

# 16K to 48K ZX Spectrum Upgrade Kit

## PCB Version - Fitting Instructions

### Dismantling the Spectrum:

Remove the screws from the underside of the machine, hold the two parts of the case together and flip it over. Lift off the top part, taking care to disconnect the two keyboard membrane cables from their sockets as they become accessible (they just pull out).

### Installation:

The 16K to 48K memory upgrade is achieved by installing 4 chips, plugging in the PCB and soldering some jumper links (if not already done) as follows:

- Install the 74HCT32 chip into socket marked IC23
- Install the 74HCT00 chip into socket marked IC24
- Install the 74HCT157 chips into the sockets marked IC25 and IC26

All these chips are fitted with the semi-circle notch in their cases at the top. Make sure they're pressed home and all the legs have actually gone into the sockets. New chips legs can be quite springy - if you have any trouble fitting them into sockets, place the chip at a slight angle so the right (or left) column of pins are just sitting in the socket and apply a little sideways pressure so that the other column of pins will align OK as you press down. To avoid damaging the components please take anti-static precautions, IE: ground yourself on an earthed device and avoid touching the pins as much as possible.

Press the RAM PCB into the upper RAM IC sockets as shown in the photos below. Make sure Pin 1 of the PCB is aligned with Pin 1 of IC socket IC22 (the top left pin) and that the board is mounted squarely so that all the other pins are aligned correctly. On some motherboards (notably the "4S" types) disc-type ceramic capacitors are used which may be an obstruction. If they cannot be folded down out of the way, they can either be removed (as they are not required when the PCB is fitted) or replaced with smaller 22nf ceramic capacitors.

### Soldering the jumper links:

There are 2 types of 16KB Spectrum boards that can be upgraded: "Issue TWO" and "Issue 3" - This is marked on the PCB (It is easy to tell the difference as issue TWO boards have the heatsink in the bottom right and all other issue PCBs have the heatsink at the top, above the edge connector.) The jumper pads which configure the memory are different on the two board versions:

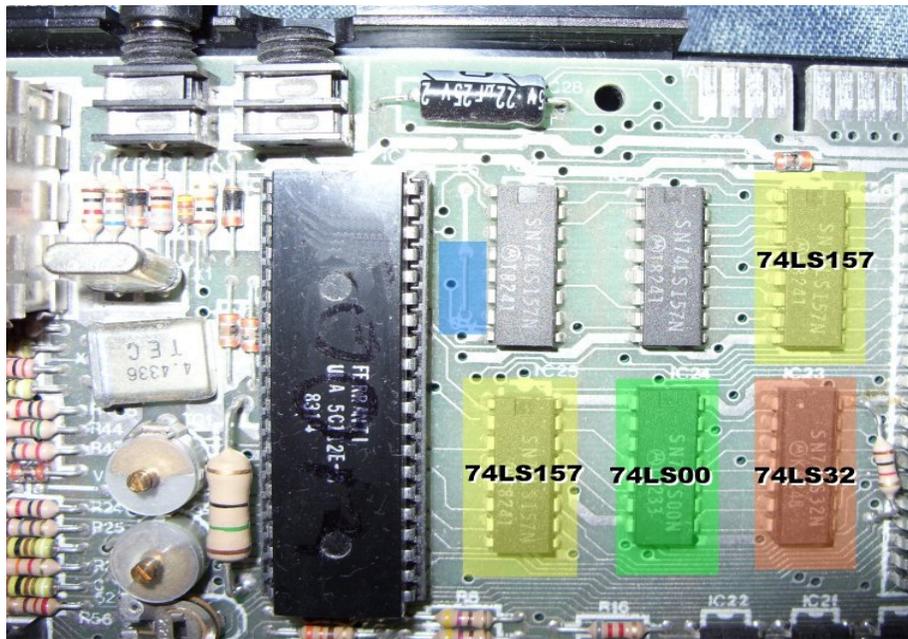
**Issue TWO boards** - On the top right of IC1 (the large ULA chip) there are 3 pads, the top is marked "+5v", the centre is unmarked and the bottom is marked "0v". Either the top or bottom pad should be connected to the centre pad (with the RAM chips supplied in this kit it doesn't matter which. The bottom pad is shown linked in the example photo on the next page but if your board already has the top pad linked instead, just leave it as that).

**Issue 3 boards** - On the right of the MIC socket (under the heatsink) there are two groups of pads marked "TI,L,H" (first column) and "OKI,3,4" (second column). If no pads are already linked, link the two pads marked "TI" and also link the two pads marked "4" as shown in the photo. (If another valid configuration is already set, just leave it as that as it doesn't matter with the chips supplied in this kit. Valid link selections are: a) TI linked (plus 3 or 4 linked) or b) OKI linked (plus L or H linked)

