WP-34s

How to install a clock crystal and an IR diode for printing[1]

1 What I used besides the WP-34s

I used a 16W soldering iron, a hot glue pistol, a tiny Philips screwdriver, tweezers and a wooden toothpick. Starting with my second converted machine, I used another soldering iron which allows for temperature trimming between 100 °C and 450 °C (Use your WP-34s to convert to °F if needed).

2 What I bought from www.conrad.de

1. Quarz MH32768C Bestell-Nr. 156007 0,79EUR
2. IR-LED 3mm Typ L-934F3C Bestell-Nr. 154394 0,37EUR
3. KERKO Chip 0603 NP0 18PF 5% 50V Bestell-Nr. 445644 0,10EUR
4. Widerstand Kohle 0,25W 5% 390R BF 0207 Bestell-Nr. 403202 0,10EUR

With this setup I achieve a range for printing of about 25cm. With different parts, longer ranges can be achieved. Katie Wasserman recommends the IR diode Vishay TSAL4400 for a range of up to 50cm. Please ask an electronics expert about this, not me.

Overall, the installation is a task that can be done by someone who has very little soldering skills, although the capacitors are very tiny and it is quite a challenge to handle them.

[1] Alexander Oestert, Germany, Sunday 17th June, 2012, 13:06

Figure 1: Unscrew all five screws. Two are under each end of the rubber foot, three more visible when back cover is removed.

Figure 2: Insert tool between silver front and gray frame and open; sides first, then top and bottom. I used the tweezers for this task.

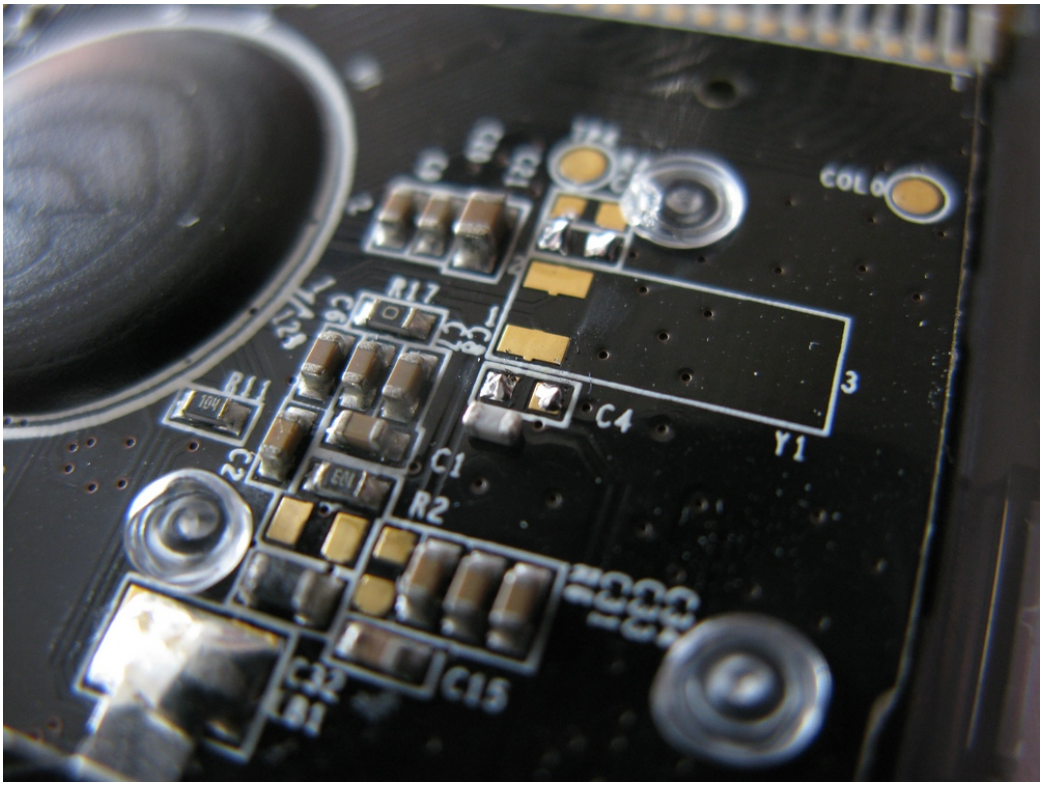

Figure 3: Identify contacts C3 and C4. Put solder on them.

