

ROMX^{c+}

Apple IIc+

Installation Guide

Revision 1 – March 2022

Dean Claxton, Jeff Mazur

Contents

ROMXc+ Hardware	2
ROMXc+	3
ROMXce Video ROM.....	4
24 Pin Video ROM.....	5
28 Pin Video ROM.....	5
ESD Prevention	6
ROMXc+ Installation	7
Testing	14

ROMXc+ Hardware

Thank you for purchasing ROMXc+! We hope that you have some fun playing around with different ROM images, and maybe even have a go at ROMifying some utilities/games/applications to share!

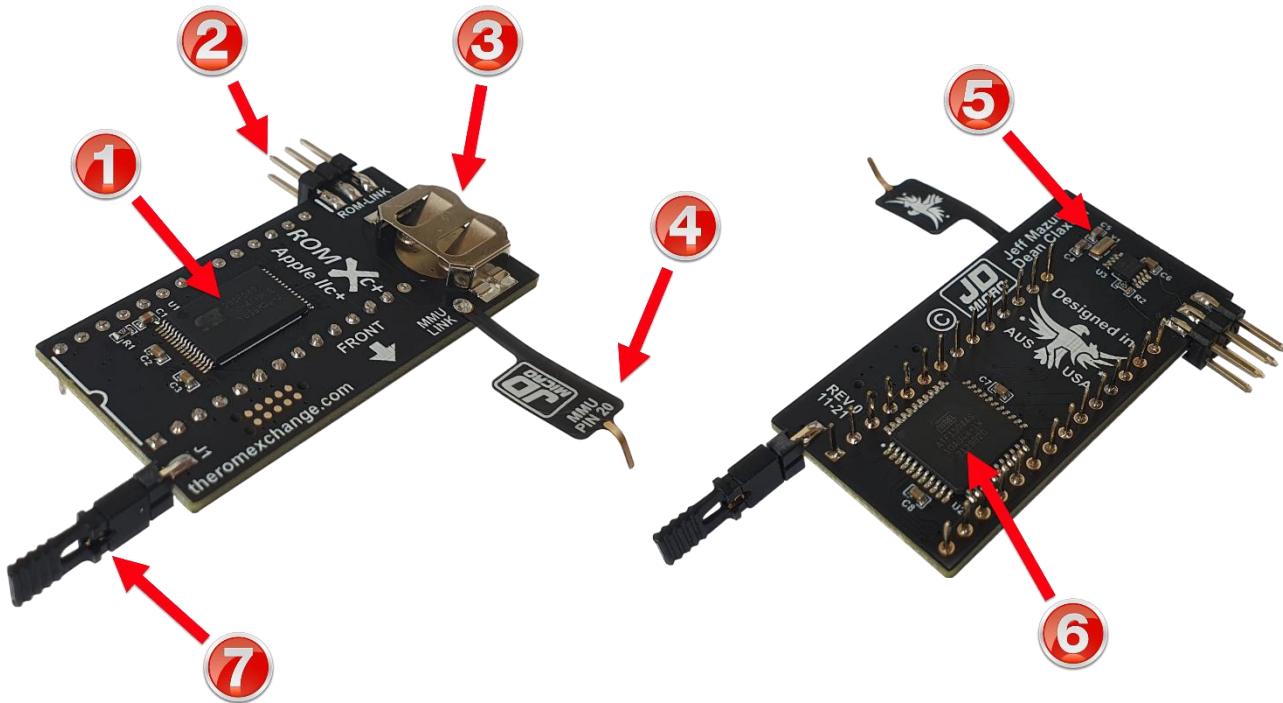
ROMXc+ ships with a 19cm ROM-Link cable (used to connect an optional video ROM to ROMXc+), a CR1220 battery for the Real-Time Clock, and a card with a QR code link directly to our web site. If you also purchased a video ROM then this will be included in your bundle.

We will be sharing tools, ROM images, and related documentation there (<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 Prevention section of this installation guide.

ROMXc+



1. 4Mbit Flash Memory.
2. ROM-Link header for link to the ROMXce Video ROM – Pin 1 end (white bar on PCB).
3. Battery holder for CR1220 RTC backup battery.
4. MMU-Link flex cable.
5. Real Time Clock circuitry.
6. CPLD (Complex Programmable Logic Device).
7. Recovery Jumper (normally installed). Remove to enable recovery mode.

