

ZX81 16K Internal RAM Module

WARNING: The module's mounting pins may be sharp on both sides; take care when handling it. Observe anti-static precautions while installing the module and store it in its static-shielding bag prior to installation.

This module is meant to be fitted in place of the internal RAM in a ZX81 computer where it can be connected to provide up to 16 kilobytes of system RAM.

This module is designed for issue 1 ZX81 circuit boards. With a little extra effort, it can be fitted to an issue 3 circuit board. Information on doing this can be found later in this document. If you are going to fit this module to an issue 3 ZX81, you should de-solder and remove all of the pins from the right hand half of the module (as viewed from above) or at the time of purchase, request a module that has not had these pins fitted.

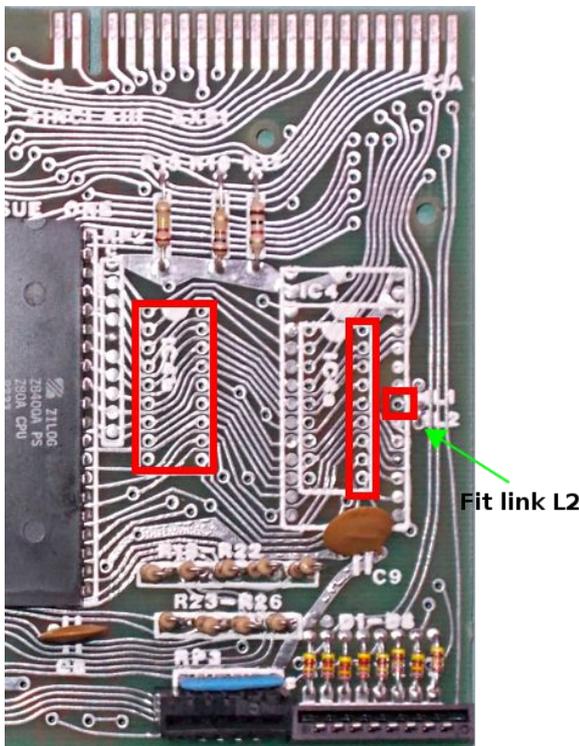


Figure 1.

Figure 1 shows the points (highlighted in red) where the module connects to the ZX81 circuit board.

It can be soldered directly to the circuit board or sockets fitted for it to plug in to. Header pin sockets with 0.1 inch spacing or standard 18 pin DIL sockets can be used. A DIL socket can be cut in half lengthwise and one half fitted to the row of holes that include the single connection point on the right hand side. It does not matter if a socket strip occupies more of the holes than the RAM module will need to connect to.

Half a DIL socket could be installed in position IC4a, though you might prefer to fit a whole socket in case you ever want to install conventional RAM ICs instead of the module.

Note that the module cannot be properly plugged in to most turned-pin DIL sockets.

A wire link must be soldered in place in the position labelled L2 on the ZX81's circuit board. Remove link L1 if it is fitted.

Once the module is in place, three additional connections must be made between it and the ZX81. This is because the module must monitor address lines A11, A12 and A13. These are not available at any of the RAM IC footprints on the circuit board because the ZX81 was designed for a maximum of 2 kilobytes of internal RAM.

Make these connections by soldering a short length of wire between each of the three exposed pads on the module and the cathode of each of diodes D1, D3 and D5. These points are labelled in figure 2. If all three connections are made (see later), then the sequence of connection does not matter; i.e. the wires can cross over each other.

Before soldering, place a small piece of heatproof insulating tape on the circuit board, as shown, to protect the circuit tracks in this area and to make sure the new connecting wires do not touch any of them. Clean the diodes' leads and melt a little fresh solder on to each at the points where the new connections are to be made.

Strip only approximately 2 mm of the insulation from each end of the connecting wires (trim the

exposed ends if necessary). If the wire is stranded, twist the strands together and tin them.

If desired, the module can be connected to operate at lower memory capacities, as described below:

8 kilobytes: Pads A11 and A12 must be connected to A11 (D1) and A12 (D3), but pad A13 must instead be connected to 0 V; the lower left pin on the module (labelled in figure 2).

4 kilobytes: as above, but pad A12 must be connected to 0 V as well as pad A13. No connections should be made to D3 or D5.

