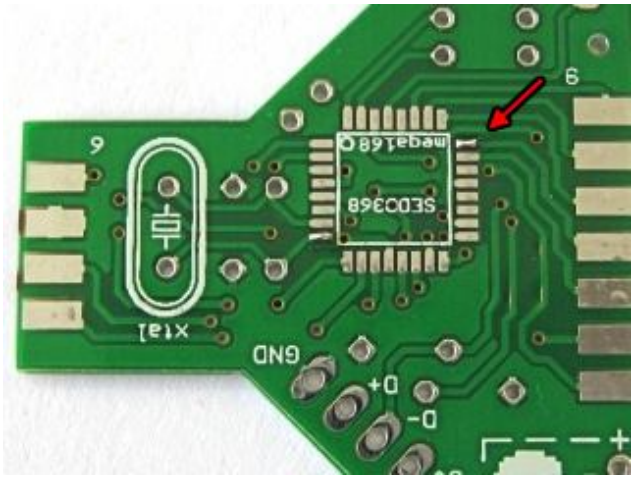
MAKE A RETRO ADAPTER

The Retro Adapter is available in kit form for you to make yourself. The kit has all the components you need, including a pre-programmed ATmega168 microcontroller.

The kit is not suitable for absolute beginners, as it does require soldering one surface mount part (the ATmega168 in QTFP package). It isn't difficult to do and does not need an expensive soldering iron, in fact I use an Antec 18W model with 0.5mm pointed tip and have arthritis in my hands. Some experience of surface mount parts, particularly ICs, is recommended though.

The Retro Adapter is now available ready-to-go or in kit form. Click the links in the menu on the left for more information or to buy one!

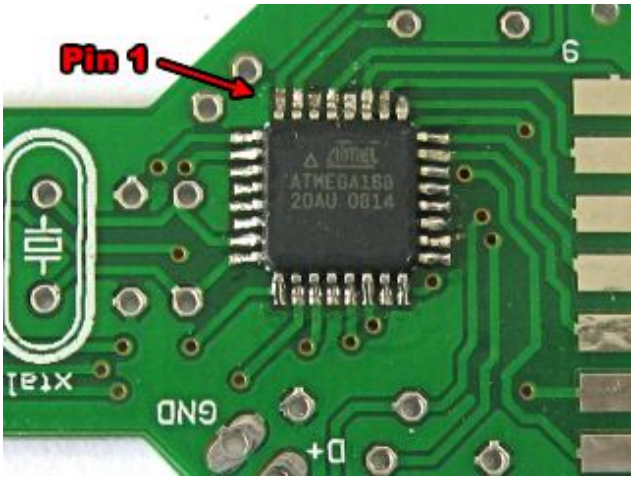


Step 1 - Prepare PCB

Start by making sure that the PCB is clean and in good condition.

Put a little bit of solder on one of the corner pads to held fix the ATmega168 in place.

You only need a very small amount of solder, it should be more or less flat.



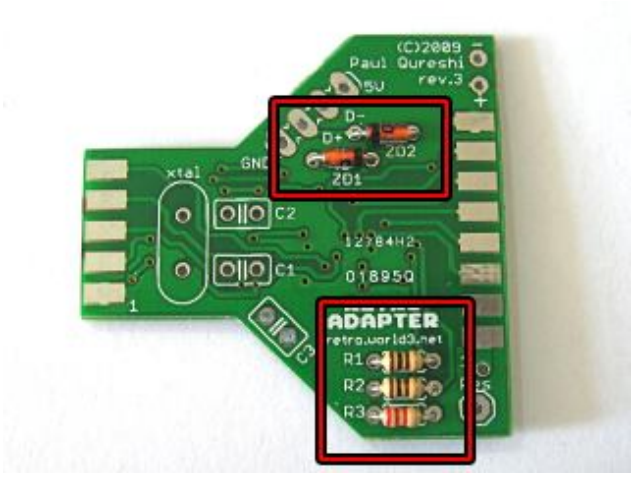
Step 2 - ATmega168

Place the IC on the board, making sure to get pin 1 in the right place (hint: make the little circle in the upper left corner of the chip match the one printed on the PCB).