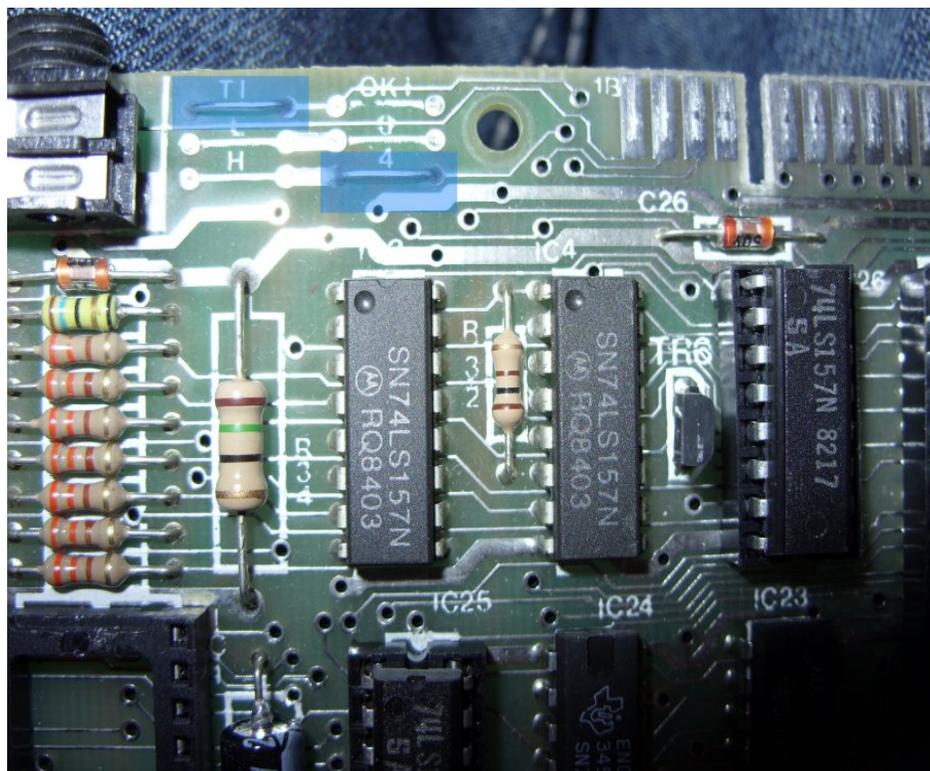
### Reassembling:

At this point you can test the Spectrum (without the keyboard membrane attached). Power up and you should notice the copyright screen takes a little longer to appear than when only 16KB is present. Disconnect the power and proceed with reassembly: Push the membrane tails back into their sockets, replace the top section of the case (try to ensure the cables don't become too pinched). Finally, replace the outer case screws. Obviously if any problems are encountered, remove the power and module and check pin alignment etc.

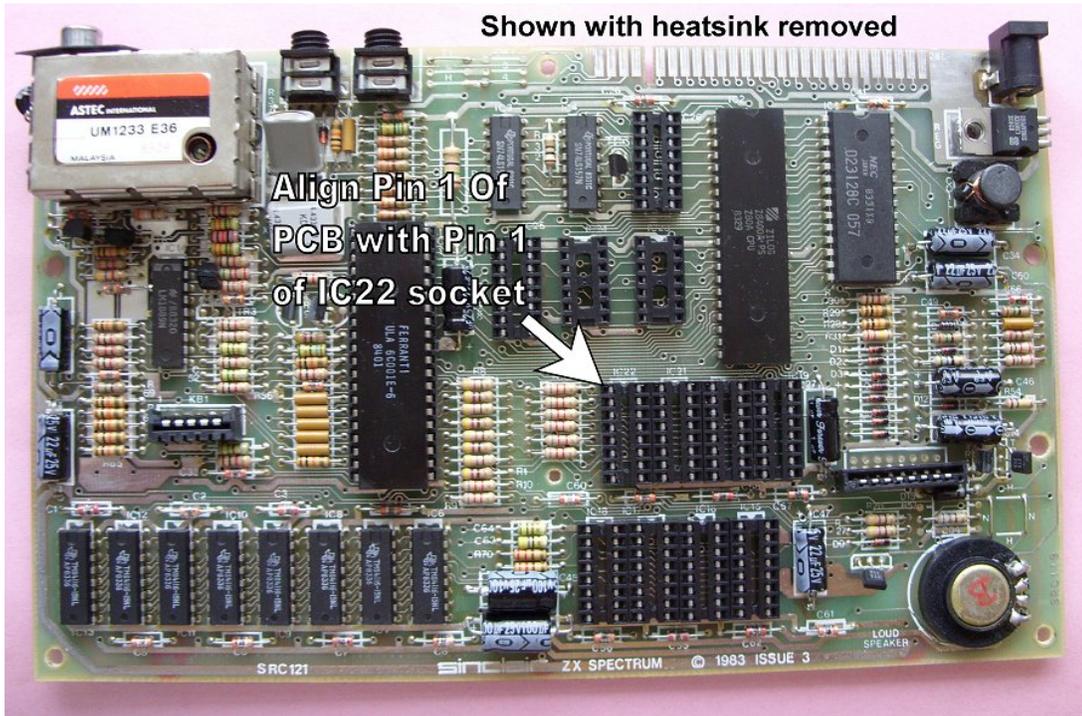
Issue TWO PCB - Jumper wire position shown in blue.  
Location of logic chips highlighted in yellow, green and orange  
(In this kit, 74HCTxxx chips are used instead of the 74LSxxx marked below)



Issue 3 PCB - Jumper positions highlighted in blue (shown with heatsink removed)



Before upgrade (issue 3 PCB shown)



After:

