

ROM Xc

Apple IIc

Installation Guide

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Dean Claxton, Jeff Mazur

Contents

ROMXc Hardware	2
ROMXc	3
ROMXce 28 Pin Video ROM	3
ESD Prevention	4
ROMXc Installation	5
16KB to 32KB ROM Upgrade	13
Testing	15

ROMXc Hardware

Thank you for purchasing ROMXc! We hope that you enjoy experimenting with many different ROM's for your Apple IIc system.

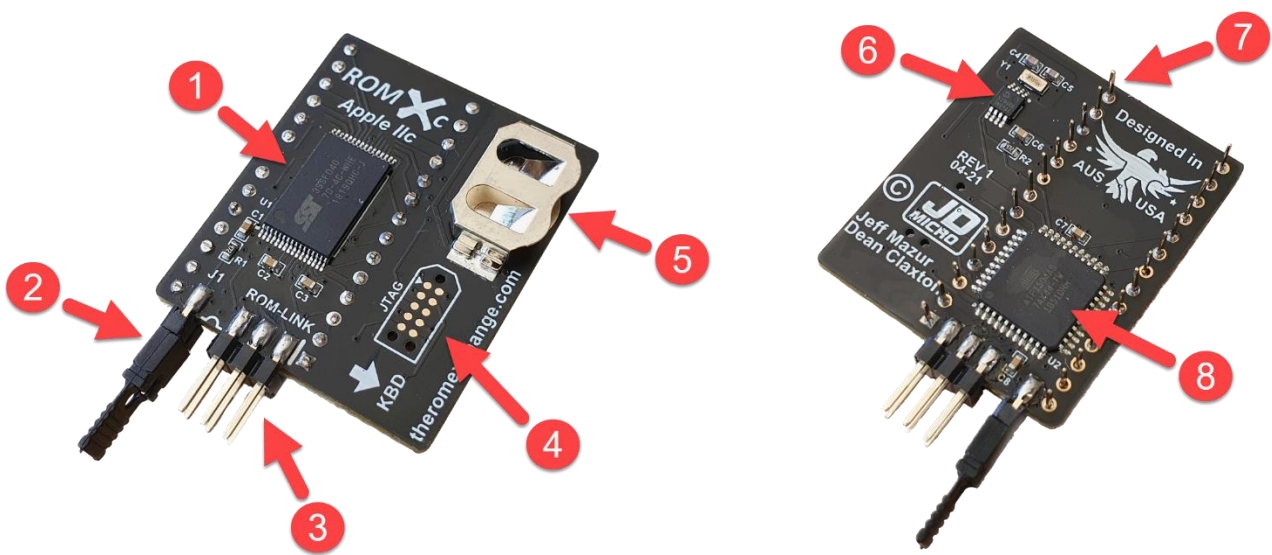
There are currently 2 ROMXc modules available – ROMXc itself, and the optional ROMXce 28 pin Video ROM. The package received should also include a 30cm ROM-Link cable for interconnection of the ROMX module and Video ROM, plus a CR1220 battery for the real-time clock. You may also have been supplied a MAP ROM Override adapter.



We will be sharing tools, ROM images, and related documentation at <https://theromexchange.com> – be sure to check the site regularly for updates.

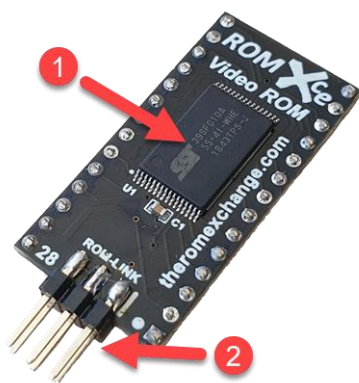
Before removing your ROMX modules from the ESD compliant packaging, please study the ESD section of this installation guide. Use the following images to familiarise yourself with the ROM X hardware before installation.

ROMXc



1. 4Mbit Flash Memory
2. Recovery Jumper (normally installed). Remove to enable recovery mode. See the Recovery Mode section for further details).
3. ROM-Link header for link to the ROMXce Video ROM – Pin 1 end (white bar on PCB)
4. JTAG header (production programming only – do not use)
5. Battery holder for CR1220 RTC backup battery
6. Real Time Clock
7. Pin headers (legs)
8. CPLD (Complex Programmable Logic Device)

ROMXce 28 Pin Video ROM



1. 1Mbit Flash Memory
2. ROM-Link Header – Pin 1 end (white bar on PCB)

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) of a different voltage potential. Exposing an integrated circuit (IC) to as little as 10 volts of static electricity can damage the IC irreparably—and you wouldn't even know it had happened, because humans can't perceive static electricity less than 1500 volts.

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 to you, then by all means use them.