2 kilobytes: as above, but all three pads (A11, A12 and A13) must be connected to 0 V. No connections should be made to D1, D3 or D5.

1 kilobyte: as above, but also remove the module's rightmost connecting pin (the one next to link L2) and connect the solder pad on the module where this pin had been to 0 V as well.

The RAM module is activated by the ZX81's RAMCS signal in the same way as the original internal RAM. This means that any peripheral that inhibits this signal and presents itself in some or all of the address space normally occupied by the internal RAM should function normally when connected to a ZX81 that has this module fitted.

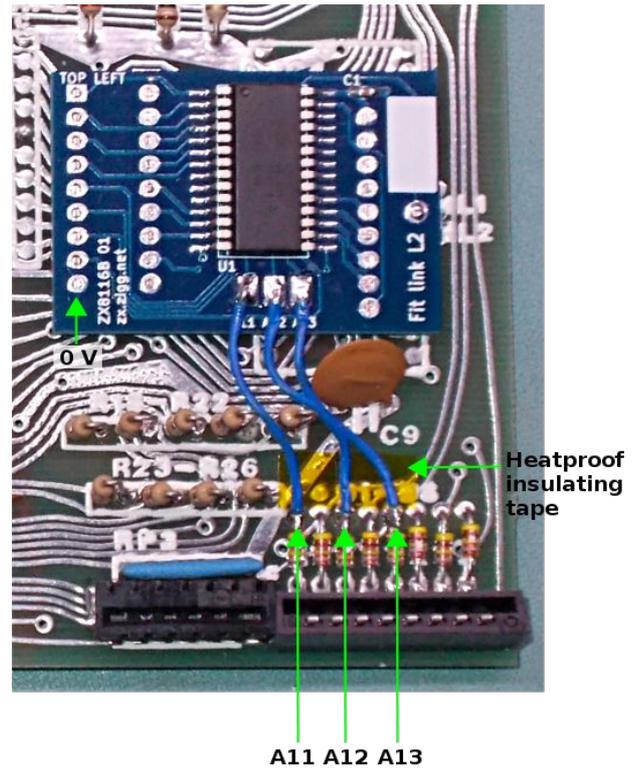


Figure 2.

Fitting to an Issue 3 ZX81

As noted earlier, the pins on the right hand half of the module must be absent.

Insert a length of solid, tinned copper wire (4 - 5 cm long) in each of the circuit board holes marked in red in figure 3. Solder them in place and fit a standard 18 pin DIL socket in position IC4B, as shown in figure 4. The socket is necessary to provide sufficient space underneath the RAM module.

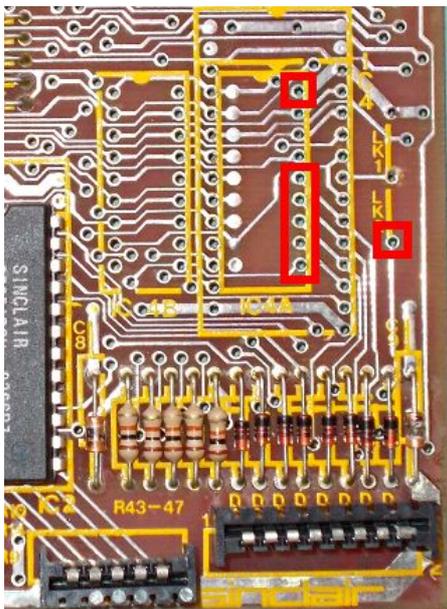


Figure 3.

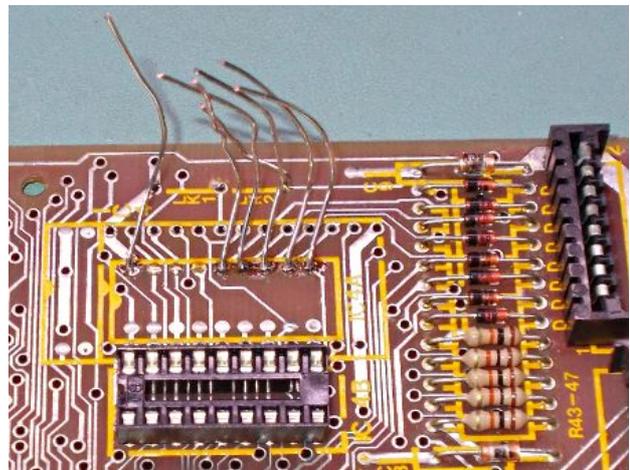


Figure 4.