ROMXce Video ROM

The ROMXce video ROM is loaded with 32 different fonts including both stock enhanced (MouseText) and unenhanced (no MouseText) fonts. The font list is covered in the user guide and is divided into 2 banks of 16 fonts. Bank selection is via external switch and the ROMX menu system allows selection of a font from the active bank to be used as the system default, or associating a particular font with a ROM image. The video ROM connects to ROMXc+ via the supplied 19cm ROM-Link cable.

Two versions of the ROMXce Video ROM exist to accommodate different motherboard versions among the Apple IIe, IIc, and IIc+ range – one for 24 pin and one for 28 pin video ROM sockets. Each ROMXce version has a slightly different mechanism for bank selection.

Unfortunately the video ROM on the Apple IIc+ is soldered directly to the motherboard, and removal is not as simple as it would seem due to the small annular ring used on the PCB – it is easy to overheat the pads, with a risk of them pulling away from the circuit board.

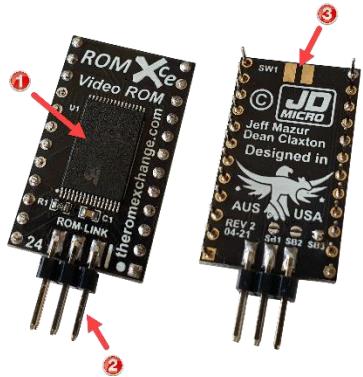
On the Apple IIc+, a 24 pin video ROM was used. Support for a 28 pin ROM is provided, with additional pads/traces with the high order address bit being controlled by the keyboard switch. The same address line is used to toggle the alternate keyboard map in the MAP ROM, and thus if a 28 pin video ROM is used then the MAP ROM must also be de-soldered and replaced or overridden else the Dvorak keyboard layout would be selected.

If you decide that you would like to perform the required motherboard modifications then the 24 pin video ROM offers a slightly easier installation path in that only the video ROM need be de-soldered – a 28 pin socket could still be installed with the 24 pin video ROM positioned in the rear section of the socket as per the factory placement. 16 fonts will be available.

Many users will not wish to perform the modifications required to install the video ROM and that is perfectly fine – there is no need to install the video ROM to enjoy all the other features that ROMXc+ has to offer. In this case, store the ROM-Link cable away in case you decide to add the video ROM at a later date.

24 Pin Video ROM

Bank selection is via a user installed switch or jumper on the SW1 pads. If a switch is not connected then only the 16 fonts in the first bank will be available.

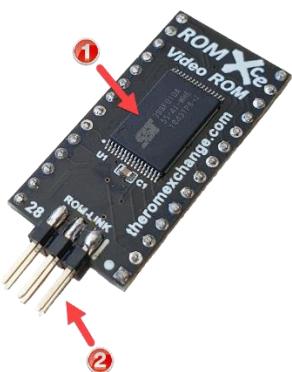


1. 1Mbit Flash Memory.
2. ROM-Link Header – Pin 1 end (white bar on PCB).
3. Connection pads for external keyboard switch.

28 Pin Video ROM

Optionally the 28 pin video ROM is available for those who would like to de-solder and socket both the video ROM and the MAP ROM.

Bank selection is via the stock keyboard switch.