Following the guidelines below will reduce the risk of ESD damage when installing the ROMXc module(s):

- Leave the ROMXc module(s) in the ESD-compliant packaging until you are ready to plug them in.
- 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 module(s) from the ESD-compliant packaging, touch the metal case of the Apple IIc power supply to discharge static electricity that may have accumulated on your body.
- Handle ROMXc modules by the edges of the PCB, not by the pins. Avoid touching the ROM-Link connector, the pins, or exposed components.

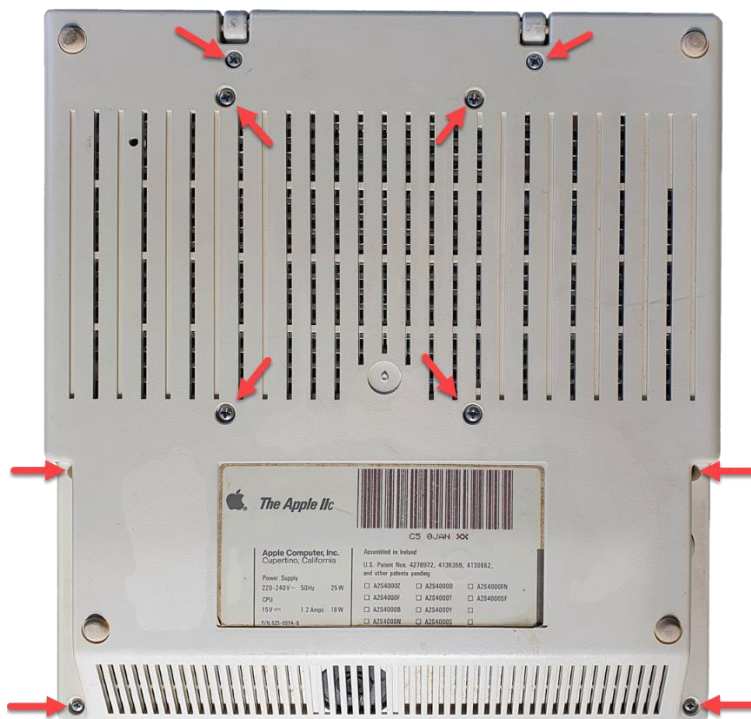
ROMXc Installation

In order to install ROMXc, the Apple IIc must be disassembled. Take your time and be careful not to apply too much force to the aging plastics!

Note that if your Apple IIc is fitted with the original 16KB ROM (Apple part number 342-0272-A), then some minor modifications to the motherboard are required in order to support the larger 32KB ROMs. See the section *16KB to 32KB ROM Upgrade*.

If you are familiar with removing the top cover, please skip ahead to step 7.

1. Switch off the computer.
2. Turn it over and remove the 10 screws as shown below :



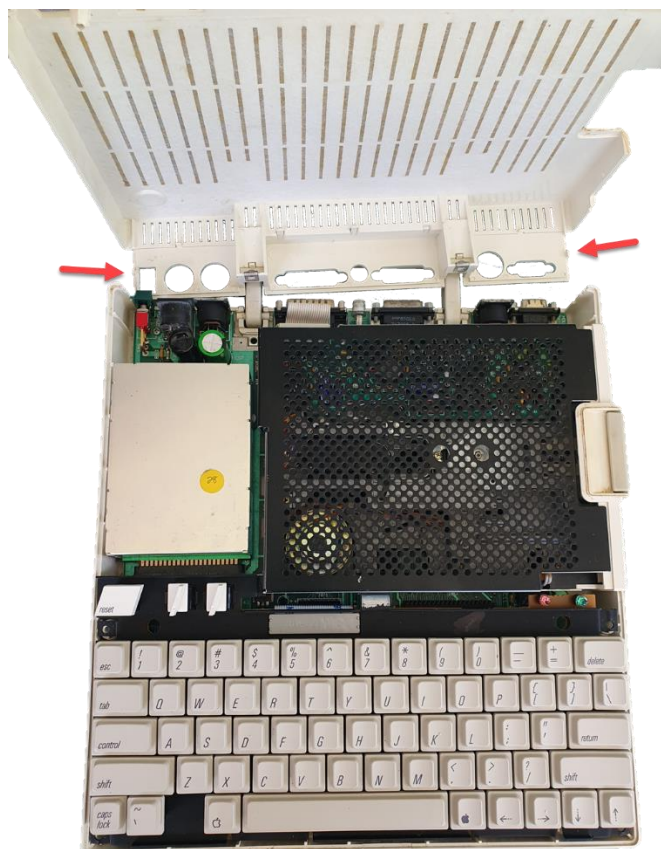
3. Flip it back onto its feet, and release the front clip that secures the top shell. This is located in the front seam, approximately in line with the N key on the keyboard. Take care not to damage the soft plastic:



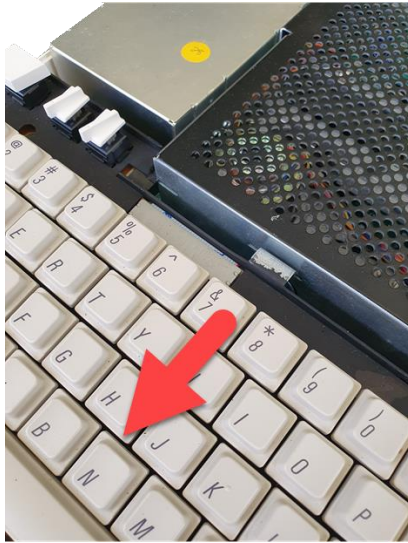
4. Once the front clip is unfastened you can begin to loosen the top shell working from the keyboard back:



5. There is a clip on each side of the rear panel – once released the upper shell can be slid back and lifted away, giving us full access to the internals. Take care as you work the top shell away from the lower shell:



6. The rear of the keyboard frame is supported via tabs that slot into the disk drive. Lift the front of the keyboard and slide it forward to disengage the tabs from the slots:



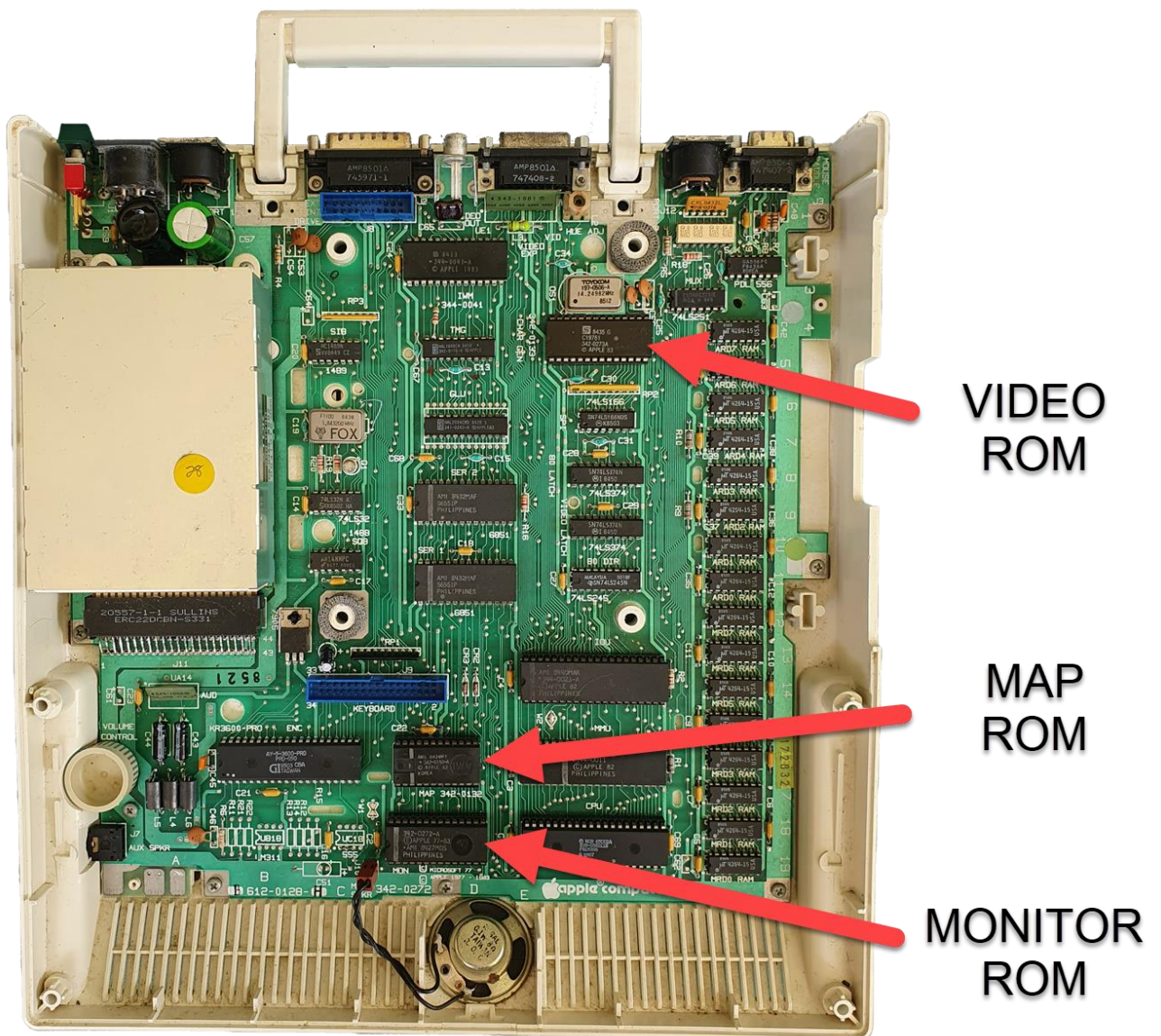
7. Flip the keyboard up and unplug it from the motherboard by pulling the connector up and out of the box header. Set the keyboard aside (you may want to take the opportunity to give the keyboard a good clean):



