

Assembly and Troubleshooting Tips

This build is not necessarily hard. It's all TH parts, but there are a LOT of them. It's easy to lose track of what part you are installing and where you are in the BOM list. Print the BOM out and mark through each item as you complete the installation of that item. If you can work next to a computer with a browser, there is a .html file that will locate where each single item is located on the motherboard and give you the ability to track its installation. Set aside days, even a week to complete this assembly. Most of all take your time.

1. Order of installing parts:

***Leave the RF modulator, channel select switch, power switch, transformer, both oscillators and relay for last.**

This is a four layer board and it will take a little more heating time with the soldering iron to fully have the solder flow. Especially on any GND pin. But don't crank the soldering iron up to 1000 degrees or leave the iron on the joint until you start burning the part or board. Flux is your friend here, don't drown the board, but don't be stingy either.

Start with the horizontal parts first. The resistors/inductors and caps and diodes. Observe diode polarity. Solder should fill the holes and wick up the component side of the board around the pins just a little.

Sockets, short connectors and transistors next. Observe transistor orientation. Taller connectors next.

At this point the board is going to be either rather clean or gross depending on how well you've cleaned at each step. Before installing the last components, I would advise using a sonic cleaner if you have one of that size or bathing the pcb in a 80-20 solution of 99% rubbing alcohol and acetone and use a stiff camel hair brush on the bottom to get the accumulated flue residue off. Check the top as well.

Let the board dry for at least two days. That should allow any trapped fluid to evaporate. Now go ahead and install the last items. Clean as you go.

2. Inspection of finished board:

This is where you might want to use a magnifying glass of some kind to go over your solder junctions. You'll be looking for globs of solder, bridging of pins and anything generally suspicious. You might also find the occasional pin that does not have solder applied. It can happen easily and cost you hours of troubleshooting if you don't catch it at this point.

Wick extra solder, apply solder and generally clean up the appearance of any suspicious joint.

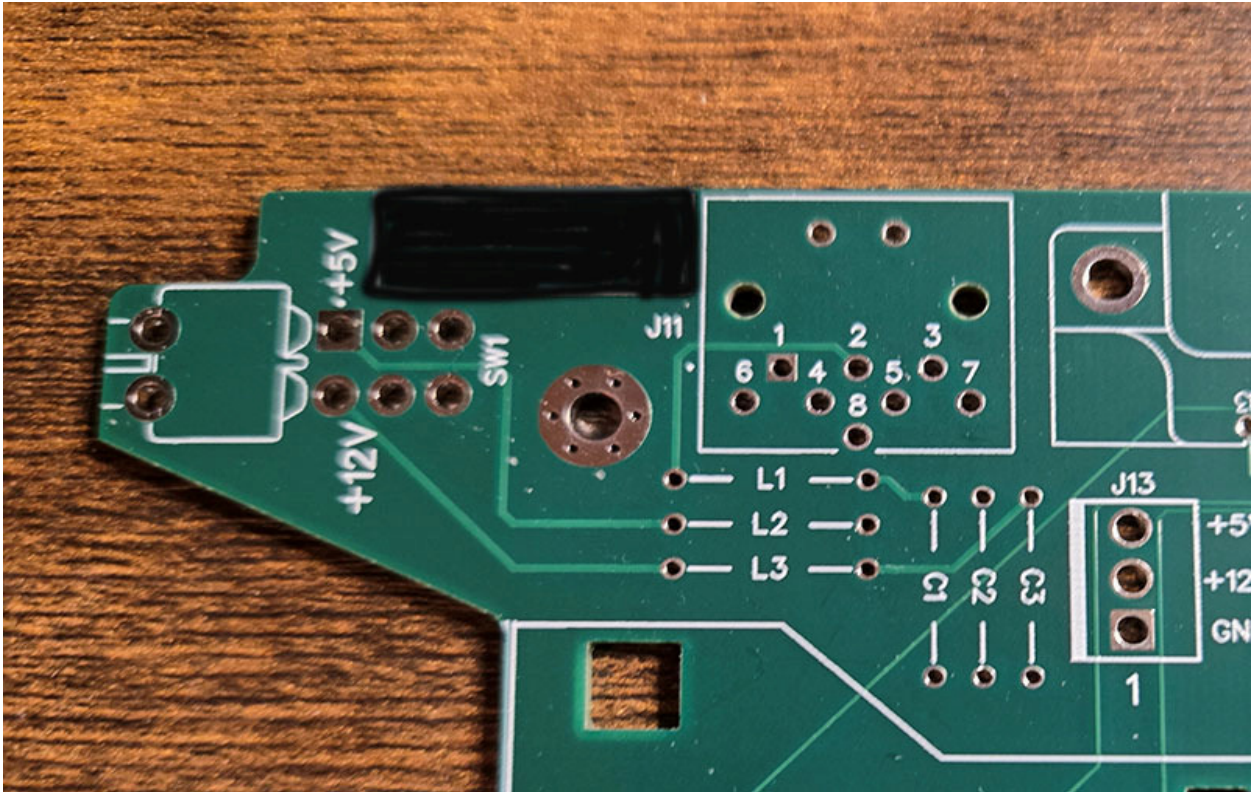
3. Make up the AC and DC power cables for the Meanwell RT65A power supply using the instructions supplied in that doc.