It helps to use tweasers to hold the chip in place while you solder the first pin to the pad you put some solder on in step 1. Apply a bit of downward pressure so the chip sits flush with the board.

Now proceed to solder all the other pins. There are several ways to do this, and I suggest looking on YouTube for instruction videos if you are not sure how to do it. My preferred method is to use a 0.5mm point tip on the soldering iron and place it against the PCB and the base of each pin. I then apply a little bit of 0.5mm solder to the top of the pin and let it flow down and around it.

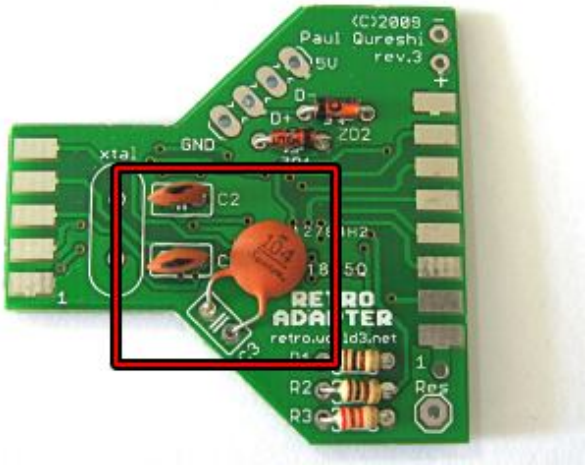
Using solder flux really helps here. Flux pens can be bought pretty cheaply. Any mistakes I correct with a desoldering pump.



Step 3 - Zener diodes and resistors

Turn the PCB over and solder the three resistors at the bottom. R1 and R2 are the USB line resistors and can be 68Ω and 100Ω. R3 is a pull-up resistor and should be 2k2.

Next solder the two Zener diodes at the top. Note that they must be soldered the correct way round, with the black bands matching the symbols printed on the PCB and as indicated in the photo.

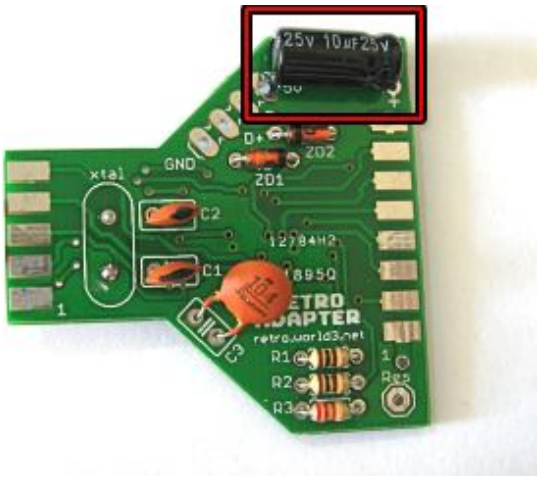


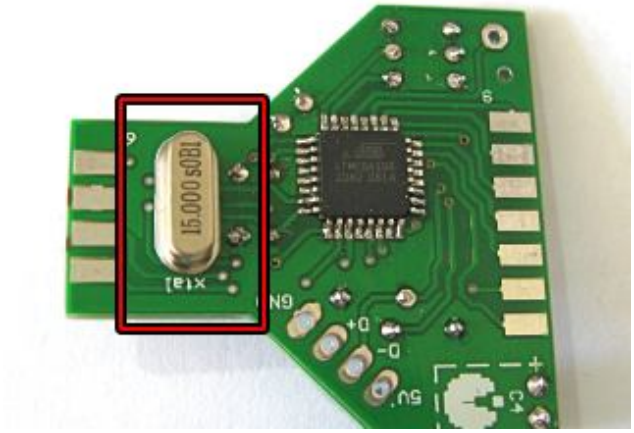
Step 4 - Ceramic capacitors

Place the two 22pF capacitors at C1 and C2, then the 100nF capacitor at C3.