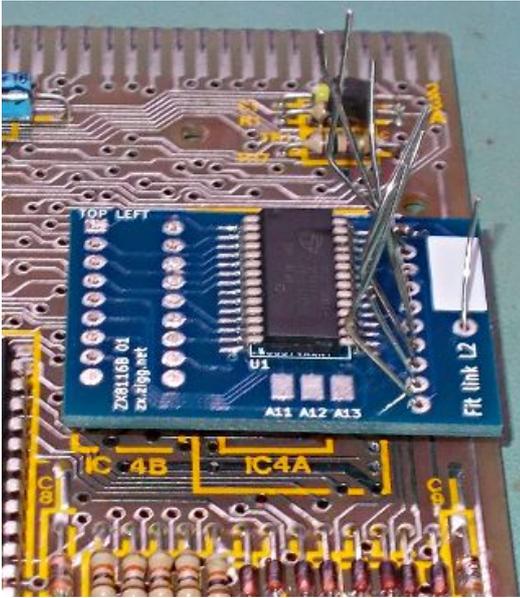


Figure 5.

Bend the wires over slightly, towards the bottom right hand corner of the ZX81's circuit board. Thread the wires through the holes in the RAM module. Put the wires connected to the right hand side of position IC4A through the corresponding holes on the module, noting that no wire should be threaded through the 2nd, 3rd or 4th hole from the top, just as on the ZX81's circuit board. Take care to keep the wires in the correct order; none of them should cross over any of the others. The rightmost wire (adjacent to the label LK2) must go through the rightmost hole on the module.

Push the module's pins fully into the DIL socket in position IC4B, allowing the wires to slide through the holes in the module as needed, keeping the excess wire above the module. See figure 5.

Peek under the module and make sure none of the wires are touching any other or the surface of the ZX81's circuit board (other than at the point where each is connected, obviously). Use a small screwdriver or pair of tweezers to reposition any wires, if necessary.

Solder in place each of the wires you have threaded through the RAM module and cut them off just above the solder joints. Also trim any excess wire left on the underside of the ZX81's circuit board.

The pads at the front of the module must be connected to address lines A11, A12 and A13, just as when fitted to an issue 1 ZX81. The instructions for connecting the module to operate at lower memory capacities are still valid, however. Wire off-cuts can be used to make these connections. After soldering each wire to one of the pads, bend it up a little and shape it so that it does not lie flat against the surface of the module. This will make sure it cannot come into contact with the circuit board track that runs under it (and is protected only by a coat of solder mask). The other ends of the wires must be connected to one each of the cathodes of diodes D1, D3 and D5. The fully installed module is shown in figure 6.

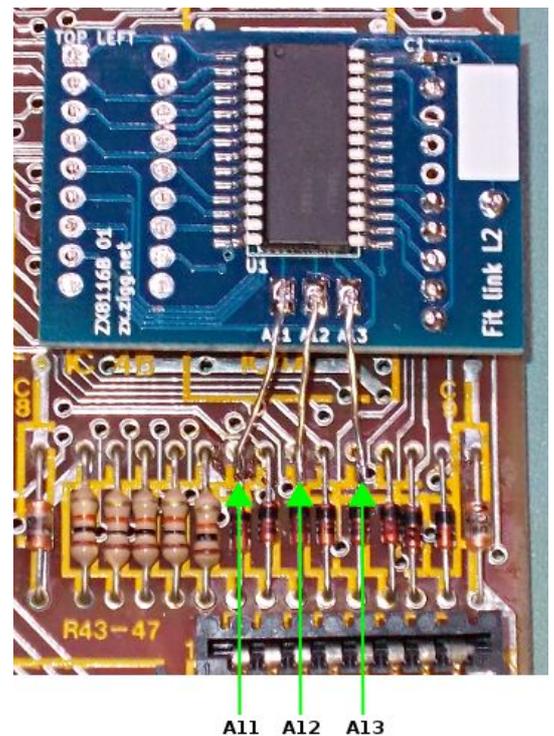


Figure 6.

Please visit <http://zx.zigg.net> if you have any questions about the ZX8116K internal RAM module.