4. First power on

Make sure the power switch is off. Connect the DC power cable to the computer power in connector and the AC power cord to a surge suppressor. Turn the surge suppressor on and then the 1450XL power switch. You should see the green power light on the RT65A.

If the electrolytic caps and diodes and transistors were soldered in with the correct polarity and orientation observed and soldering was done well, and you didn't make any mistakes in the power supply cable connections, you should not have any sudden bangs or smoke escapes from any part on the board at this stage.

Using a multimeter set for DC voltage, measure the input voltages carefully at the three inductors at the top left corner of the board.



- 5V at the left side of L1
- +5V at the left side of L2
- +12V at the left side of L3

You may not see exactly those voltages, but they should be very close. Now measure voltage at the power input pins of all of the major sockets. Check the schematic if you are in doubt of the power input pin on those sockets. Again it might not be precisely +5V, but it should be close.

Okay if you measure a bad voltage or none make a note of which sockets. When you are done measuring, turn the power switch off, the surge suppressor off and disconnect the DC power cord from the computer.

If you measured good supply voltages on all the sockets you are ready to go to the next step. **If not, then you will need to check your soldering to see where it went bad. Then retest to see if what you did fixed the problem. Repeat until these voltages are good. There's no reason to move forward until these voltages are good.**

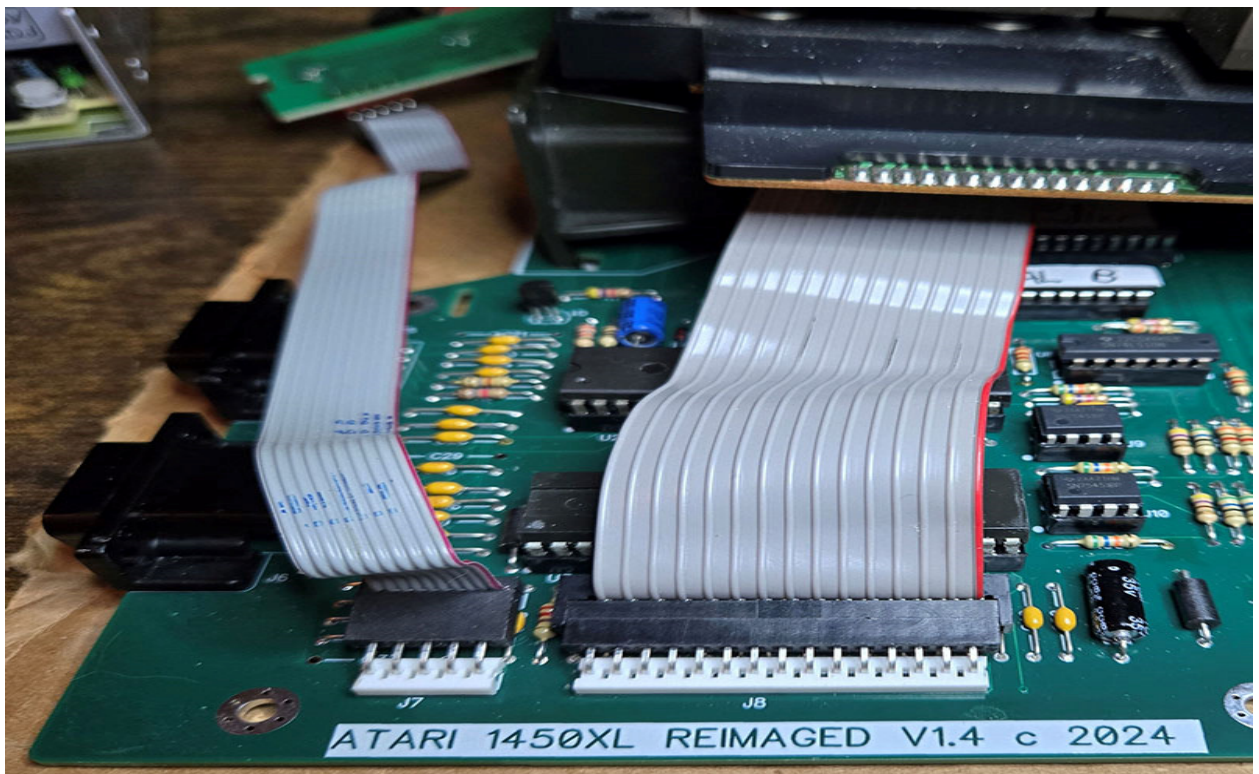
5. Installation of the chips:

At this point you can install the chips into their sockets. Be mindful of chip orientation. All chips should have pin 1 in the lower left position of the socket. Leave out the SC-01 speech clone board for now.

Program and install the PAL and the Handler chips next.

Double check the chip orientation one last time and that all chips are firmly seated.

6. Attach the 1200XL keyboard with a cardboard insulator between the board and the bottom of the keyboard. You may have to bend the keyboard connector pins upward to slide the connector on, but don't bend too much and try to keep the pins evenly elevated and spaced. Do the same for the 1200XL LED panel. Take note of the pin 1 orientation on the board and don't connect backwards.

