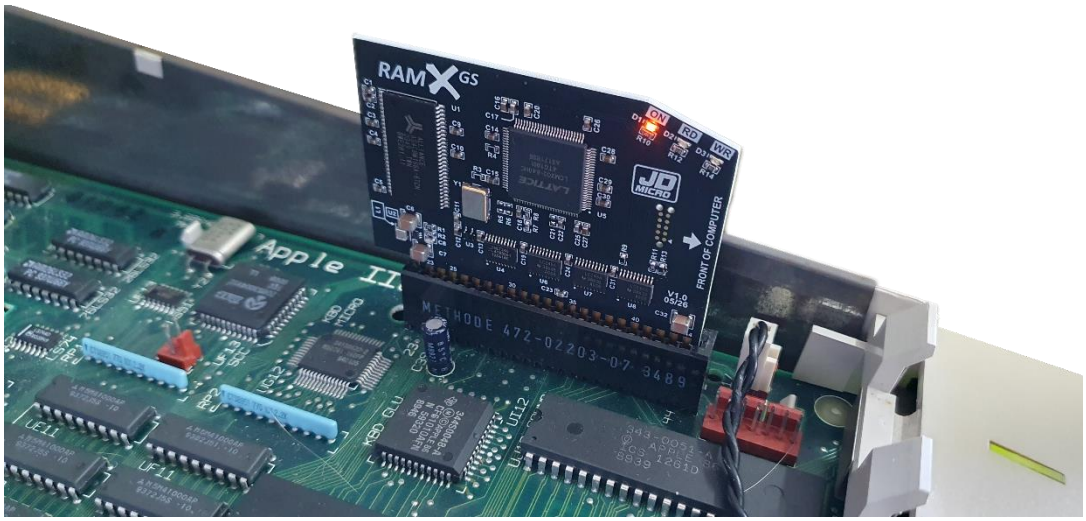
3. Touch the case of the power supply to discharge any static electricity that may have accumulated on your body.

4. Following ESD precautions, remove the RAMX^{GS} card from the ESD-compliant packaging and visually inspect it to ensure that there is no physical damage.

5. Install the card ensuring that the arrow markings face towards the front of the computer (the component side of the PCB should face TOWARD the power supply):



6. After checking that the card is properly seated in the slot, power on the computer. The amber ON LED should light up:



7. Installation is complete. Proceed to the RAMX[GS] Utility Disk section to test the card.

RAMX^GS Utility Disk

When building the RAMX^GS card we found that there was a lack of any fast memory test utilities available for the Apple IIGS, so we created one!

We rolled the RAM configuration utility into the same application – the one disk is used to test the card, change the memory configuration between 4MB/8MB, and enabled/disable the LEDs.

The RAMX^GS Utility Disk can be downloaded from the JD Micro website as a 140KB ProDOS image than can be booted from your favorite disk emulator (e.g. Xdrive).

Testing the Card

To perform a test of your card, simply boot the RAMX^GS Utility Disk image and the fast RAM test will execute automatically.

The fast RAM test does not extensively test the RAM chip itself as those are tested by the RAM manufacturer. Instead, it tests connectivity of all the address, data and control lines on the card. i.e. It tests the RAMX^GS hardware and will verify that the card has been installed correctly and is operating normally. It only takes a few seconds to run, and should give you a PASS result as shown below:



Note that the reported expansion RAM will vary depending on the ROM version of your Apple IIGS. ROM03 machines have more onboard RAM and thus the expansion starts at bank $10. A ROM03 will report “RAM 7168K” on this screen.

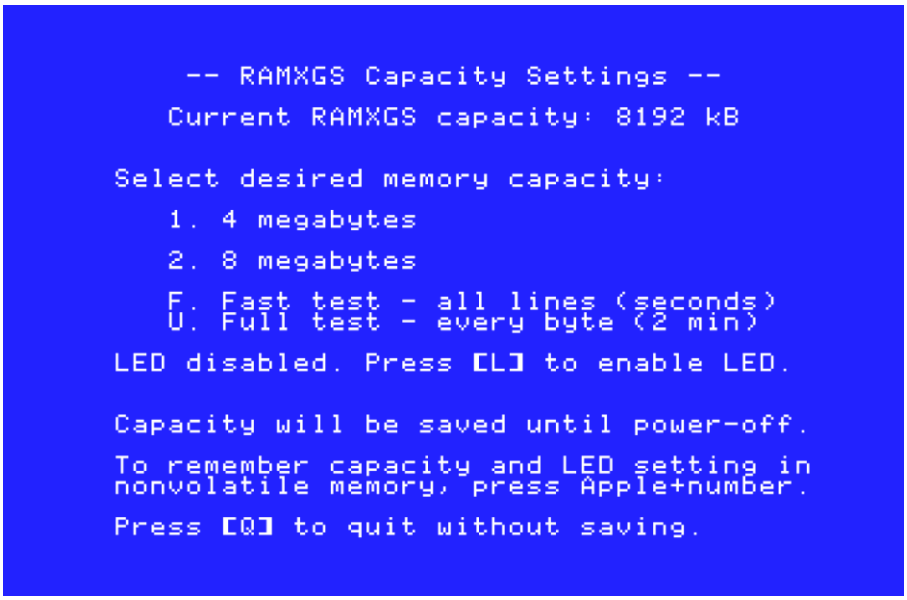
All RAMX^GS cards are run through this RAM test before sale. In the event of a FAIL result, check that the card is fully seated in the slot before re-running the test. The FAIL screen includes additional diagnostic information – please photograph the screen and forward this to support@jdmicro.com

From the PASS screen, press any key to access the settings menu which includes a more extensive RAM test.

Settings Menu

The following operations are supported from the settings menu:

- Set RAM capacity (4MB or 8MB)
- Re-run the fast RAM test
- Run a Full RAM test
- Enable/disable the LED's
- Store the setting in non-volatile memory
- Quit to ProDOS



RAM Capacity

To maximize compatibility, the memory capacity of RAMX[GS] can be switched between 4 megabytes or 8 megabytes. The capacity can be set either temporarily (until the Apple IIGS is powered off), or in non-volatile memory where the setting will persist.

- Press "1" to set the capacity to 4 megabytes until the computer is powered off.
- Press "2" to set the capacity to 8 megabytes until the computer is powered off.
- Press Apple+1 to set the capacity to 4 megabytes and store the setting in non-volatile memory.
- Press Apple+2 to set the capacity to 8 megabytes and store the setting in non-volatile memory.

Either Apple key can be used to store the setting in non-volatile memory.

Note that the LED setting is also stored in non-volatile memory when the Apple+1 or Apple+2 key combination is used.

After changing the capacity, reboot your Apple IIGS by pressing Ctrl+Apple+Reset. Pressing Ctrl+Reset alone is not sufficient for the IIGS firmware to recognize the capacity change.

Fast RAM Test

Press F to re-run the fast RAM test. Once completed, press any key to return to the settings menu.

Full RAM Test

Press U to run a full RAM test. This is not exhaustive however it does write 00, 55, AA, and FF to every memory location on the RAMX^{GS} card.

It should take less than 3 minutes to cycle through the test, and return a PASS result:



Enable/Disable LED's

By pressing the "L" key, the LEDs on the RAMX^{GS} card can be toggled on and off. The LED setting is retained until power-off.

To store the LED setting in non-volatile memory, first select the desired LED setting with the "L" key and then make a RAM capacity choice by pressing Apple+[number].