8. Unplug the disk drive cable from the rear of the motherboard by pulling the connector up and out of the box header. Lift the disk drive out vertically and place it aside:



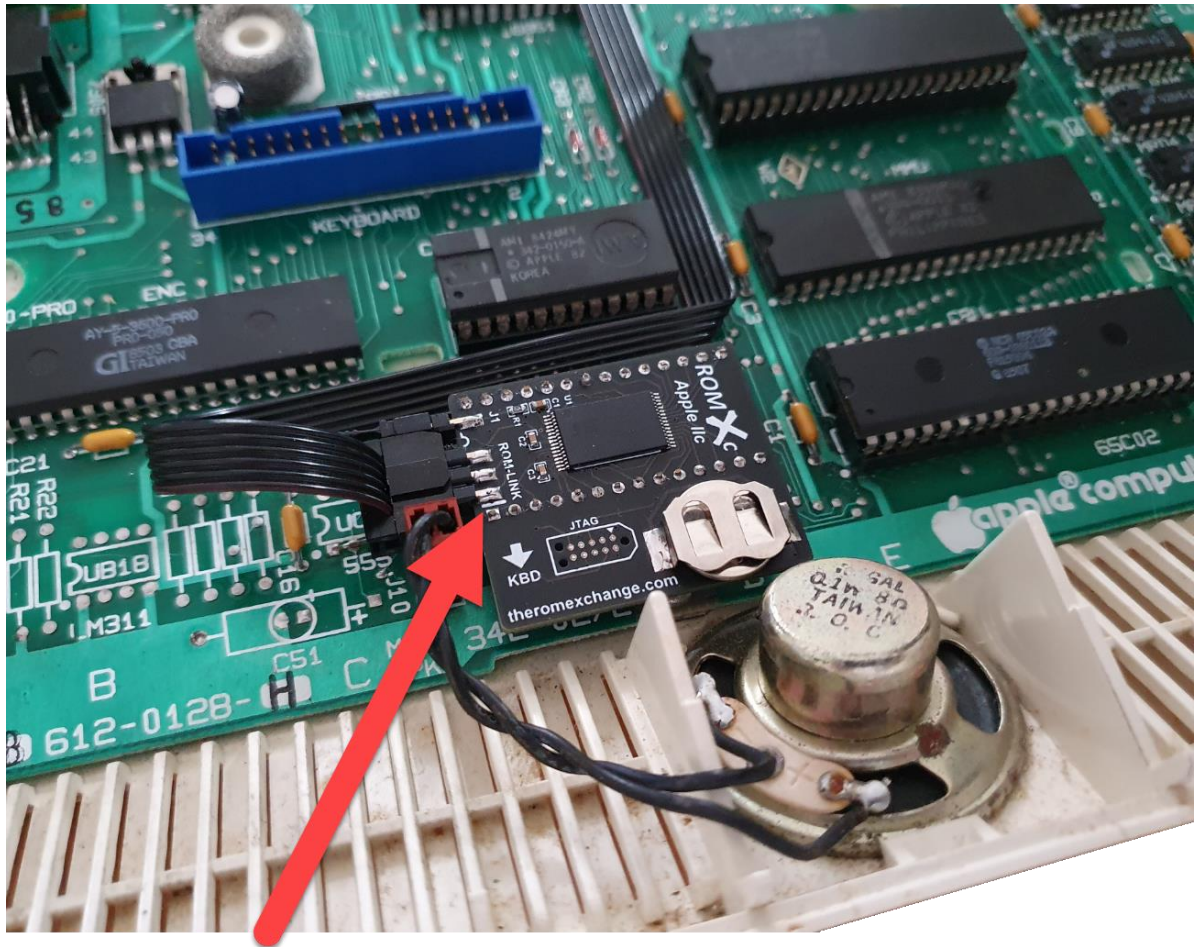
We can now examine the motherboard and locate the key components that we are interested in :



9. Following ESD precautions, remove the Monitor ROM at position D19, and the Video ROM at position E4 from their sockets. This is easily accomplished using a small flat-bladed screwdriver. Starting at one end of the IC, carefully insert the screwdriver between the top of the IC socket, and the bottom of the IC. Gently lever the IC up just a little, then move to the other end of the IC and repeat the process. Continue levering the IC up a little at a time, alternating end to end until the chip is free of its socket. Do not try to lever it out in one go – doing so will likely bend the pins.

- Following ESD precautions, remove the ROMXc module from the ESD-compliant packaging and visually inspect the pins to ensure that none have been bent. Install the CR1220 battery into the battery holder with the + sign facing upwards and attach the ROM-Link cable to the header - the red stripe on the cable (pin 1) should be located at the end of the ROM-Link header marked by the white bar on the PCB.