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

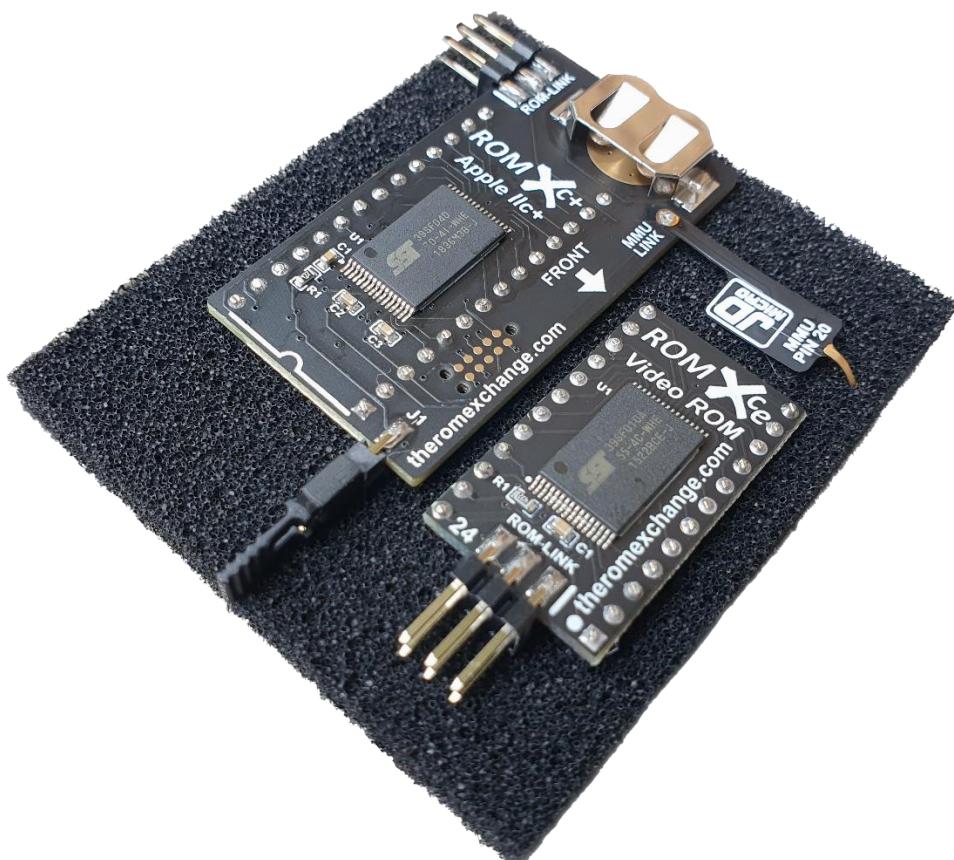
ESD Prevention

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).

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 when installing the ROMX module(s):

- Leave the ROMX 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 ROMX modules by the edges of the PCB, not by the pins. Avoid touching the ROM-Link connector, the pins, or exposed components.

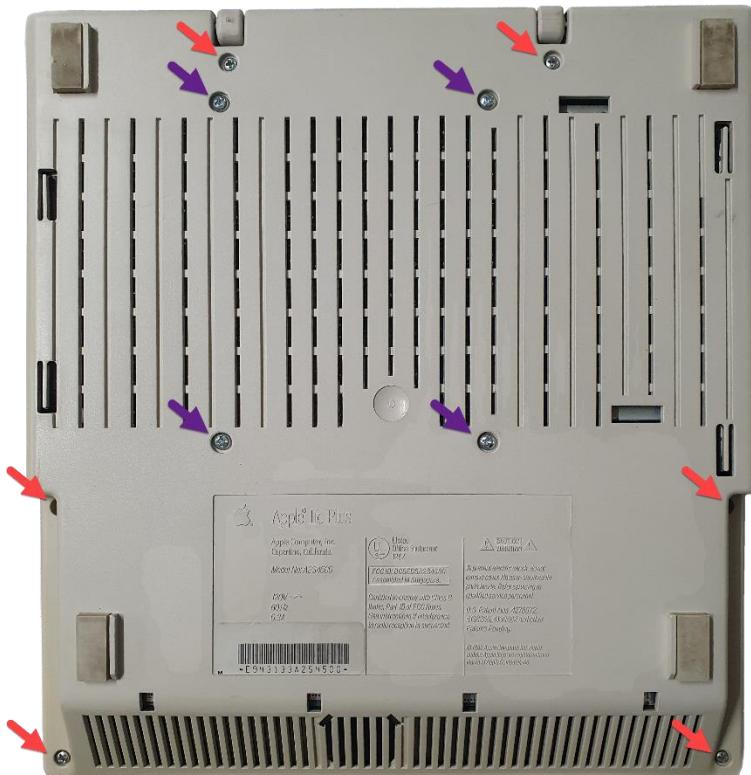


ROMXc+ Installation

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.

If you are familiar with removing the top cover, please skip ahead to step 6.

