838-32K-X1

Manual

Last Updated: March 6, 2025

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Summary

The 838-32K-X1 memory expansion card provides 32K of expansion ram via a 32k x 8 SRAM for the TI-99/4A home computer. This memory expansion is designed for use with TI Extended Basic/Other flavors of Extended Basic, Editor Assembler, TI LOGO or any other Solid State Software Command Module designed to utilize the additional memory, as well as the UCSD p-System.

For information on whether or not the memory card can be used with a module, refer to the module owner's manual.

This card cannot be used at the same time as other memory expansion cards doing so may result in damaging your system components.

If you are assembling a DIY kit, please refer to the installation section first.

Card Features

- 32K SRAM
- ON/OFF switch to enable or disable the card if needed
- DC-to-DC power converter to help with heat and extend card life
- Improved circuitry to remove the requirement of constant DRAM refreshing

Theory of Operation

Please refer to the below link for theory of operation:

https://unige.ch/medecine/nouspikel/ti99/mem32k.htm

Hardware Requirements

- TI-99/4A console
- Texas Instruments Peripheral Expansion or 838-PEB
- Texas Instruments Flex Cable Interface or 838-IO Plus card
- TI Extended Basic/Other Extended Basic module or other specialized command module designed to utilize the expanded memory
    - The TI Basic computer language which is built into the computer and most software packages cannot make use of the expanded memory

Installation

1. Ensure your Peripheral Expansion box or 838-PEB is powered off for at least 2 minutes
2. Unplug main power cable to the expansion box
3. Open your expansion box/838-PEB
4. Insert your new 838-32K-X1 expansion card into an available expansion slot with the correct orientation.

> **Note**: Inserting the card backwards will result in damaging the card and other components of your system.

5. Make sure the on/off toggle switch at the back of the card is in the '**ON**' (upward) position
6. Replace all expansion box covers
7. Plug main power to expansion unit

Testing

For a comprehensive RAM test please use JediMatt's 32K Expansion Test program at the below link:

https://forums.atariage.com/topic/254502-32k-expansion-for-the-side-port-released/page/5/#comment-3597208

To verify that the system sees the new memory follow the below steps:

1. Power up Expansion unit
2. Insert Extended Basic or other form of extended basic into the TI-99/4A console.
3. Power up the TI-99/4A console
4. Press any key to get to the command module selection menu
5. Select the extended basic that is inserted
6. Type '**SIZE**' without the quotes and press **ENTER**

If your system sees the extra memory, you should see a screen that reports as below:

If your system does not see the memory, there could be an issue with one of the below:

- Memory card faulty
- TI-99/4A faulty
- Flex Cable Interface / 838-IO Plus faulty
- Flex Cable Interface Cable or 838-IO Plus cable faulty or loose

Warranty

Assembled 838-32K-X1 cards that have been purchased from SHIFT838 Store or authorized resellers are warrantied for 90 days from date of purchase. For any warranty or support inquiries please refer the support section at the end of this document.

All DIY card kits that were not assembled by SHIFT838 are not under warranty. These cards are marked as DIY.