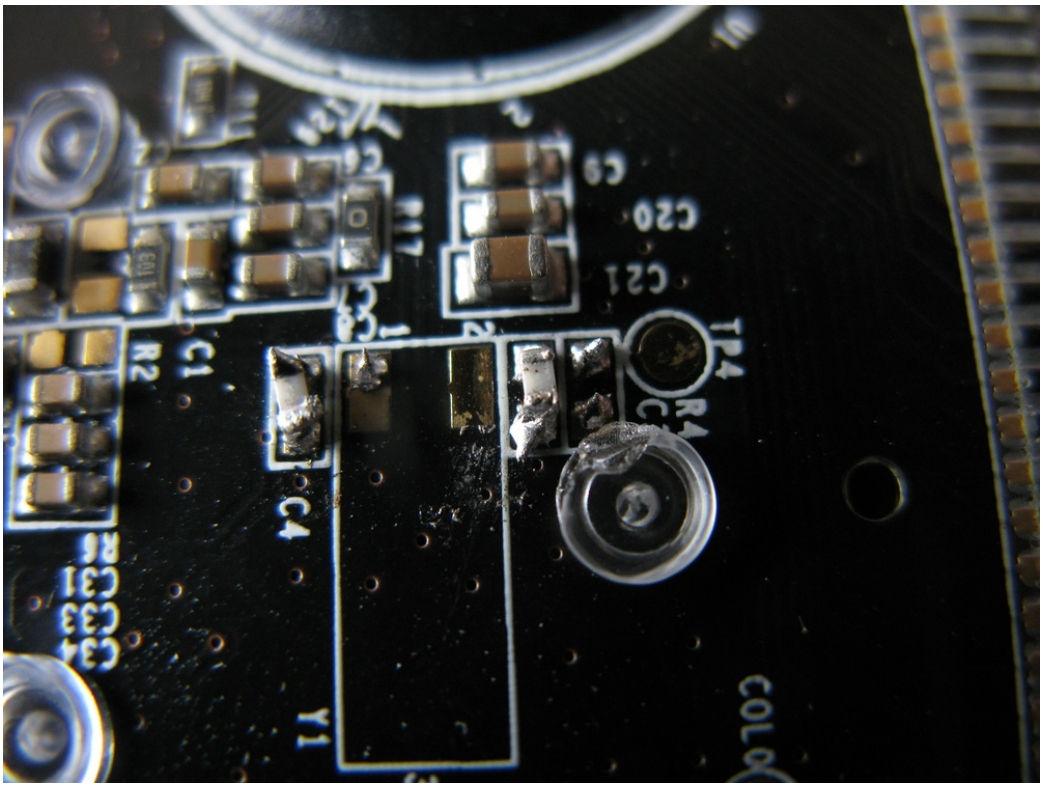

Figure 4: Put tiny capacitors in the vicinity of C3 and C4, hold with wooden toothpick, solder contacts, while solder is liquid, put the caps in position with toothpick. This is a layman's work. If you can do better - good for you! On the HP 20b, all the soldering contacts have a bit of solder on it, which is even easier. Having converted four machines in the meantime, I found that it is best to only put a tiny amount of solder on one of the contacts, solder the cap to it and only then add solder to the other contact.

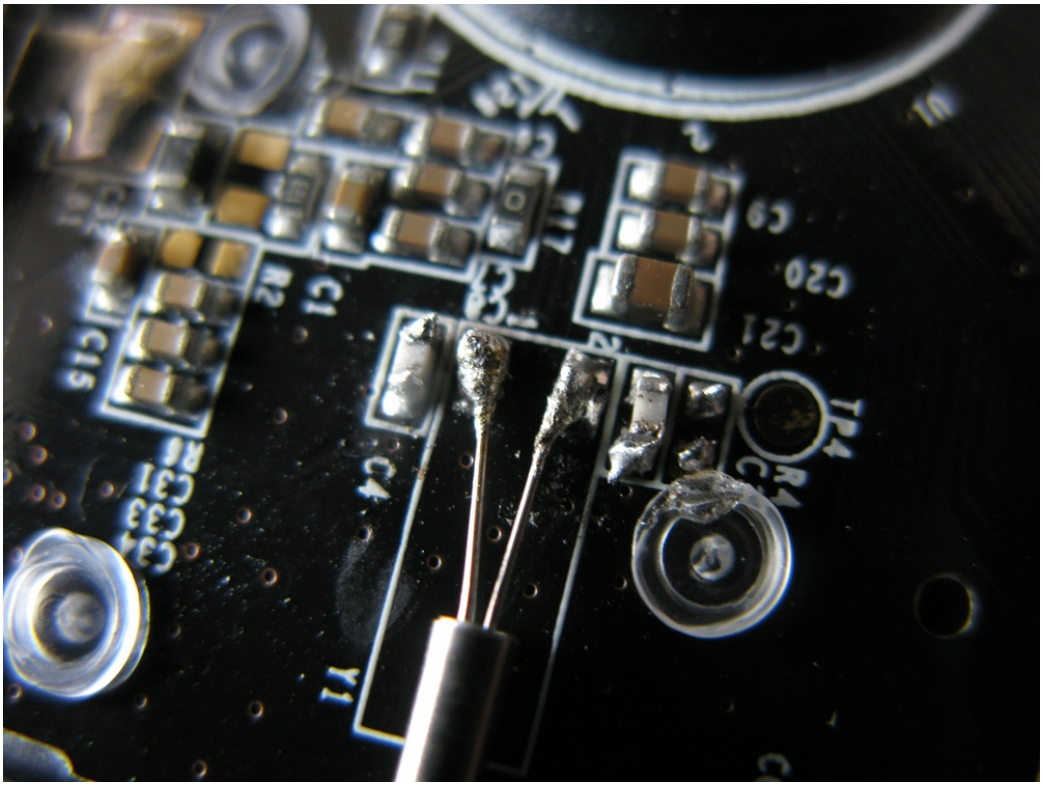

Figure 5: Shorten contacts of clock crystal so that it fits in the Y1 rectangle. Put solder on crystal's legs and on PCB contacts. Kink the legs of the crystal so everything lies flat before soldering. Solder it in, while holding it with tweezers or your fingers. Note that the crystal has no polarity.

Figure 6: Look for the shorter and the longer leg to identify the diode's anode (long lead) and cathode (short lead). Shorten legs of IR diode and resistor as much as possible, more than I did, to make the whole thing as compact as possible. Solder resistor to formerly longer leg of the IR diode.

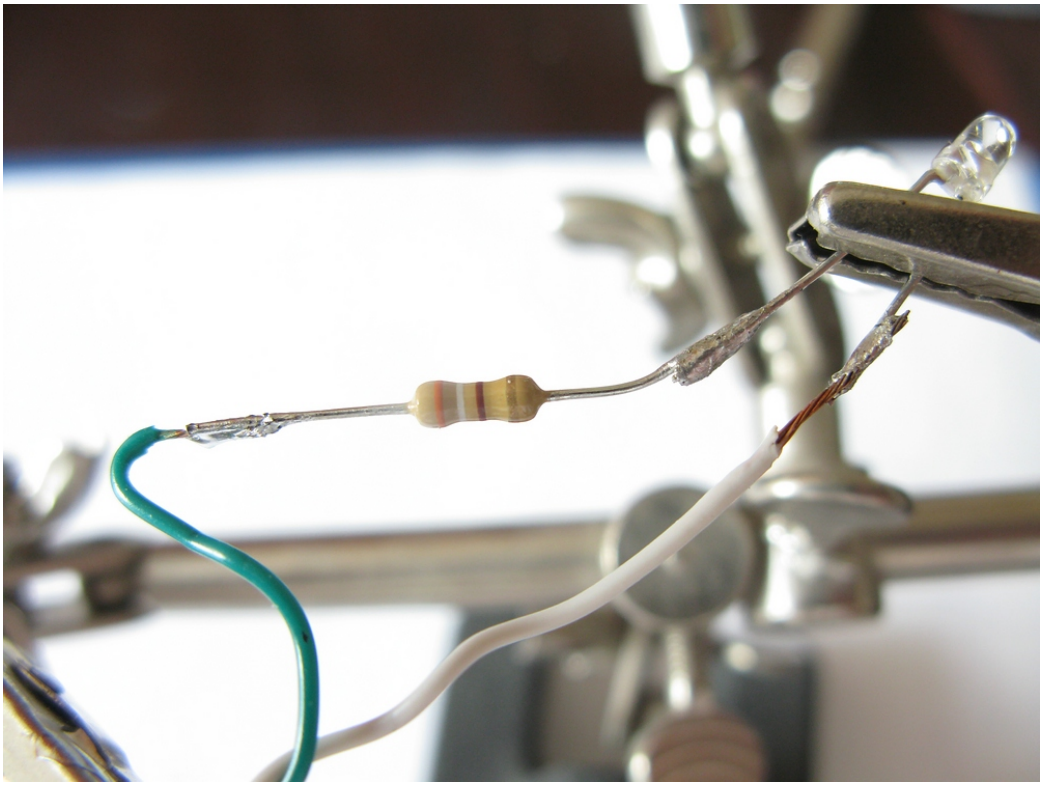

Figure 7: Solder two 10cm wires to resistor and shorter leg. Use considerably thinner wire (wire-wrap wire) than I did. The thinner the wire the easier to cram it in the case later. You could use shorter wire, too, if you like to have the diode stick out the side instead of the top.

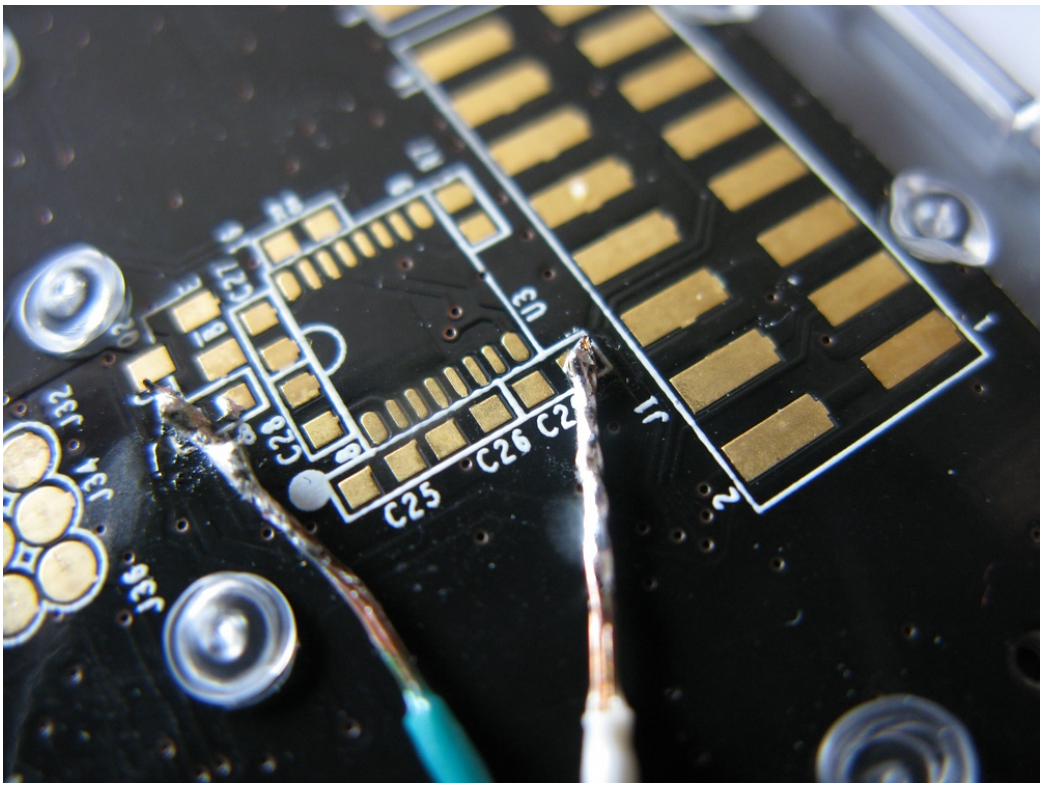

Figure 8: Solder the wire from the longer leg to R18, the other wire to C29 (the corner pin of U3). The other pad of R18 connects to the base of Q2 (also unpopulated) so checking which is which is easy and shorting the two pads is also fine. The C29 connection is for ground. The other side of this pad connects to the unpopulated U3 (pin 6), so again they can be shorted if you get it wrong. I glued the wire with hot glue to the PCB and the back case before reassembling on my first converted machine, but skipped the glueing on subsequent conversions.