1. Switch off the computer.
2. Turn it over and remove the 6 screws marked by the red arrows below. For those performing the video ROM modification you will also need to remove the 4 disk drive screws marked by the purple arrows :



3. Flip it back onto its feet, and lower the handle:



4. You should now be able to raise the front of the top case section :



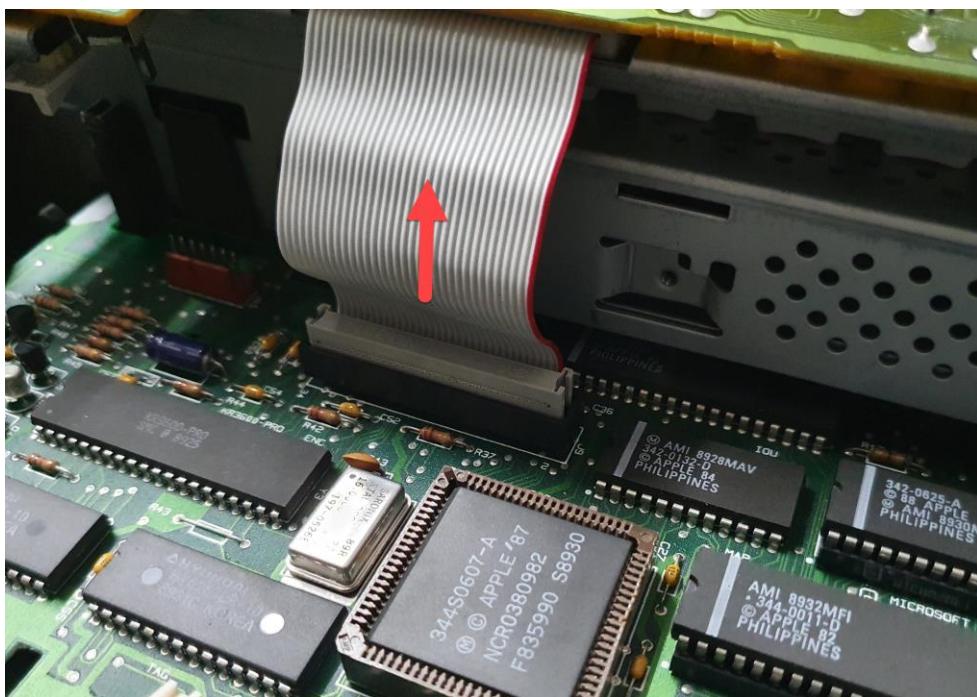
5. Once released the upper shell can be slid back and lifted away, giving us full access to the internals.
Take care as you work the top shell away from the lower shell:



6. So as it does not fall off and become lost, it may be worth removing the volume slider cap from the slider shaft before removing the keyboard:



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):

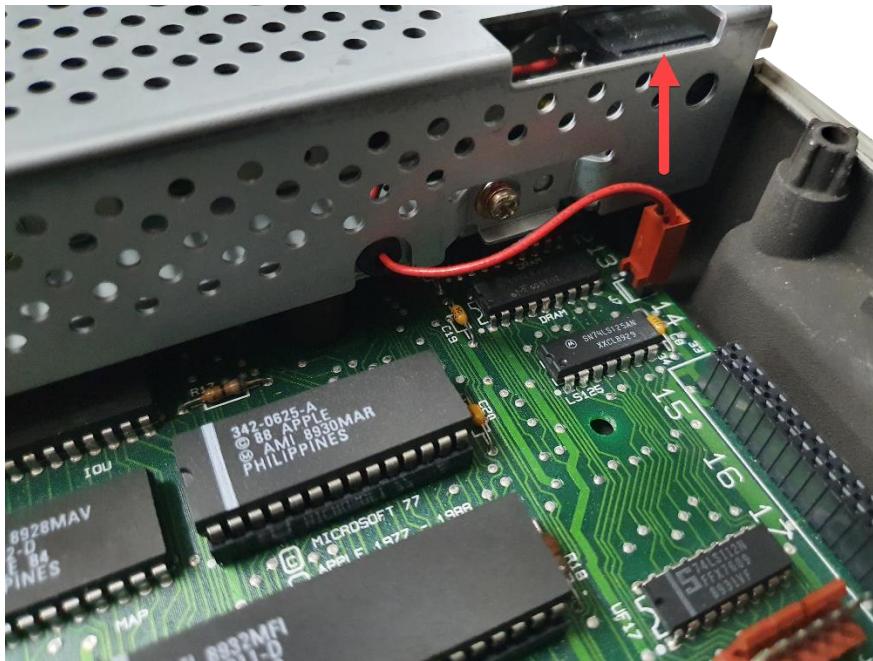


8. If you are not installing the video ROM at this time, skip ahead to step 11.

If you are installing the video ROM (and have removed the drive screws marked by the purple arrows in step 2), unplug the disk drive cable from the rear of the motherboard by pulling the connector up and out of the box header :