Don't forget to register your card if purchased from SHIFT838 as assembled and tested! Goto https://www.shift838.com to register your card.
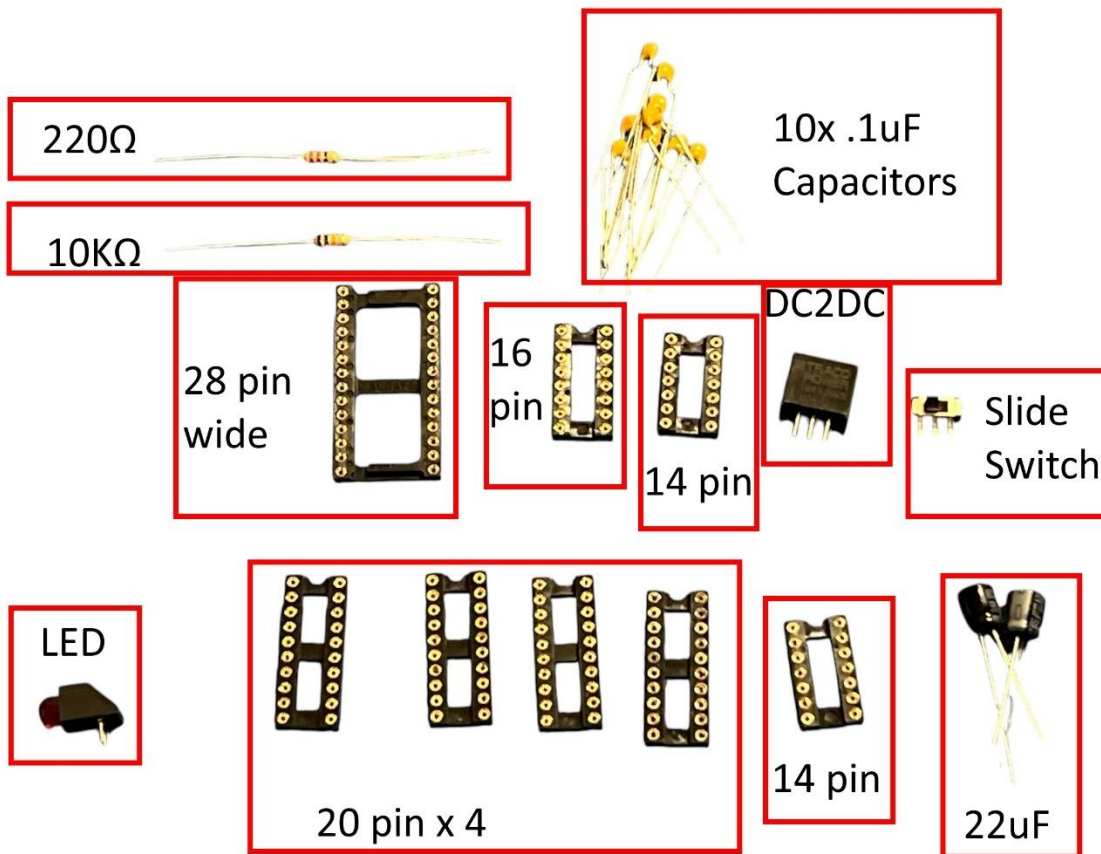
Assembling the DIY card kit

Thank you for purchasing the DIY kit! This kit comes with all components required to assemble the 838-32K-X1 memory expansion card. What you will need to assemble the card:

- Soldering iron
- Desoldering tool (just in case you screw up)
- Appropriate solder for electronics such as 60/40 tin rosin core. I use .6mm diameter for most of my work
- Optional: Painter's tape (I'll tell you why in a moment)
- Good lighting
- Good magnification glasses if you need it
- Multimeter
- Patience

Kit Contents
- 838-32K-X1 bare PCB board
- 1 x 220 Ω ¼ watt resistor
- 1 x 10K Ω ¼ watt resistor
- 10 x 50v .1uF ceramic capacitors radial
- 1x 3 pin right angle slide switch
- 1x right angle LED (color may vary)
- 2x 22uf Electrolytic Capacitors radial
- 1x 5v DC2DC converter (replaces standard voltage regulators)
- 4x 20 pin IC socket
- 2x 14 pin IC socket
- 1x 16 pin IC socket
- 1x 28 pin wide IC socket
- 1x 32k SRAM
- 1x 74LS138N
- 1x 74LS21N
- 1x 74LS125AN
- 1x 74LS245N
- 3x 74LS244N

220Ω

10KΩ

10x .1uF Capacitors

28 pin wide

16 pin

DC2DC

14 pin

Slide Switch

LED

20 pin x 4

14 pin

22uF

Soldering components

I typically like to start with the components that have the lowest profile first. Be very mindful of vias, there are a few that are close to pads.

I told you about the painter's tape, well many solder spools when melting the flux within the solder cord will launch itself onto parts of the board. Well, I like my edge connector for the PEB connector to be clean, so, flip the board over to show the back of the board. Take a piece of painter's tape and tape it across the connector to protect the edge connector.