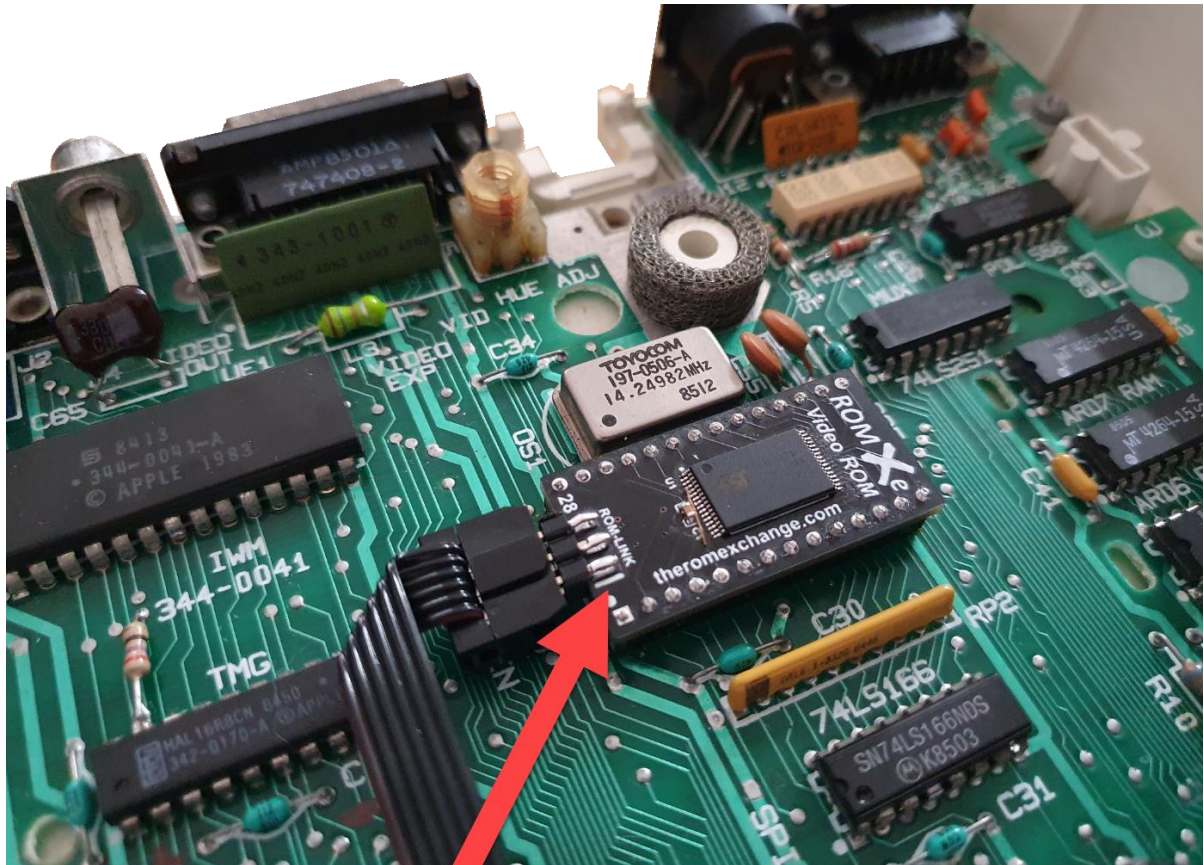
Ensuring that all pins are lined up with the Monitor ROM socket, install the ROMXc module and run the ROM-Link Cable around the MAP ROM chip as below. Double check the pins are lined up correctly :



PIN 1 (RED STRIPE)

11. Following ESD precautions, remove the ROMXc Video ROM module from the ESD-compliant packaging and visually inspect the pins to ensure that none have been bent. Attach the ROM-Link cable to the header - the red stripe on the cable (pin 1) should be located at the end of the ROM-Link header marked by the white bar on the PCB.

