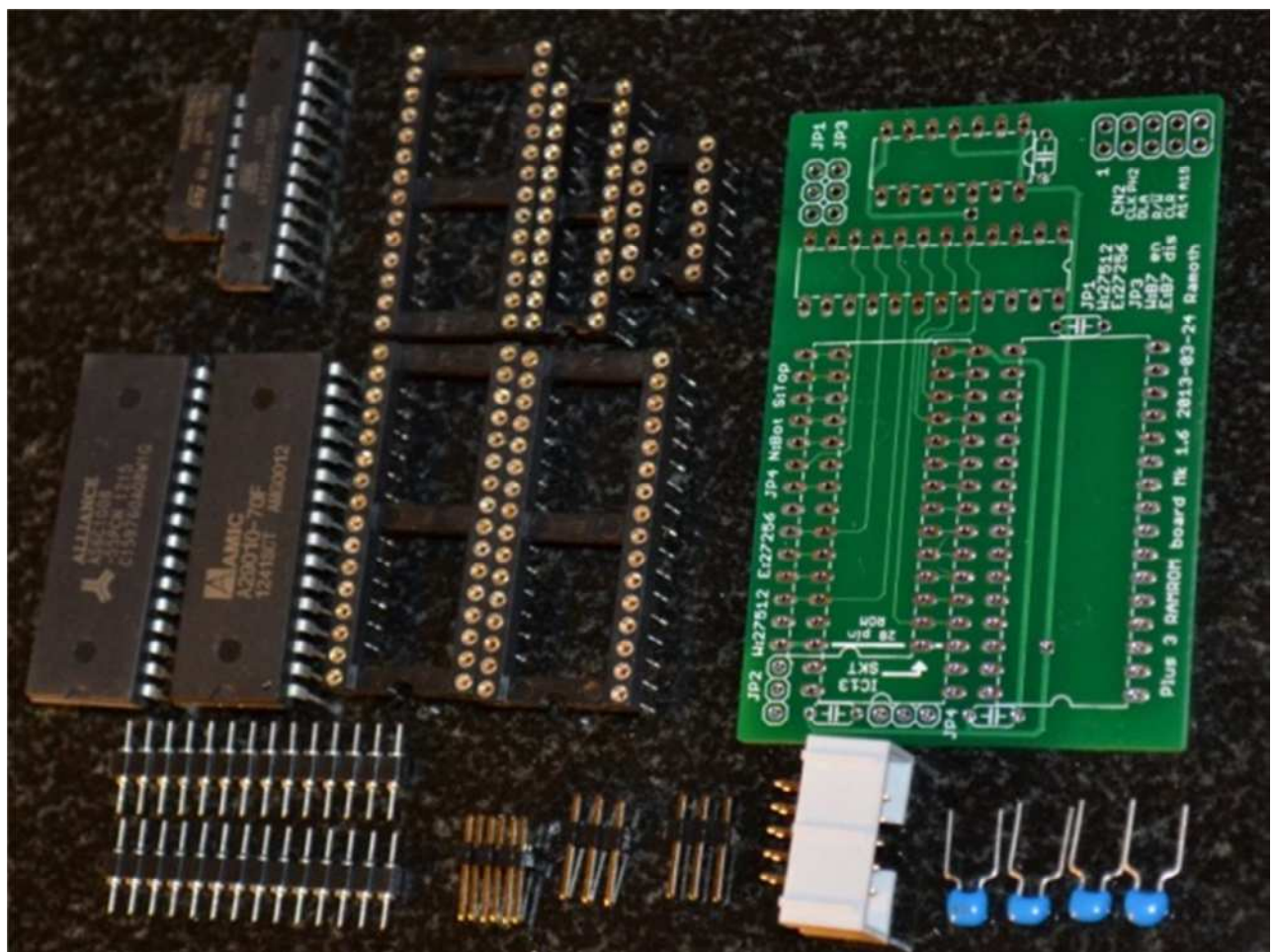


### Plus 3 RAM+ROM board Assembly Guide

### Kit contents.

The kit contains the following :

- 1 Circuit board.
- 1 Pre-programmed 29010 Flash ROM chip
- 1 128K Static RAM chip.
- 1 Pre-programmed ATF22v10 programmable logic chip
- 1 74ls74 flip-flop.
- 2 32Pin IC sockets for ROM and RAM chips
- 1 24 pin 0.3" IC socket for the PLD
- 1 14 pin IC socket for the 74LS74
- 1 28pin IC socket
- 2 14 way pin headers
- 2 3 way pin header
- 1 6 way pin header
- 4 jumpers
- 4 100nf capacitors
- 1 2x5 way socket.
- 1 2x5 way plug with attached length of 10 way flat cable.



