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Tutorial: Connecting a Seetron BPK-000 to a CFAH* Series Display

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January 15, 2002, 04:46 PM	#1

CF Tech ⊙
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### Tutorial: Connecting a Seetron BPK-000 to a CFAH* Series Display

Disclaimer:

Use this tutorial at your own risk. If you let the magic blue smoke out of your PC, LCD, or BPK-000 that is your responsibility.

Some people have asked us what was involved in connecting one of our CFAH* series character displays to a Seetron BPK-000 "serial backpack". We thought we would find out.

First up is to have the BPK-000 Manual on hand. You will also need a resistor, soldering equipment, and perhaps some ribbon cable and connectors, as well as the BPK-000 and your favorite Crystalfontz CFAH* Series LCD.

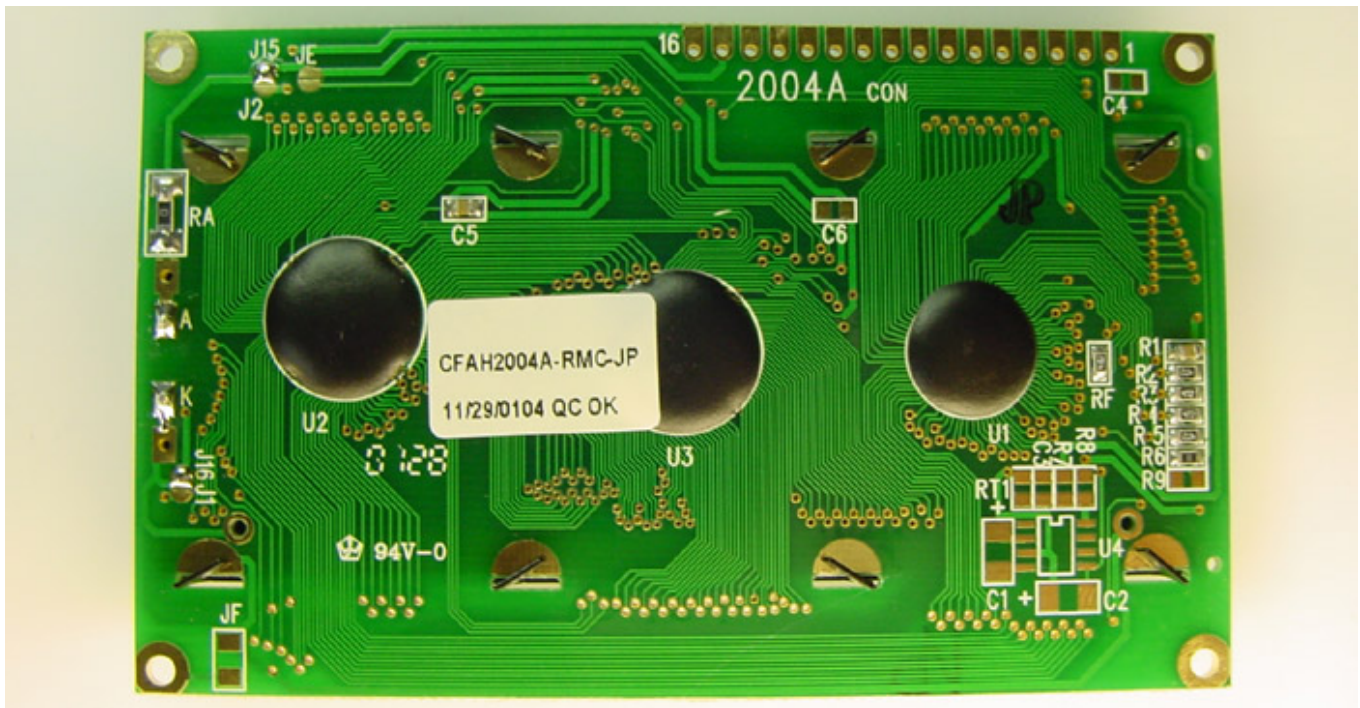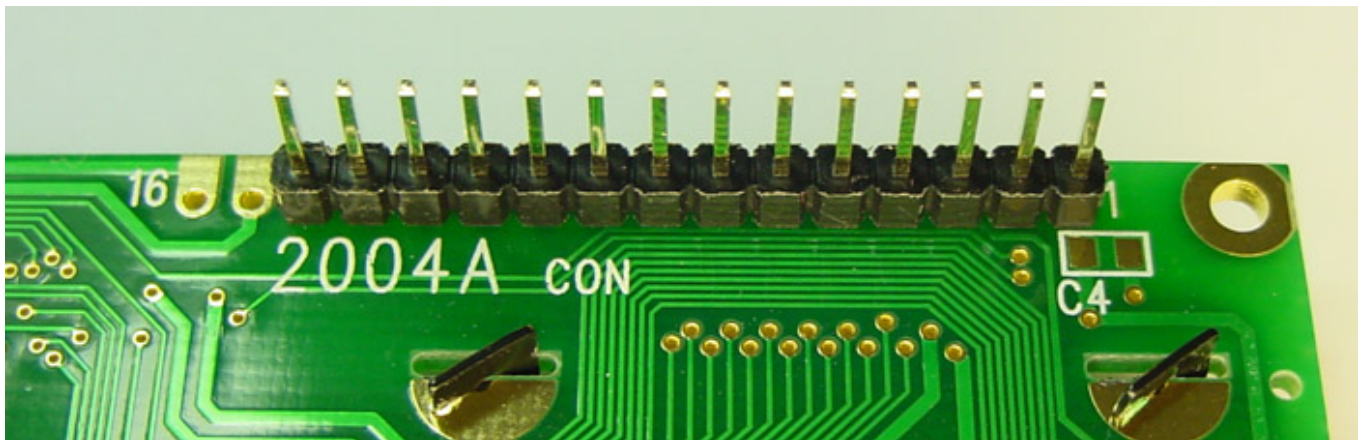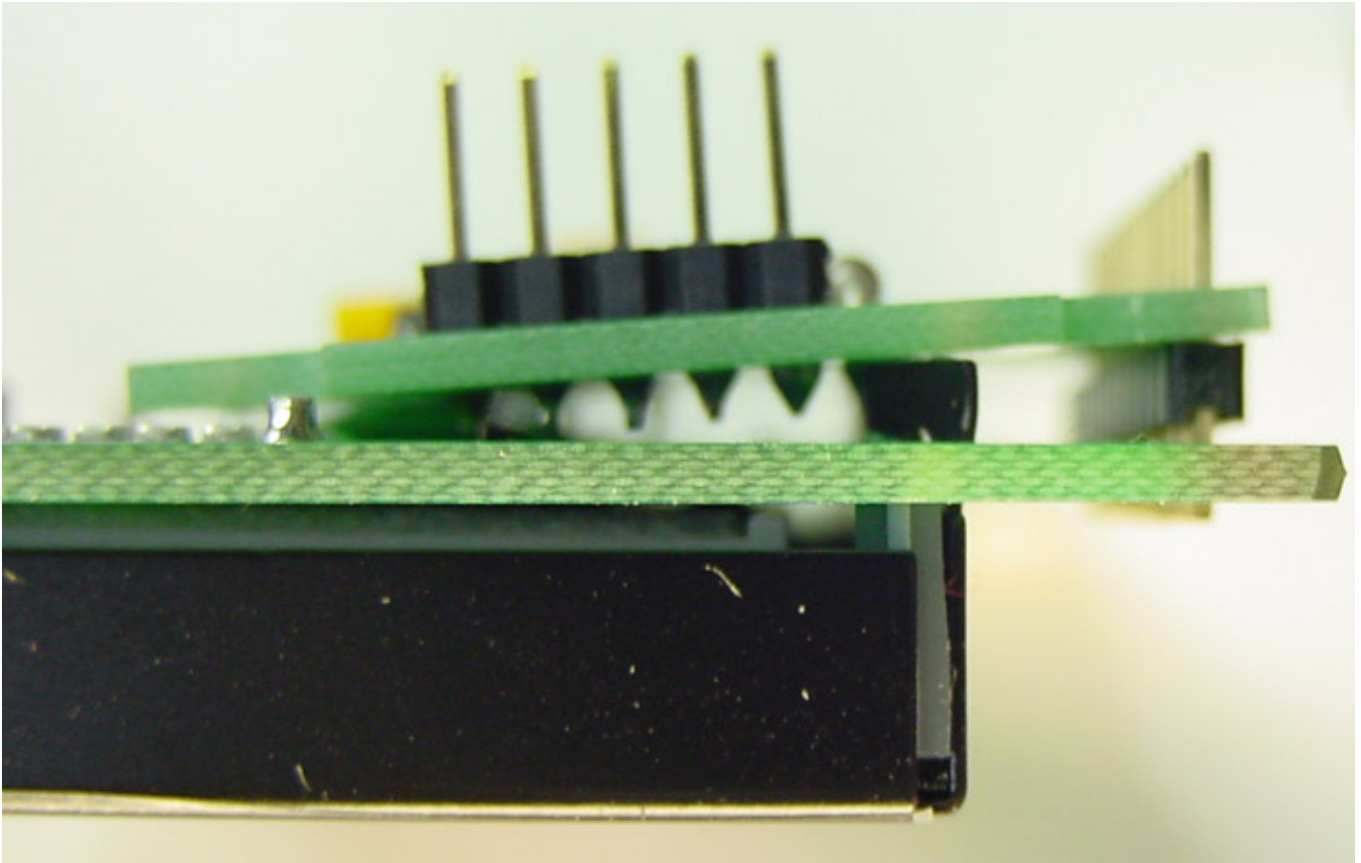Here is what you get from Seetron:
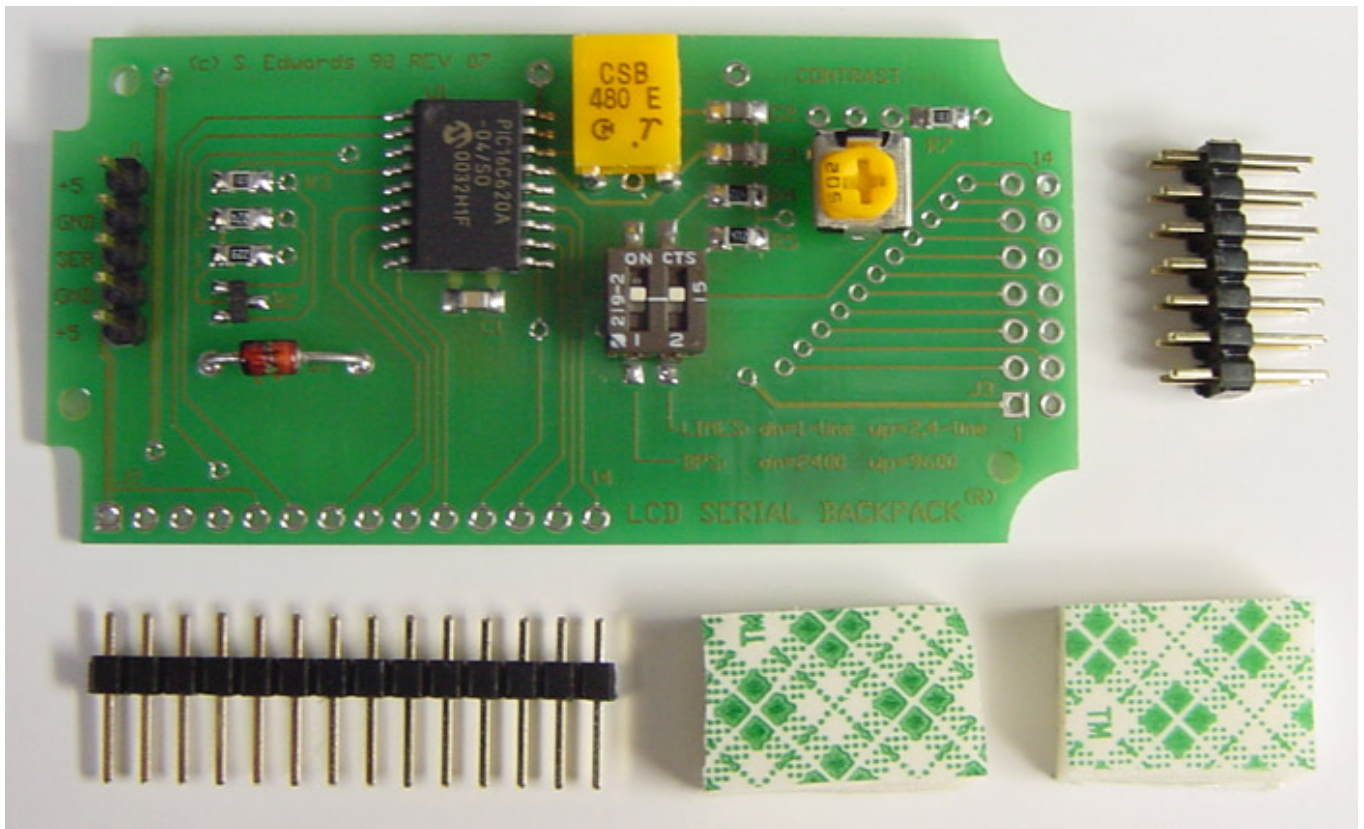
Here is a back view of the BPK-000:
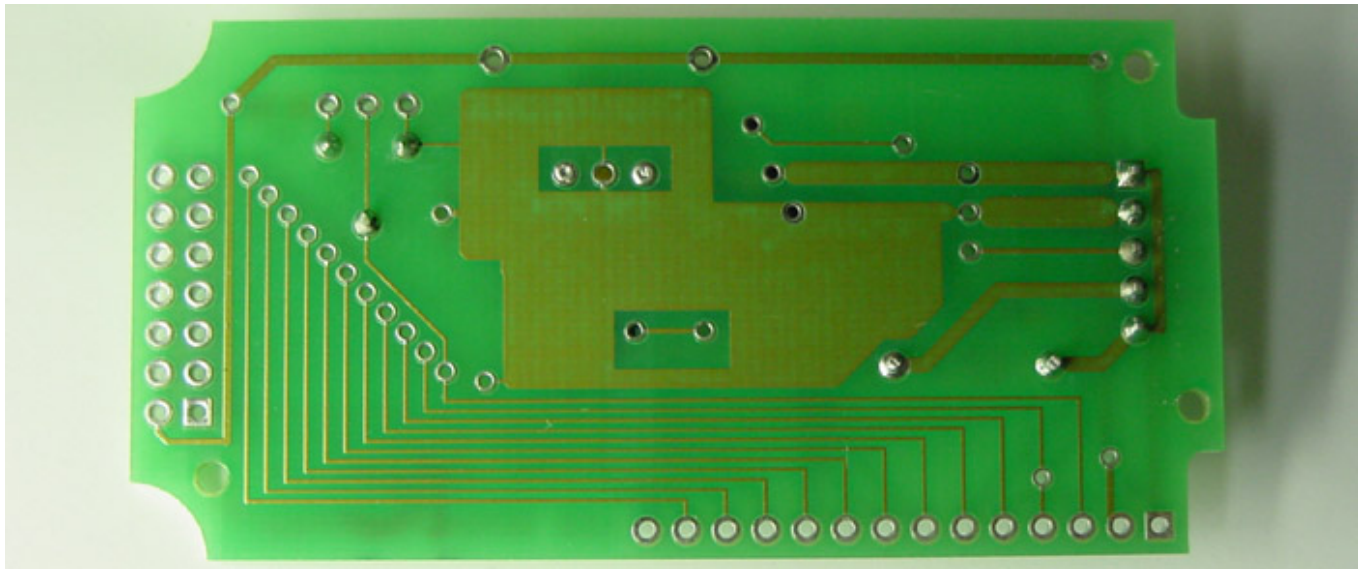
Here is the display (CFAH2004A-RMC-JP) that will be connected to the BPK-000.
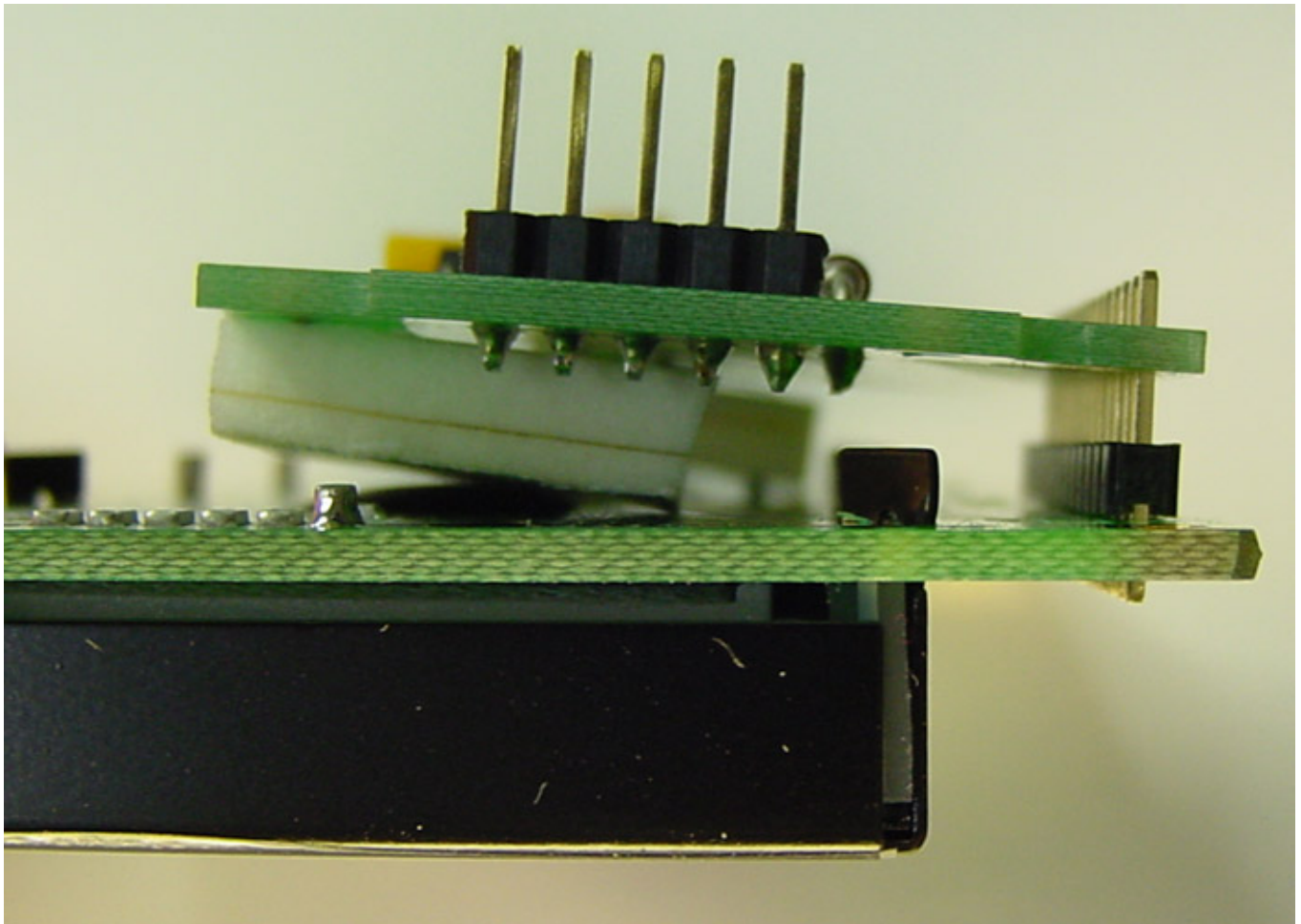
Seetron supplies a 14x1 "Berg strip" for displays that use a single row, and a 2x7 "Berg strip" for displays that use double-row connection. We will use the 1x14:


Now we can do a test fit of the display and BPK-000:

Does not look like that works. I wonder what the *included* double-sided foam tape is for? Yes, this looks a little better:
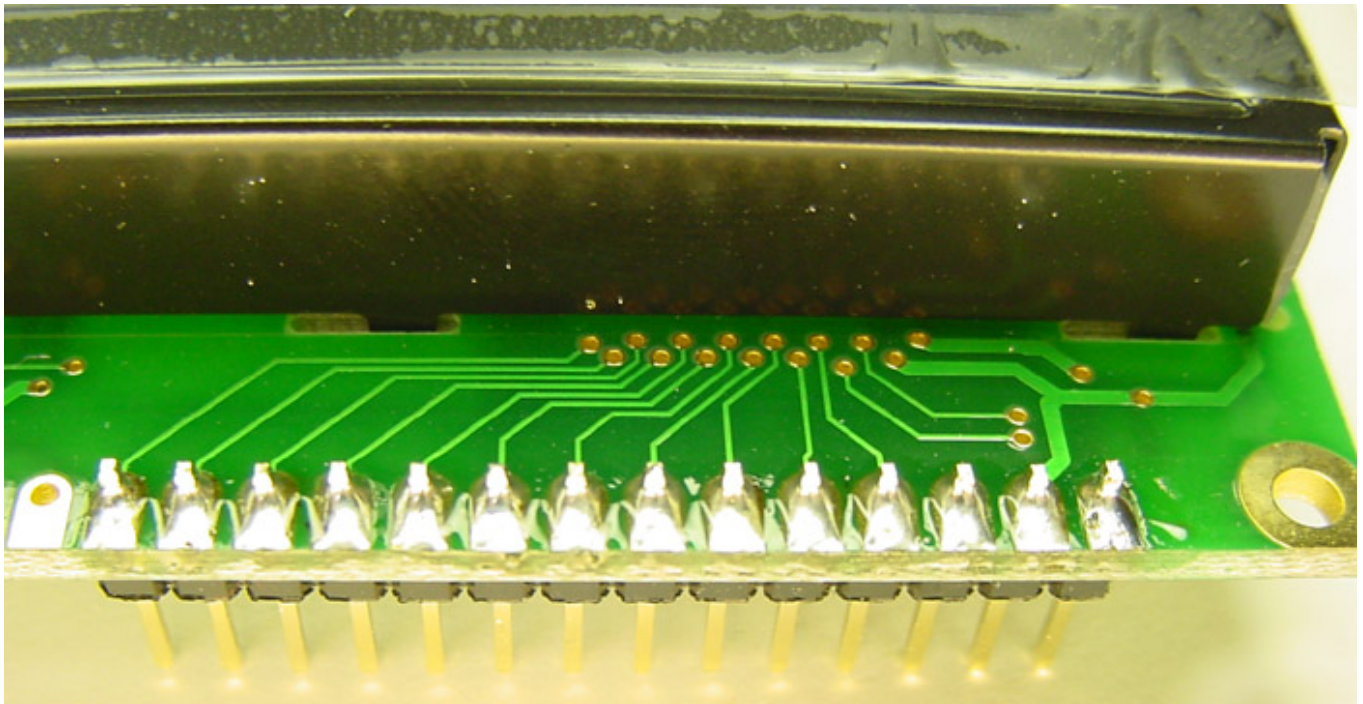
The tape supplied is extra thick, and that seems to be intentional, since it gives clearance between the BPK-000 and the display's bezel mounting tabs. You still need to find a position for the tape that allows it to mate with fairly flat surfaces on both the BPK-000 and the display. These locations seemed OK:
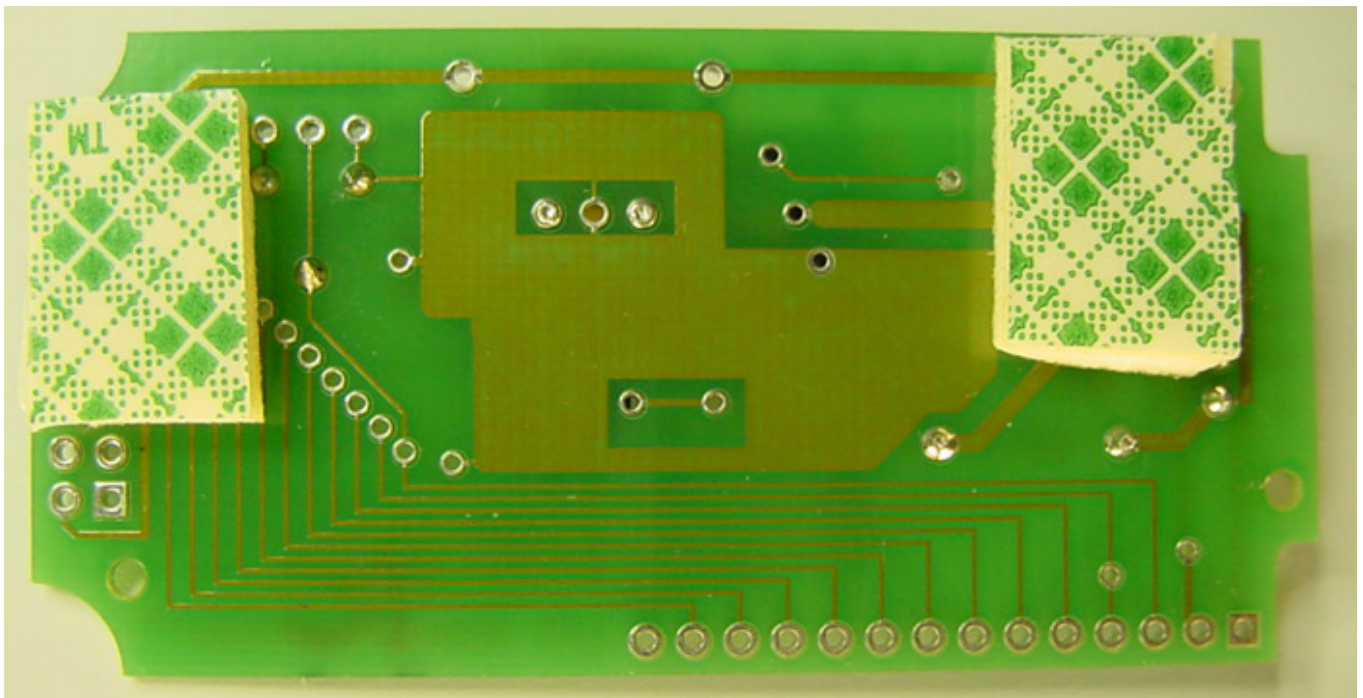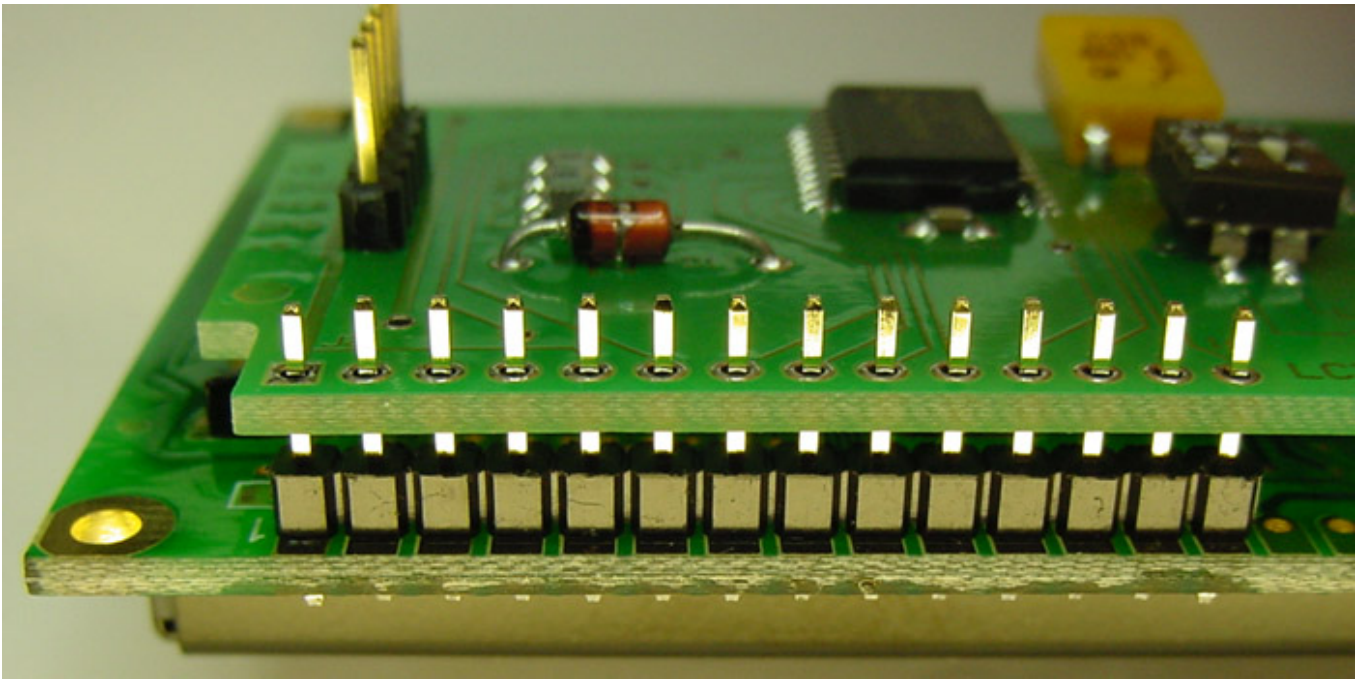