1. Take the 10K Ω resistor and insert it into the R1 position and bend out the legs a bit to keep it in place
2. Do the same for the 220 Ω and place it in the R2 position
3. Solder the legs on the back side and clip them off and once done your board should look like below:
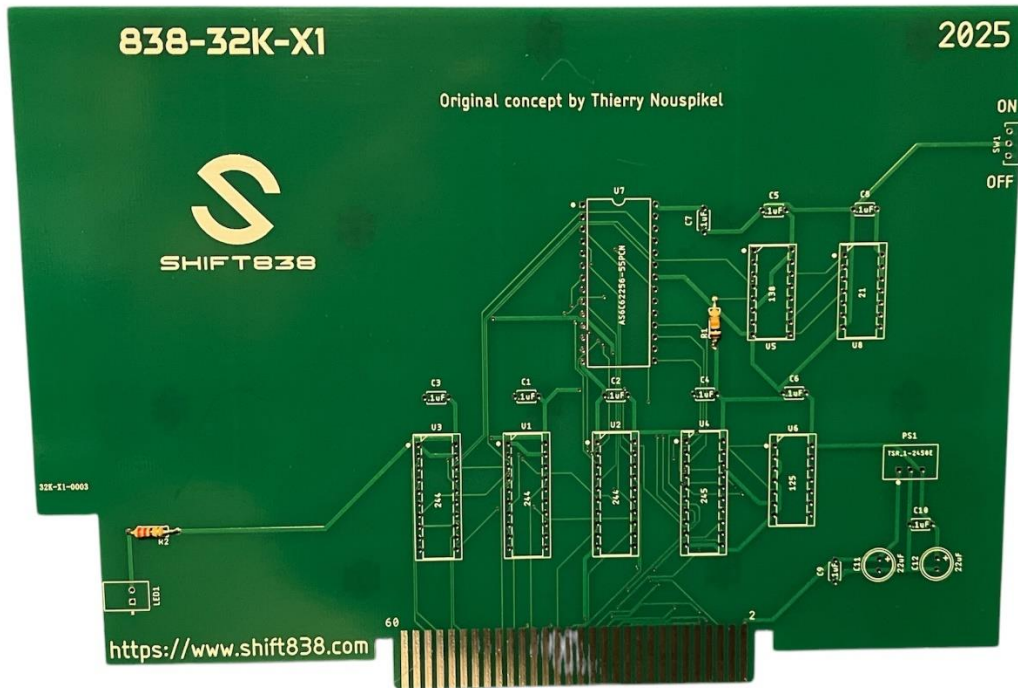
4. The next lowest profile is actually a toss up between the slide switch and the sockets. Let's get the sockets next.

   Note: Take note of the socket directions. All pin #1 of the chips will be towards the top of the PEB card. Ensure the sockets pin 1 indicator faces the top of the card. You will see pin 1 designated on the card by a white circle next to pin #1 of each IC.

5. Insert the sockets with the correct orientation for pin #1. Some sockets may be loose.   Take a piece of painter's tape and strap them down to make sure they do not move.
6. Typically, I will solder the alternate corners of the sockets, so for a 20-pin socket, I will solder pin #1 and pin #11.
7. Remove the painter's tape from the sockets
8. Verify each socket has not moved and is pressed all the way down onto the PCB. If one side is up or both sides is up, simply heat the corner pin to that side while pressing it down. Be careful not to burn your fingers on the socket pins!
9. Once you have verified all sockets are as close as they can be to the board then finish soldering every pin of the sockets on the board and your board will look like the below photo:
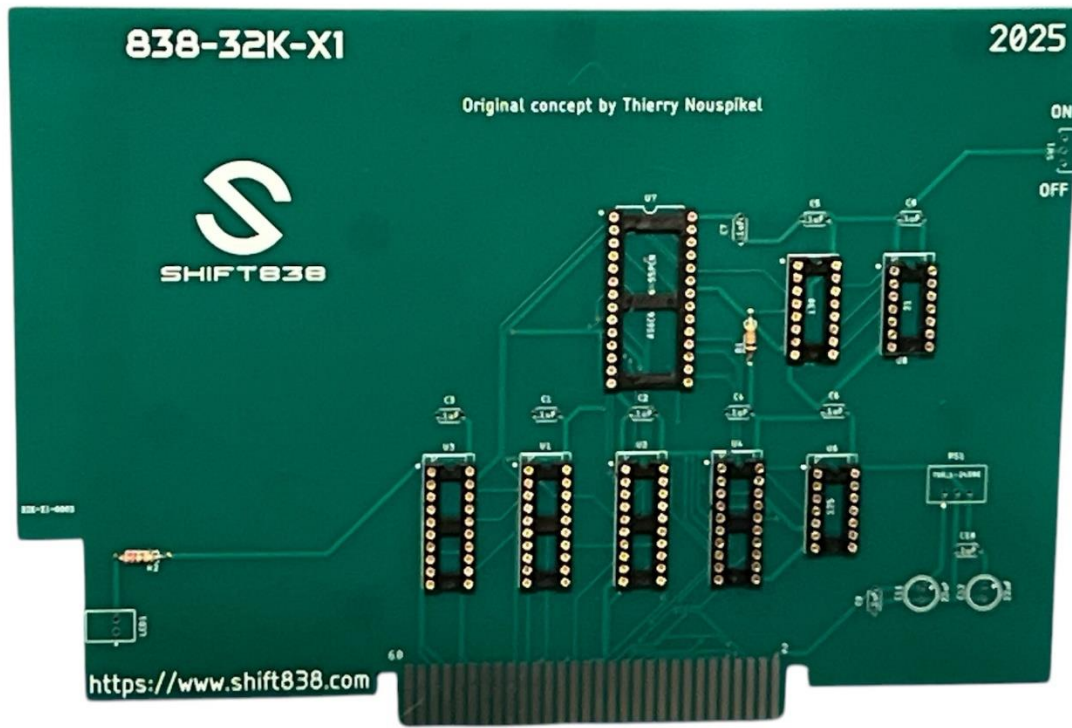
10. Take the .1uF ceramic capacitors and put them in capacitor spots C1 through C10, bend the legs out and solder each leg and clip them off. – Not much left to do!
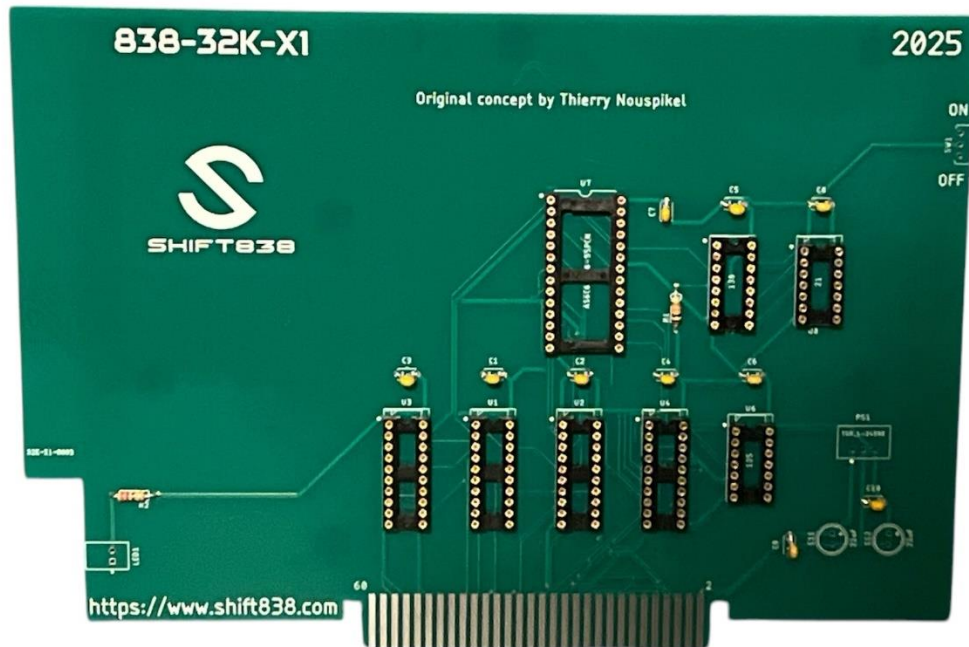
11. Now let's solder the slide switch, LED, DC2DC converter and the two 22uF capacitors.
    a. Remember the electrolytic 22uF capacitors are polarized and can only go in one way. Ensure the positive lead (longer lead) is closest to the '**+**' symbol.
    b. The DC2DC converter has a white dot closest to pin #1 on the PCB as well as on the component itself. Match the dots up for correct alignment.
12. Clip the legs that need clipping
13. Move the slide switch to the '**ON**' (upward) position
14. Now let's install the IC's
15. Match up the ICs to their respective position, ensuring pin 1 is correctly oriented.