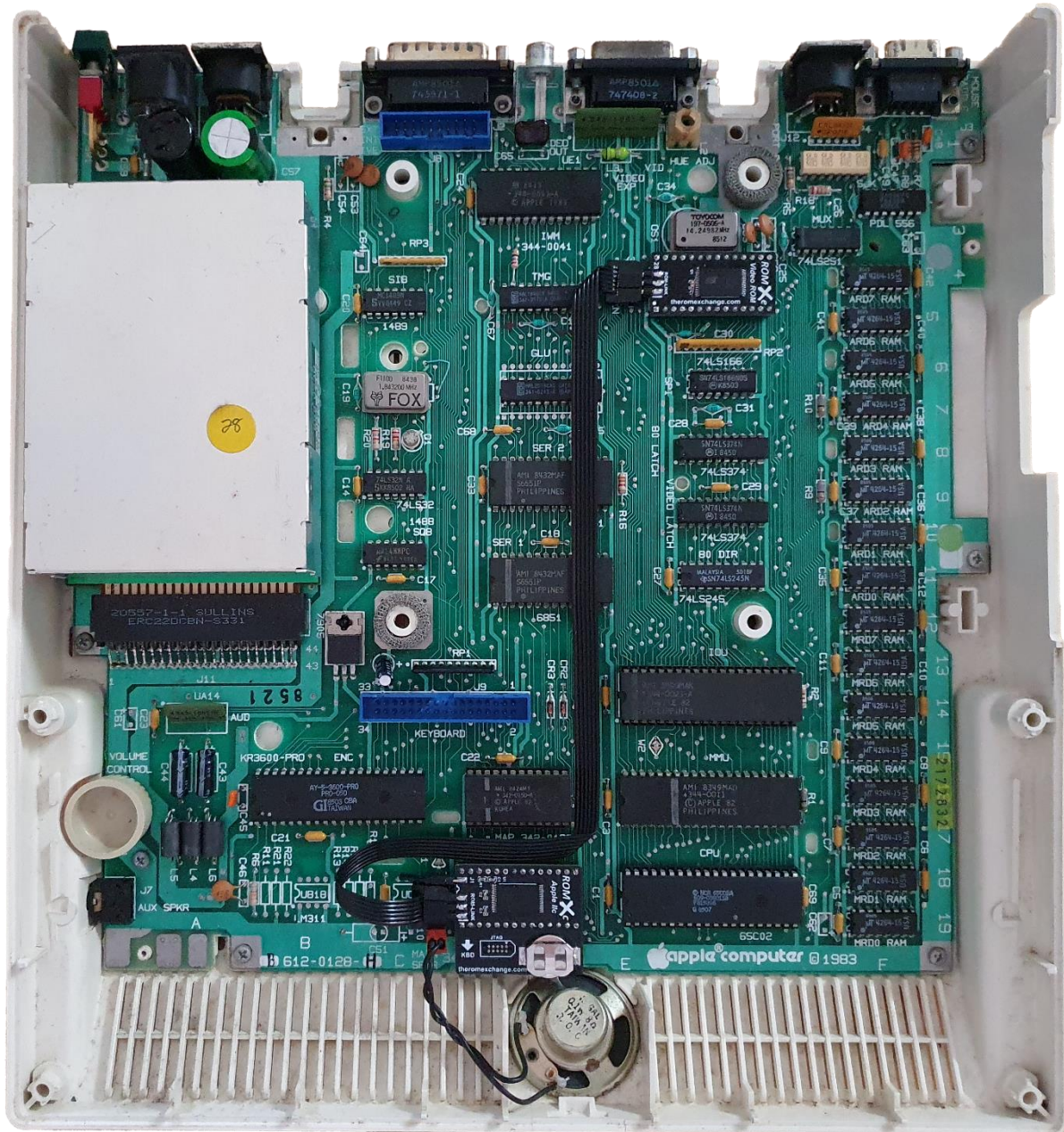
Ensuring that all pins are lined up with the Video ROM socket, install the ROMXc Video ROM module. Run the ROM-Link Cable as below, keeping it as flat to the motherboard as possible to ensure that it does not rub on the underside of the disk drive (you may opt to use a piece of masking tape to secure the cable flat to the motherboard):



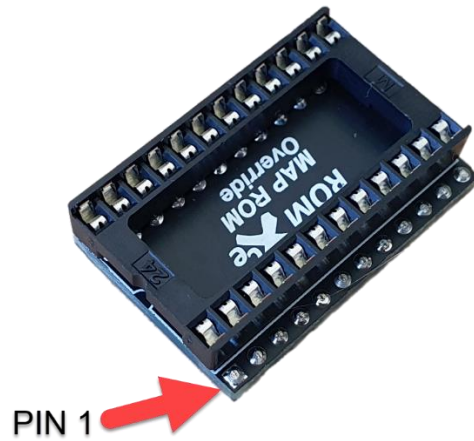
PIN 1 (RED STRIPE)

Don't throw out the ROMXc packaging! You can press the original IC's into the conductive foam and place them into the antistatic bag and box for storage.