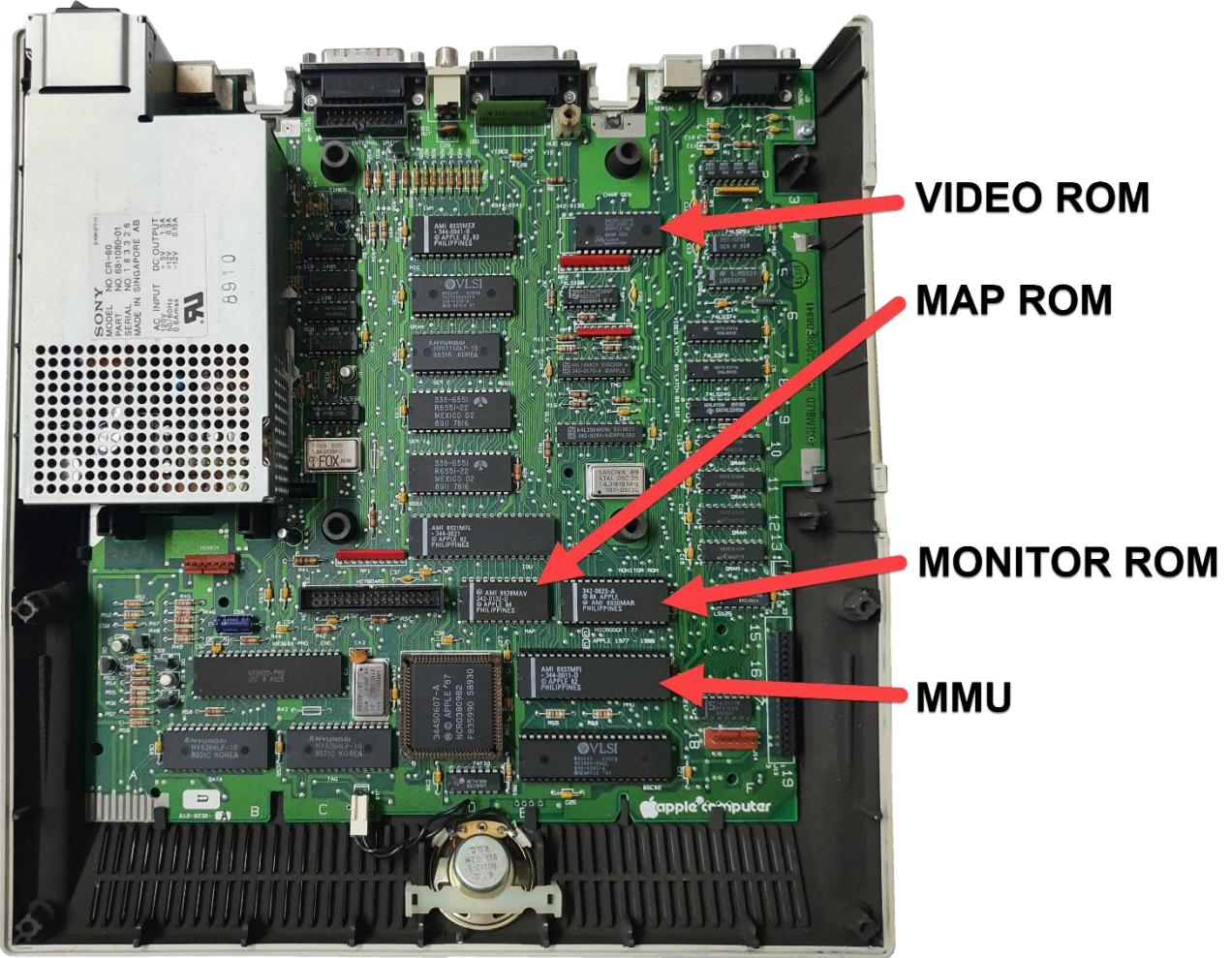


9. Unplug the disk drive eject switch cable by pulling the connector up from the header :



10. Lift the disk drive out vertically and place it aside.

You will now have unhindered access to the motherboard so as we locate the key components that we are interested in :