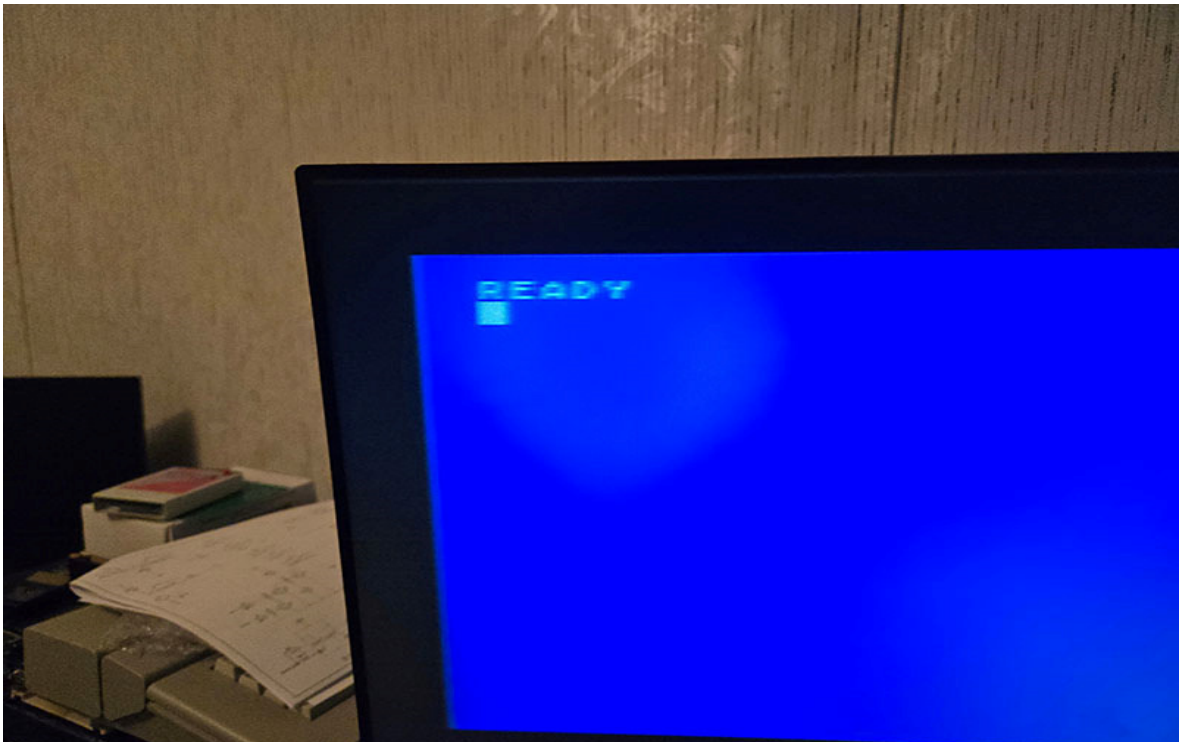


7. Moment of truth:

We'll start with the least connections to get a display on your monitor and a basic boot ready prompt on the screen. We only need two cables to the computer, the DC power cable and the monitor out or RF modulator cable.

Connect the DC power cable to power in connector on the 1450XL. The surge suppressor should be off. The AC power cable from the RT65A power supply should then be plugged into the surge suppressor. Turn on your monitor/TV. If using the RF modulator set the channel switch to channel 2 and your TV to channel 2. Most of the time there won't be a live channel on that number to interfere with the Atari signal. Otherwise set your monitor for the input the Atari signal will be coming in on, usually AV.

Now turn on the surge suppressor, verify the power light on the RT65A comes on and then turn on the 1450XL power switch. You should see the display change or blip and may also hear a low frequency burrrrr... as the Atari boots. If everything goes okay, you should see within a few seconds this:



If you do, then congratulations you've passed the first major test in recreating a replica of a computer that Atari never release to the public the 1450XL. You can move on to the next incremental steps in testing the functioning of various features of the computer. Skip to section 8.

If however you never get the Ready prompt or you smell smoke or hear a bang, then it's troubleshooting time. Remember at this point the bare board you started with is good, everything else is suspect.

- A. Carefully feel all the tops of the chips. They should be warm, but not hot, hot to the touch. If you have a really hot chip, turn power off. Either that chip is bad or the circuit around it is causing the problem or both. Disconnect the power and monitor cable and remove the keyboard and LED boards. Now you can troubleshoot.

Chips do go bad, a new part is bad out of the gate etc. Sometimes despite your best efforts transistors and diodes get installed incorrectly, you have a bridged solder connection and chips get installed backwards or one of their pins is bent up out of the socket etc.

Do a visual inspection first. Is there a diode in the wrong orientation or a transistor that is in backwards. Check the soldering around the chip and circuit. Is a pin solder bridged with another. Does a pin not have solder at all. Is the chip not fully seated? If you don't see any problems, then the next step is to replace the chip, especially if it's not an Atari custom chip. If it is a custom chip, try it in another Atari computer to see if it still works.