- Once installed, the ROM-Link cable should be routed as below, again keeping it as flat as possible to the motherboard to ensure it does not interfere with the disk drive when it is reinstalled:



13. If you are installing the MAP ROM Override adapter (which allows the second bank of fonts to be selected via the keyboard switch without switching in the second Key map (Dvorak for US IIc's), then you may now remove the MAP ROM from its socket at position D17, and install the MAP ROM Override Board taking note of the pin one position to the left side when viewed from the front (text inside ROM socket will appear upside down when installed (whoops):



The MAP ROM can then be installed in the MAP ROM Override adapter socket :

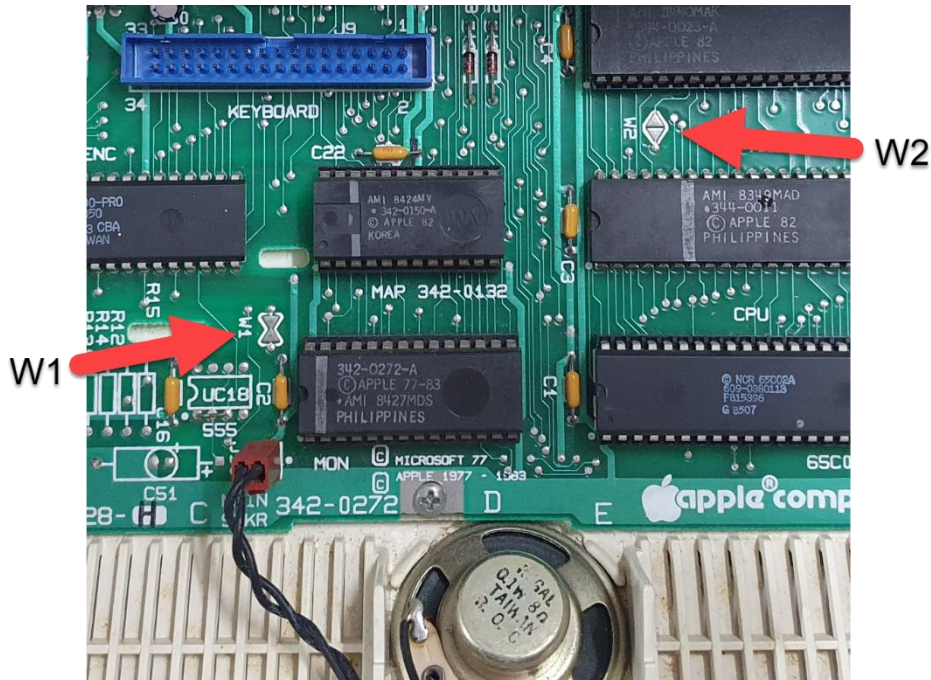


Done! If your computer was originally fitted with a 16KB ROM, proceed to the section *16KB to 32KB ROM Upgrade*. Else, proceed to the *Testing* section before reassembling the case.

16KB to 32KB ROM Upgrade

If your Apple IIc was originally fitted with a 16KB ROM (Apple part number 342-0272-A), then you will need to modify the motherboard to enable 32KB ROM support.

Fortunately, Apple built in future support for a 32KB ROM via two sets of jumper pads on the motherboard - W1, and W2:

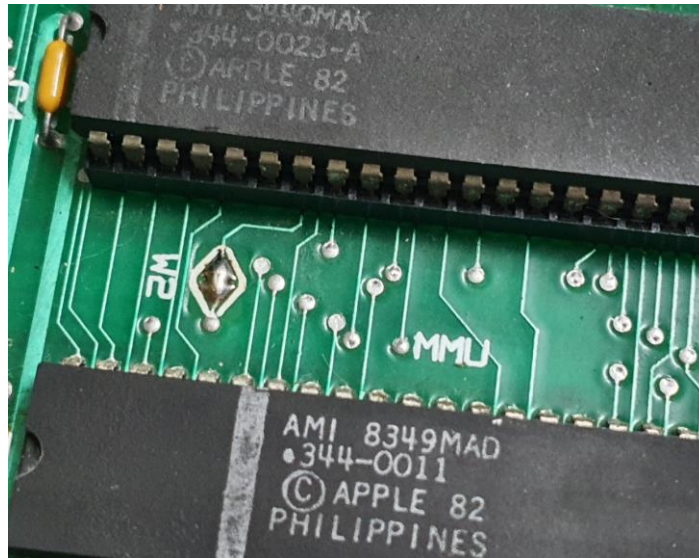


To perform the modification we need to cut the jumper trace joining the two W1 pads, then bridge the two W2 Pads.

1. Using a sharp craft knife, slice through the copper between the two pads of the W1 jumper. Be sure to take a reasonable margin to ensure there is no connection between the two pads. If you have a multimeter you can perform a continuity test before and after, to ensure the connection has been severed:



2. Join the W2 pads with a solder blob. If you don't have a soldering iron available you could try using conductive paint such as the silver loaded paints used for automotive demister repair. If you have a multimeter, use the continuity test to ensure the pads are now joined:



Done! Your motherboard now supports 32KB ROMs. Proceed to the *Testing* section to ensure your ROMXc is operating correctly before reassembling the case.