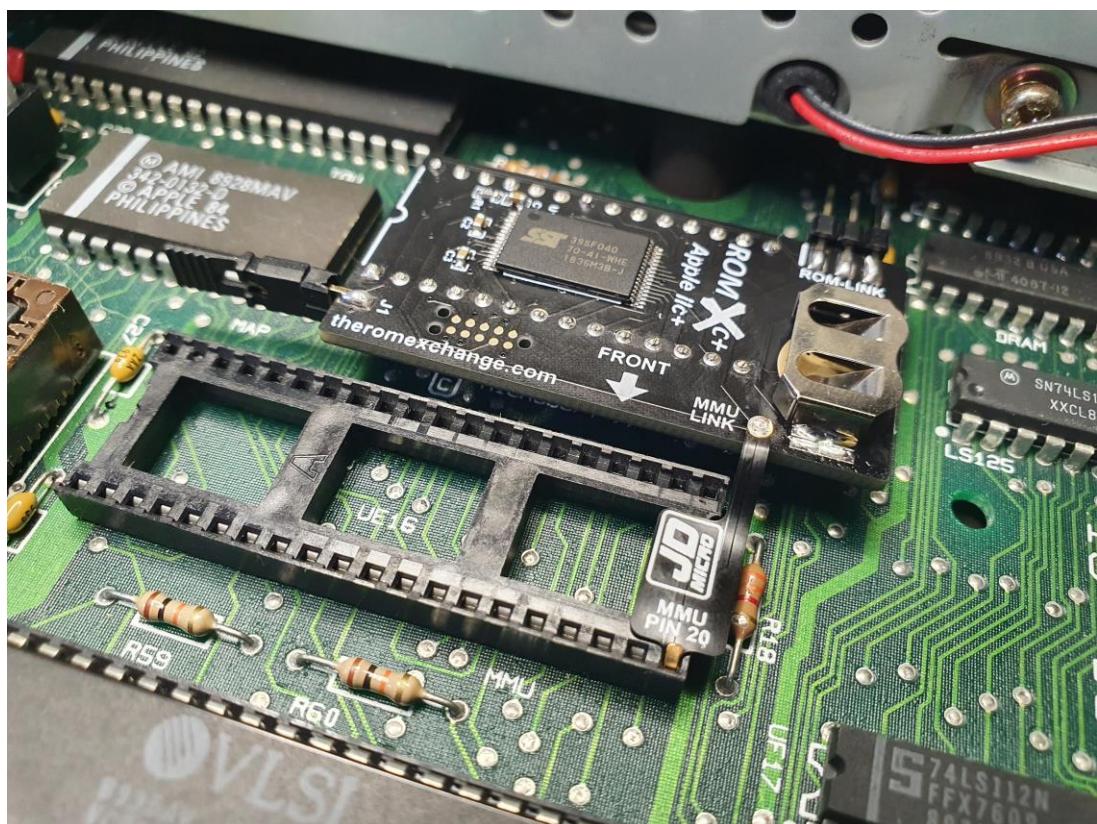
11. Following ESD precautions, remove the Monitor ROM at position E14, and the MMU at position E16 from their sockets. This is easily accomplished using a small flat-bladed screwdriver. Starting at one end of the IC, carefully insert the screwdriver between the top of the IC socket, and the bottom of 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.

12. Following ESD precautions, remove the ROMXc+ module from the ESD-compliant packaging and visually inspect the pins on the underside of the module to ensure that none have been bent (the MMU-Link pin on the flex cable has been intentionally bent with a gentle curvature).