Congratulations! You have built the card and it should look like the photo below:
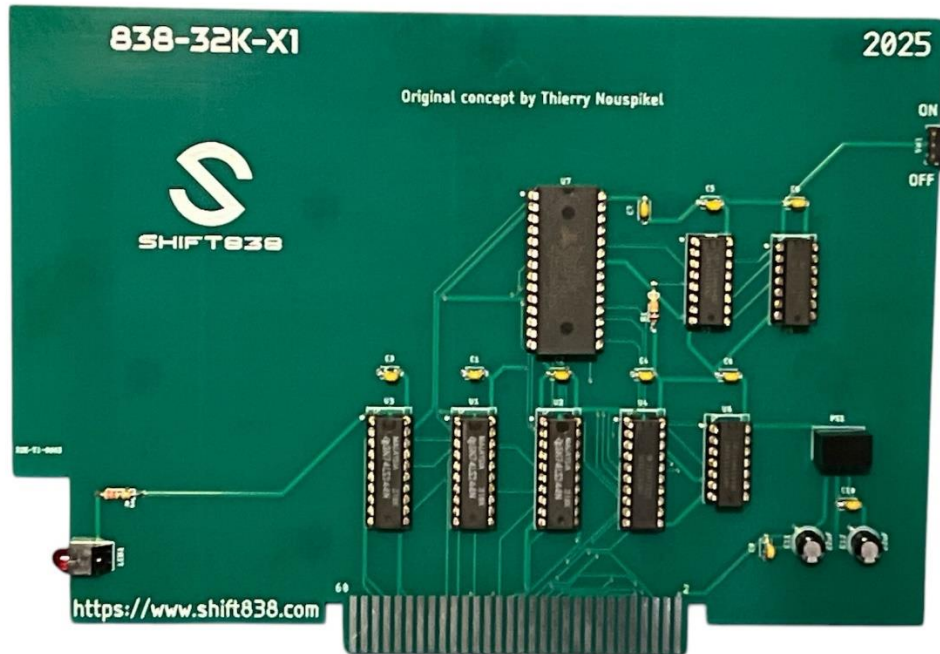
But does it work? To find out please follow the steps in the 'Testing' section.

Troubleshooting

Behavior	Possible Cause
No Boot Screen Color Bars (Press Any Key Screen) Just a blank Cyan screen	• Check that all components are oriented correctly • Verify no solder bridges between pins as well as close vias
Memory is not seen when issuing SIZE command	• Verify ON/OFF switch is set to '**ON**' (up) • Bad memory IC or another component on card • Bad Flex cable interface / 838 -IO Plus • Loose or bad flex cable or IO Plus cable

Links

- SHIFT838 Web Site: https://www.shift838.com
- SHIFT838 Web Store: https://www.shift838.com/store

Support

If you need support feel free to drop an email to support@shift838.com

Telnet to heatwave.ddns.net port 9640

Revision History

Date	Author	Notes
March 4, 2025	Chris Schneider	Original Release
March 6, 2025	Chris Schneider	Added Theory of Operation link