Figure 9: This is the hole I melted with the soldering iron into the top side of the back case - not the back cover. You can also drill the hole.

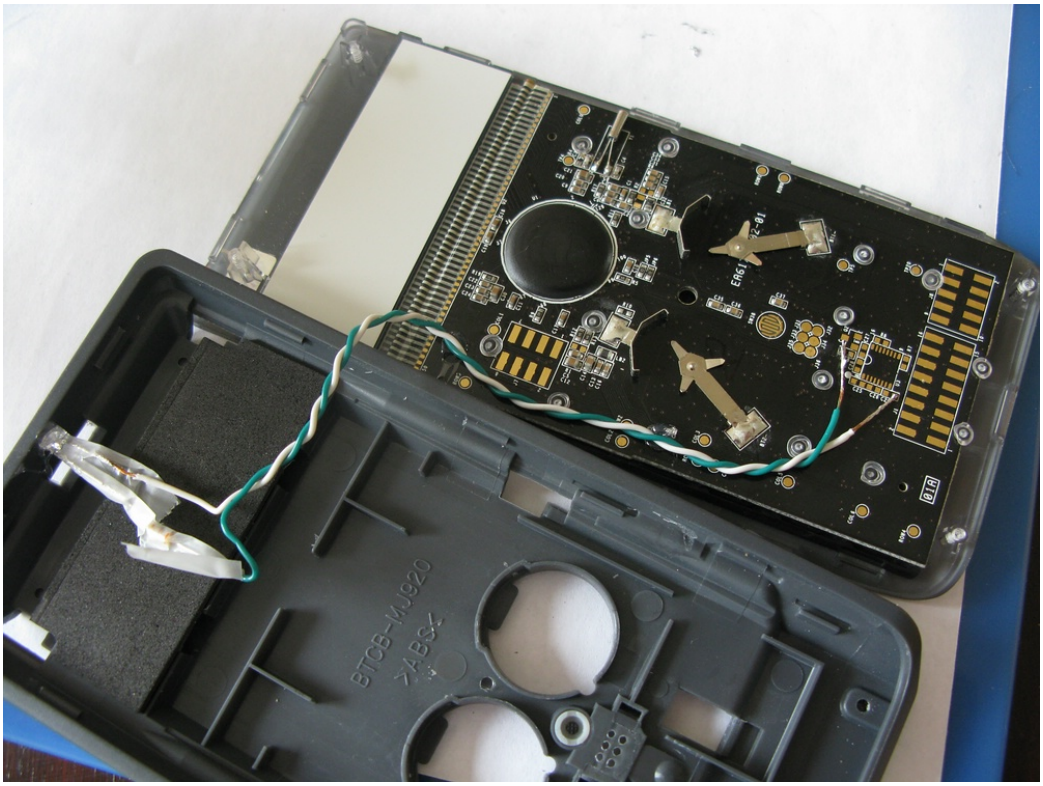

Figure 10: The IR diode and the connecting wires in place. Make them thinner and possibly shorter, in order to be able to easier fit them in the case. If you have fancy shrinking tube or electrical tape, by all means, use it. I had only transparent tape to do the job...

Figure 11: The damaged LCD of my first machine. I had the wires behind the LCD while pressing to reassemble, which probably was fatal. Take care to NOT press on the LCD glass when you put the case together again, just try to press on the outer frame.

Figure 12: Everything installed in another WP-34s of mine. Only after the soldering was done did I successfully flash to the IR firmware. Before, flashing wasn't successful and the calc did hang.

Figure 13: The printing commands are located at the end of P.FCN catalog, all beginning with this pretty printer symbol, not with P, so don't be confused when you search for them. The printer entries in P.FCN can be reached by pressing f EXIT (the little arrow). Outside of a catalog, this little arrow acts as a keyboard shortcut to the [print]r X command - handy to print just the number in the display.

Figure 14: Final location of my IR diode.