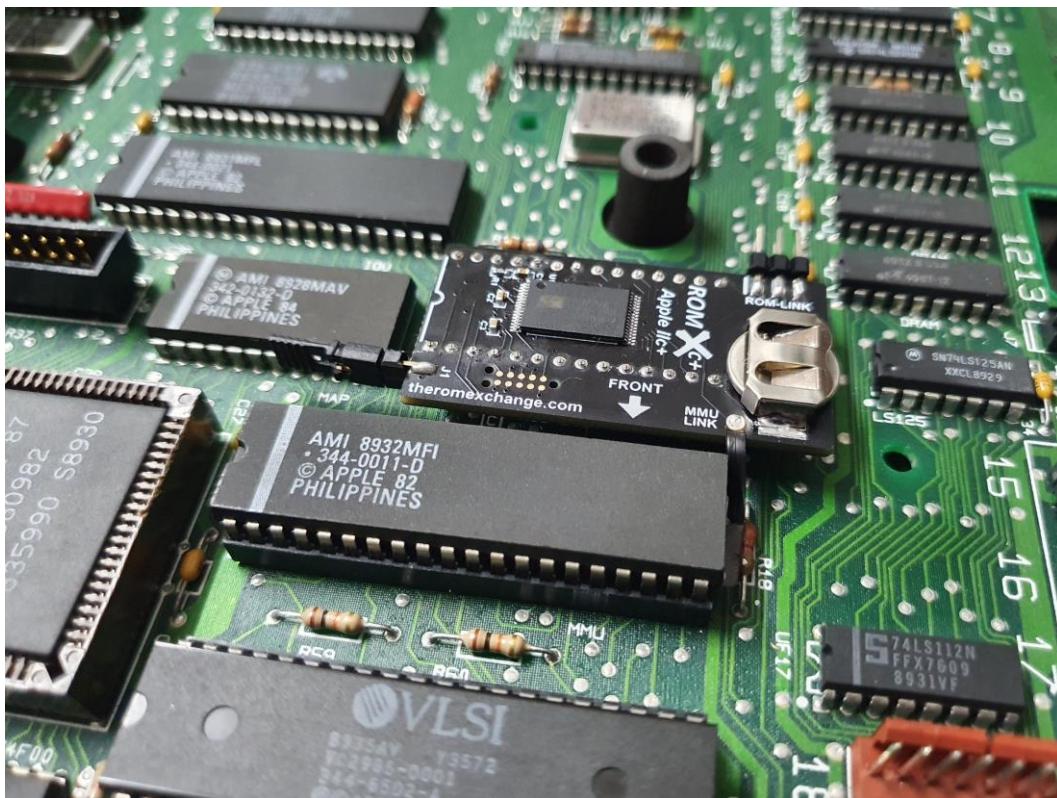
Install the CR1220 battery into the battery holder with the + sign facing upwards.

Ensuring that all pins are lined up with the Monitor ROM socket, press the ROMXc+ module down into the socket, ensuring it is fully seated. If it is correctly positioned then the pin on the MMU-Link flex cable should line up with pin 20 on the MMU socket (front right corner when viewed from the front).

Gently guide the pin on the MMU-Link flex cable into the MMU socket as shown below, taking care not to bend the pin sharply. The flex cable should be clear of the other pin sockets :



13. Reinstall the MMU over the top of the MMU-Link flex cable, ensuring that the MMU is fully seated :



Installation of the video ROM will be covered in a future release of this installation guide.

As mentioned, the video ROM must be de-soldered and a socket installed. It makes the most sense to install a 28 pin socket when performing the modification.

If you wish to install a video ROM then you can follow the connection guide in the ROMXc installation manual (red stripe on ROM-Link cable to pin 1 (white bar) on ROM-Link headers).

Done! Proceed to the *Testing* section before reassembling the case.

Testing

We can now perform a quick test to verify that the ROMXc+ module is correctly installed.

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

The keyboard switch should be in the off position (up), and you can replace the volume slider cap.

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 7 key to boot Choplifter. You will need a joystick to play!
4. After successfully testing your ROMXc+ installation you can now reassemble the case – working from the rear panel back to the front. 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.

The first thing you'll want to do after reassembly is to set the Real-Time Clock (RTC). You can do this directly from the ROMXc+ menu. Press I for I)nfo followed by CTRL-C. Use the arrow keys to set the correct Date and Time and press Return when finished. See the User Guide for more details.

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