### **Tools you'll need.**

A medium wattage soldering iron and solder.

A small flat blade screwdriver

Wire cutters

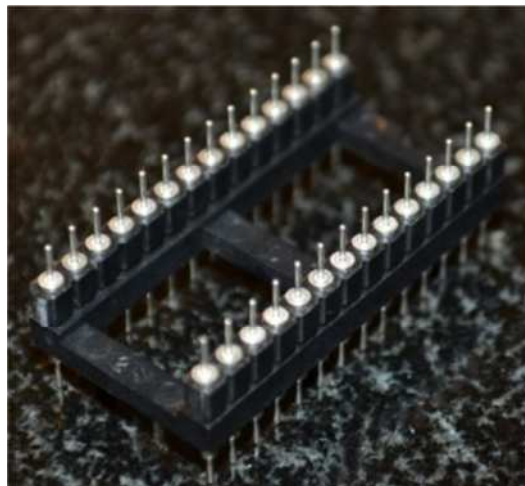
I am assuming that the builder is comfortable using the above tools, the build procedure will assume so.

### **Build procedure.**

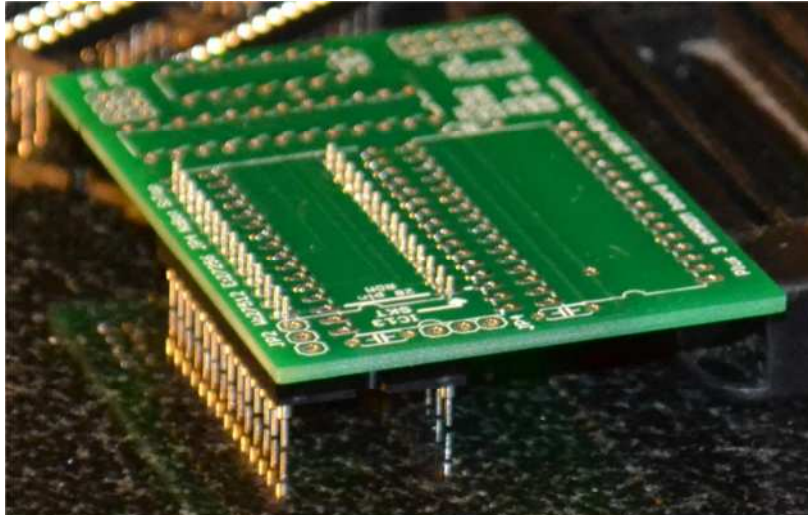
**Important Note:** The top side of the circuit board is the side with the writing on.

Since the connector that plugs into the ROM socket on the Plus 3 is underneath the flash rom, it is easiest to assemble these in a specific order.

The first thing you should do is to take the 28 way IC socket and insert one of the two pin headers in each side of the socket. The 14 way pin headers are slightly thinner on one end, this should be the end that you plug into the socket. You should end up with something that looks like this

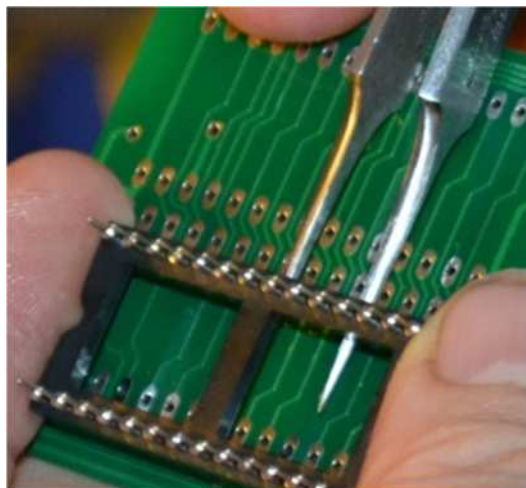


The next stage is to insert this into the bottom of the circuit board, it should be inserted into the two rows of 14 pin holes into the **BOTTOM** of the board, it may be useful to place something under the opposite edge of the board to support it.

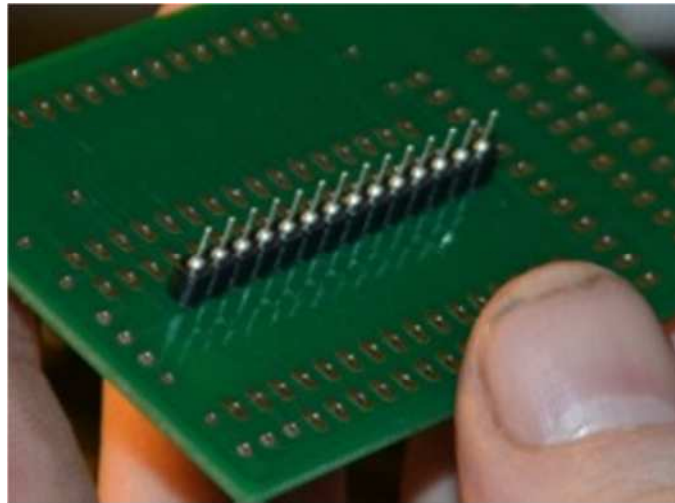


Once you have the header inserted into the board you should begin by soldering the line of pins **FURTHEST** from the edge of the board, the ones with the IC13 arrow next to it. You may want to start by soldering the pins at either end of the row and then making sure that the header is correctly seated before soldering the rest, as you can re-flow the solder on the two pins to adjust the position. You should then go ahead and solder the rest of the pins of this row.

At this point you will need to remove the rest of the header so that it is easier to solder the ROM socket on the top of the board, this can be done by sliding a small flat blade screwdriver or a pair of tweezers in between the pin header and the 28 pin socket.



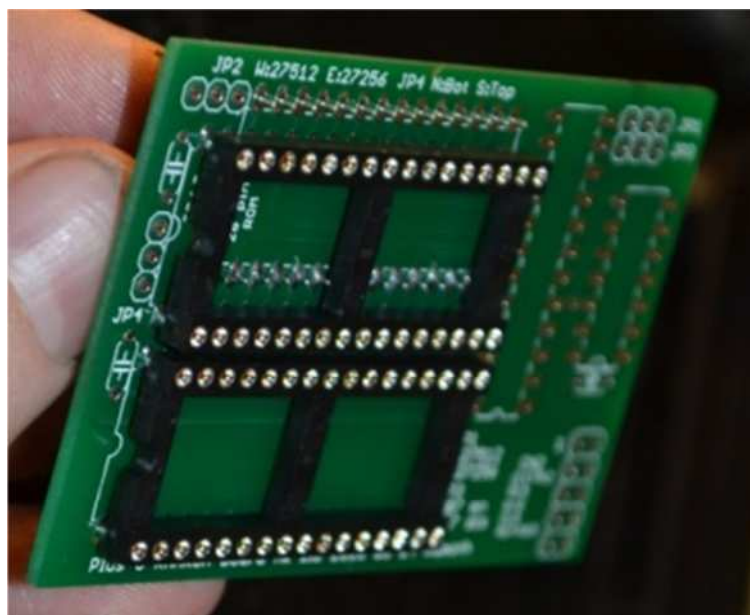
You should then end up with the single row of pins soldered to the board like so



Next you will want to solder on the ROM and RAM sockets (32 pin), doing these together means that the board will lay reasonably flat whilst being soldered, the sockets should be arranged so that pin 1 is towards the end of the board. Again first soldering opposite corners of the socket and then melting and seating the sockets may be a good idea before soldering all the pins.

When you have finished you will have the two sockets and the row of pins soldered.

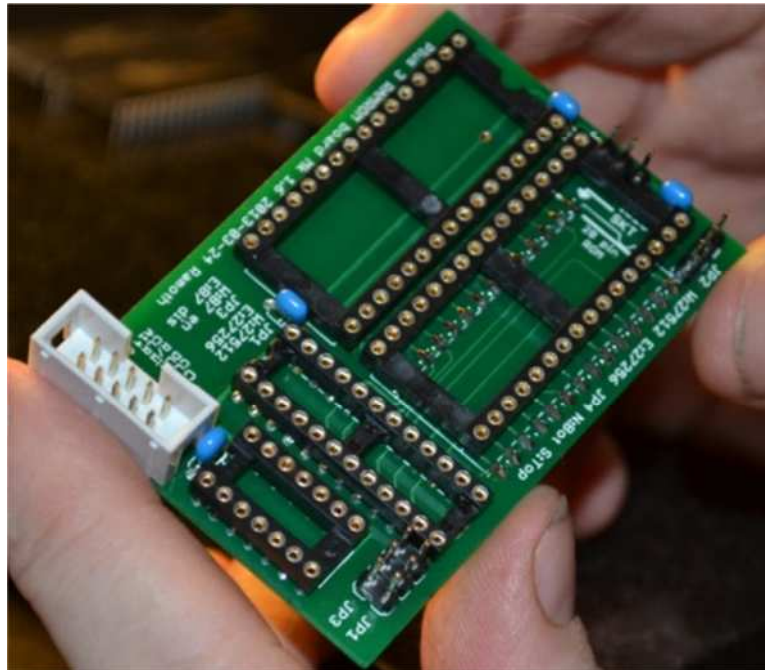
Next you need to replace the 28 pin socket so that the row of pin headers still attached to it are protruding through the remaining row of holes nearest to the edge of the board, with the already soldered pins plugged into the other side of the 28 pin socket. Be careful to make sure they are aligned correctly.



You should then solder the remaining row of pins in place.



With this complete the rest of the components can be soldered on in whatever order you wish I would suggest next soldering on the remaining two IC sockets, then the 4 100nf capacitors, these are not polarised so it doesn't matter which way round they go. Finally you will want to solder in the jumper pins and the socket. Note the supplied socket has pin 1 marked with a little triangle, pin 1 is also marked on the board, if the two are correctly aligned then the side of the socket with the cut out will be away from the edge of the board.



Finally you will want to populate the board with the 4 ICs



Once the board has been assembled it will need to be fitted into your Plus 3, to do this you will need to remove the top of your Plus 3 interface, carry out a slight modification to the connections to one of the ICs and solder 6 wires in place.

The first thing to do is to modify the decode circuit at IC9 so that the rom socket becomes active for SWR banks 4-7 instead of just bank 4. IC9 was not socketed on my Plus 3, though as I have a de-soldering station I decided to socket the IC before carrying out the mod, you can do this if you wish, but a simpler way of doing the mod is as follows

Cut pins 3 and 13 of IC9 as close to the board as possible.  
Bend pins 3 and 13 up and solder them together with a wire link.  
Connect another wire from pin 7 (GND) to the link between the two pins.

Once this is done you will need to separate out the wires that need to be soldered to 6 points on the Plus 3 board, these are :

Wire No	Where to connect	Purpose
1	IC10 pin 6	Clock to enable SWR register latch
2	IC10 pin 5	PHI2
3	IC10 pin 8	Drive latch signal, switches reads to RAM.
5	IC8 pin 9	R/W
7	IC12 pin 1 or IC15 pin 1	nReset, clears SWR latch switches reads to ROM.
9	IC7 pin 5	A14
10	IC7 pin 4	A15

Once these wires are soldered in you can go ahead and fit the board, you will need to remove IC13 from its socket and store it in a safe place. You should then push the header on the bottom of the RAMROM board into the vacant IC13 socket, taking care to make sure that they are aligned correctly. Finally you will need to connect the cable who's ends you have just soldered onto the board by plugging it into CN2.

Once this is done you should be ready to switch on and use.

Note on power on the electron will take slightly longer than normal to make its initial beep, maybe a couple of seconds, this is because the code from the ROM is being copied into RAM. The initialization code checks to see if the last break was a power on or a pressing of the break key and only does the copy at power on (or CTRL-BREAK), so pressing BREAK on its own should not be any slower.

If you have any problems with the construction or fitting of this board, or any comments suggestions or questions please feel free to contact me :

Email: [afra@aurigae.org.uk](mailto:afra@aurigae.org.uk)

Stairway to Hell / Stardot : <http://www.stardot.org.uk/> user prime.