I went ahead and bit the bullet and purchased the [Backbit Chip Tester Pro v2](#) a few months ago and I can't say enough good things about it. It's expensive, but can test the Atari custom chips as well as ram and logic chips and verify bad/good condition. If you are concerned about possibly putting a bad chip in another Atari and damaging it, this is the only way to go.

- B. So what if all the chips are cold. That's usually a short near the power input connection. Again do a visual check, it will usually expose any obvious problems. You are looking for the same things as before. Fix what you find wrong and test again.
- C. So what if you do get a display of sorts, but not the ready prompt or it glitches. That could mean a lot of possible things. Nothing really fatal, just something that is not fully working. It can be one of the Atari custom chips going bad. The only thing you can do is swap with a known good one from another Atari or use the Backbit Chip Tester.

This is also where what's called a cold solder joint can rear it's ugly head. All it means is that a solder joint is not formed correctly, it can be intermittent as the board flexs or it might not make any connection at all. They can be very hard to track down, especially on a board this size. The only thing you can do is reflow solder joints that look bad. Then test again.

Another possibility is that one or more of the PAL chips or the Handler chip had a bad programing run. Reprogram/replace the chips.

- D. So what if you smell smoke or hear a loud bang/sizzle. Well that means you've been afflicted with the scourge of all wanta-be electronics gurus, you screwed up something and then you compounded your problems by not catching it when you did your post assembly visual checks before power was applied. You just outed yourself with the aroma and pyro techniques. You'll get over it. It's not fatal. That's why you ordered at least one extra part each isn't it? Find the problem and fix it. Test again.

Truth be told I don't know of any electronics guru that doesn't screw up sometime. If you are completely unable to figure out what you did wrong, post on AtariAge and be willing to endure some mind numbing suggestions. Somewhere in the responses is usually a pointer to the fix.

8. Feature testing

Feature testing boils down to having the necessary equipment to test all of the various features of the 1450XL. Most are fairly basic, and are relatively easy to check. For some there is even a built-in test program. You can enter that by holding down Option while booting the Atari. The following items with an asterisk can be tested that way.

SIO

*Audio-Visual

Joysticks/Paddle

Cartridge

*Memory

*Keyboard

For the remaining features you will need the 1450 SALT Test Assembly board and Cartridge or use the manual approach using disk drives or other SIO devices to test SIO, joysticks and paddles to test the joystick ports, and several different types of cartridges to test the cartridge port.

But there are three additional features that the Atari 1450XL brings to the table. In addition to a non XL/XE standard PBI connector those additional features are:

Phonetic Speech chip SC-01

Single Chip 300 baud modem

Parallel Disk Drive Connector and Handler

If you still have a land line phone then the built-in modem should be easy to test with the 1400XL Telecommunicator Cartridge. You simply treat the 1450XL as a telephone and hook it up to your phone jack on the wall. Of

course it communicates by digital tones rather than by voice. But most people haven't had a land line phone in decades though. There are several methods of using the internet, a ATA device and VOIP services to mimic the old POTS line. Youtube has several videos showing how to do that in general.

To test the speech chip is really simple too. Since there are very few released pieces of Atari software that take advantage of the speech chip, ie currently only one, the 1400XL Telecommunicator cartridge, you don't have much option. But you don't even need that cartridge. Simply hold down the option console key while booting the Atari 1450XL will cause a builtin routine to speak. If you hear that, then you know the speech feature is working.

The final new feature is not testable at this point. The recreation of the parallel disk drive controller has not been achieved yet.

The PBI connector of the 1450XL is slightly different than the one for the 600 and 800XLs. The 1450XL original board runs a signal from U33 pin 6 to PBI pin 38 named EarlyExtend. On the 600/800XL the PBI pin 38 is called Extend and on the 1450XL that signal comes from U23 pin 8. I decided to have as much compatibility with 600XL/800XL/130XE PBI devices as possible by using the same Extend signal on PBI pin 38 and running +5V to both PBI pins 47 and 48.