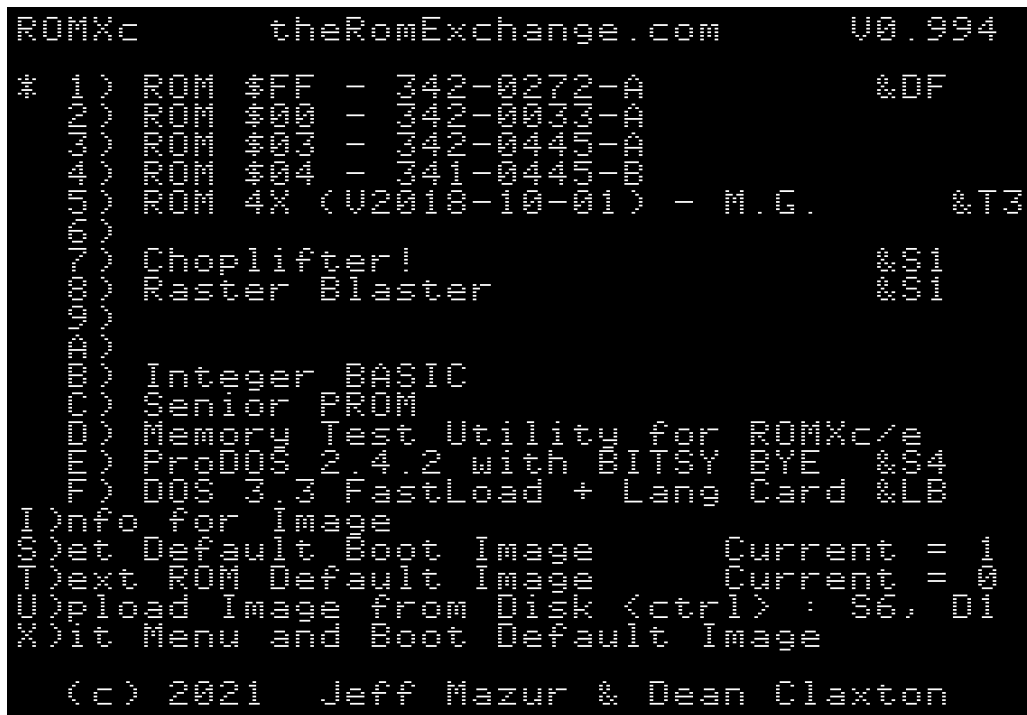
Testing

We can now perform a quick test to verify that the ROMXc modules are correctly installed.

1. Reinstall the disk drive and keyboard, ensuring that the connectors are fully seated, and that the disk drive is located correctly in the chassis.

The keyboard support frame should be slotted back into the side/corner of the disk drive and the front of the keyboard should be supported on the screw posts in the chassis. Ensure the keyboard switch is in the off position (up).

2. Power on your computer. You should be presented with the following menu – press the ESC key to stop the countdown timer. If your computer does not display the menu, check your monitor connection before checking that the ROMXc module is correctly installed.

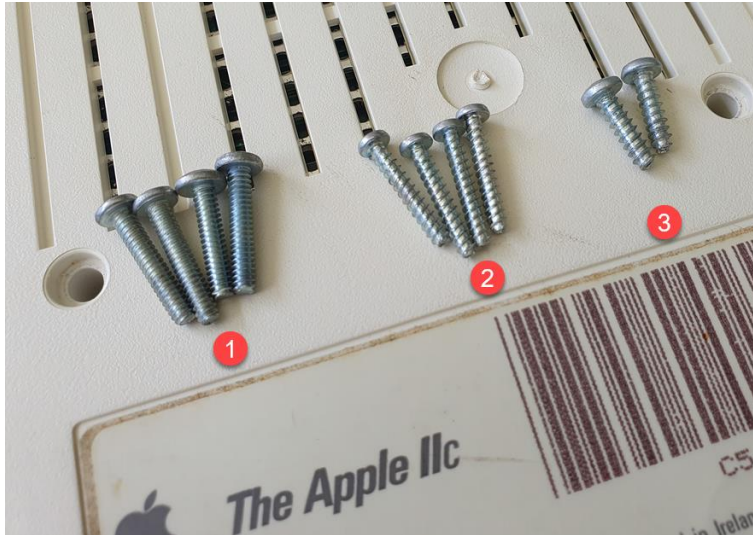


3. Press the 5 key to boot using the ROM 4X ROM which has a text ROM link to Text ROM 3 (ReActiveMicro). Press CTRL+RESET – the cursor should be displayed as an Open Apple:



4. After successfully testing your ROMXc installation you can now reassemble the case – working from the rear panel back to the front clip. Once the top of the case is back in position, turn it over and replace the 10 chassis screws. Take care not to overtighten them.

Note that there are 3 different screw types used:



- Type 1 : 4 x machine screws used to mount the disk drive
- Type 2 : 4 x long screws used on either side of the keyboard area
- Type 3 : 2 x short screws used at the rear

All done! Visit <https://theromexchange.com> to download the ROMXc User Guide for further information on how to use ROMXc.