Step 5 - Electrolytic capacitors

Solder the 10µF capacitor at the top. Make sure that the polarity is correct, with the -ve lead towards the -ve marking on the PCB.

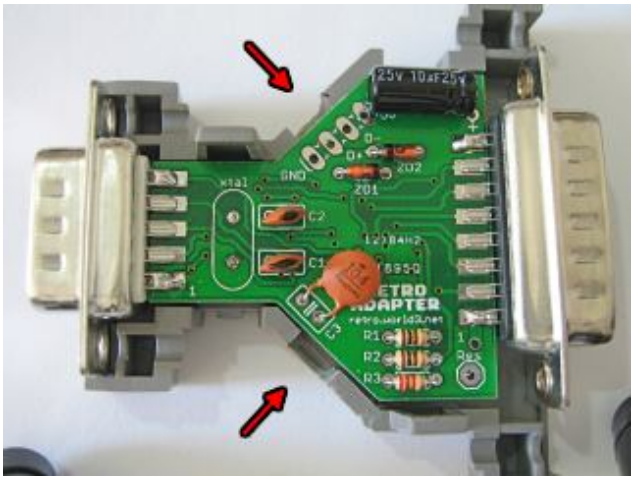




Step 6 - Crystal

Turn the board over and solder the 15MHz crystal to the PCB.

You can place it on either side really, but I recommend using the same side as the AVR since it has a ground plane under the crystal which theoretically improves stability a bit.



Step 7 - Subminiature D-type connectors

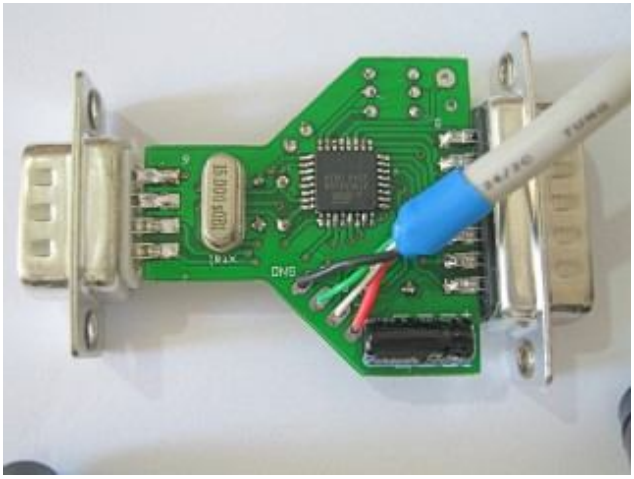
Start by pushing the PCB loosely between the pins of the two d-types. The pins sandwich the PCB and hold it in place.

Now place the whole thing in the DB9-DB25 converter box. Make sure that the d-types are sitting in the correct position with their metal shields just behind the plastic lip of the box.

Push the PCB as far in to the DB15 connector as possible, so that there is clearance between the plastic shell and the PCB. The box needs to be able to close completely flush here, so must not be overlapped by the PCB.You will find that the PCB now sits some way back from the DB9, but still within its pins.

Solder the two outermost pins on each d-type to fix everything in place. After one more check that everything lines up properly, you can remove the PCB from the shell and continue soldering the rest of the pins.

Make sure that the D-types sit vertically, i.e. at 90° from the PCB. Also check that your solder joints cover both the PCB and the pin. It helps to heat the PCB with the iron as well as the pin.



Step 8 - USB cable

Strip about 2cm from the end of the USB cable and remove the shielding wire mesh and protective foil to release the four inner wires. I recommend putting a bit of heat-shrink tubing over the end of the main cable to prevent the end of the shield wire touching anything.

Strip the ends of the inner wires and prepare them with solder. For reference, the standard colours are:

Red:	+5V
White:	D-
Green:	D+
Black:	GND