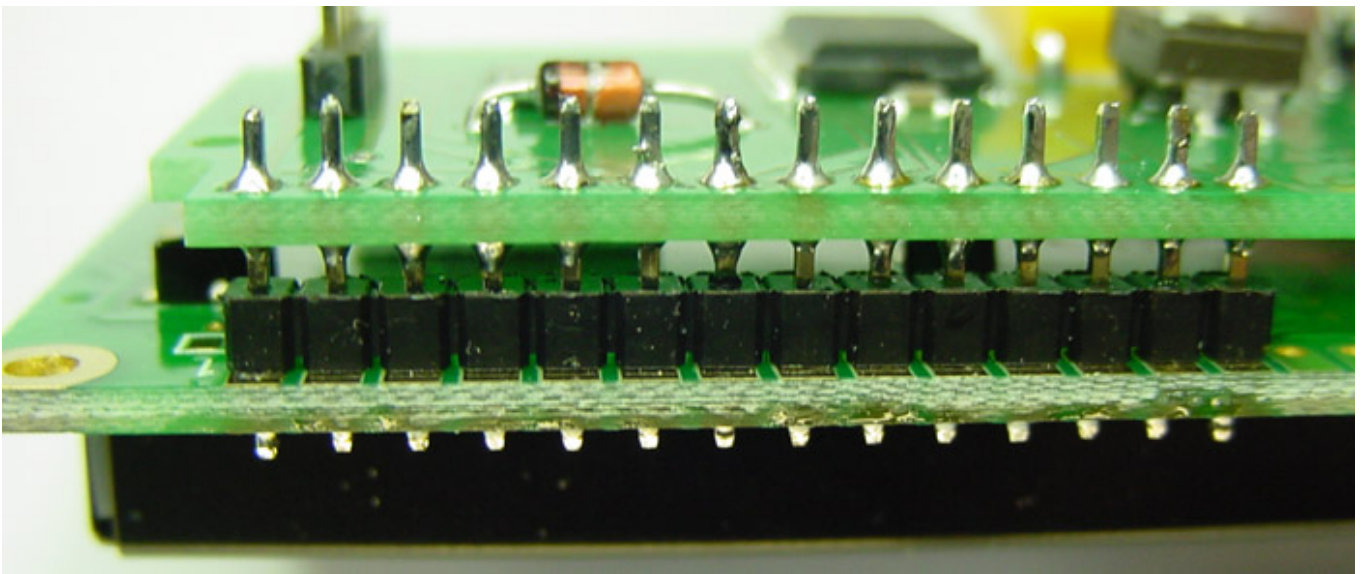Might as well place the connector in the display:
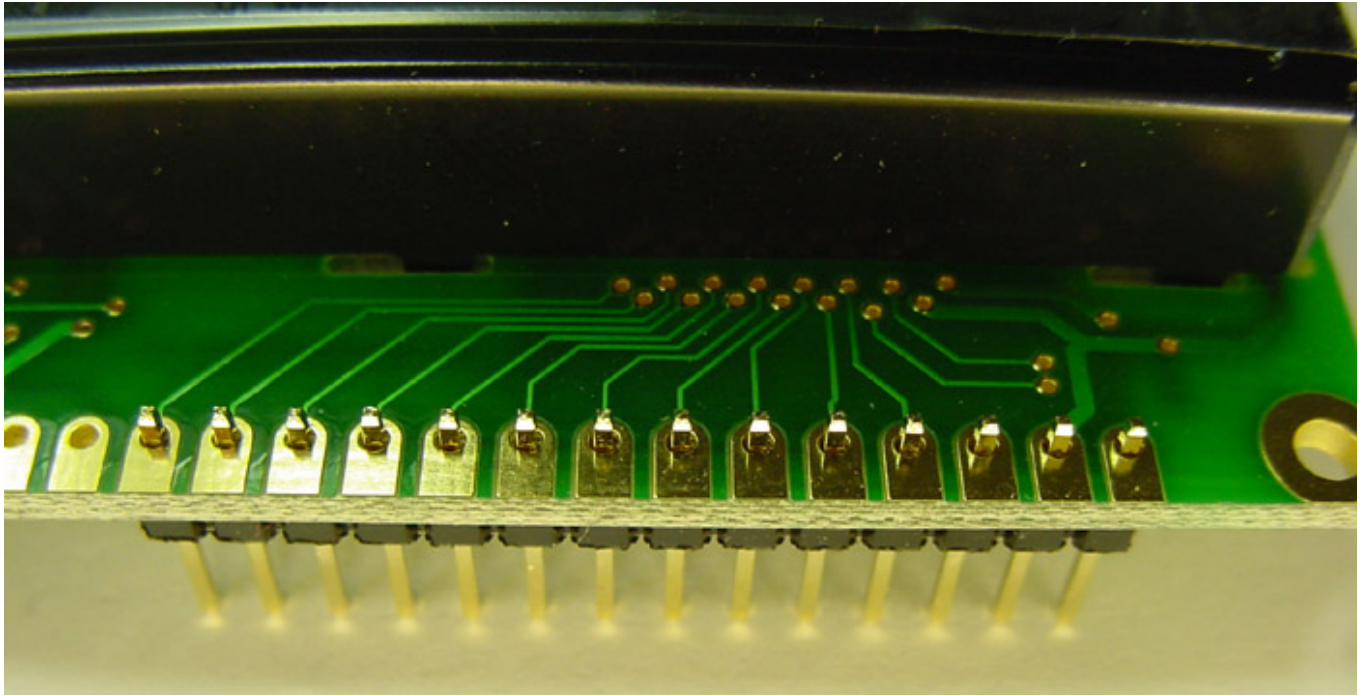
And solder it:

Now you can remove the rest of the backing from the tape, and assemble the display with the BPK-000:

and solder it.

At this point, I made some temporary connections to see if works, or if I just made a pile of broken parts out of a pile of good parts:

Now all that is left is connecting the backlight. The BPK-000 manual says that the "Backlight Hookup" is on page 8, but I can't find any other mention of it. Hmmm.

Well, let's do the math anyway. We need to calculate the size of the resistor.

$R = (5v - Vled) / Iled$

You need to look up the current and voltage of the backlight from your LCD's data sheet. The CFAH2004A-RMC-JP's data sheet gives these values:

Iled (normal) = 0.28 amps (280mA)
Iled (maximum) = 0.56 amps (560mA)

Vled (normal) = 4.2 volts
Vled (maximum) = 4.6 volts

So:

Rmax = (5 - 4.2)/0.28 = 2.8 ohms (normal)
Rmin = (5 - 4.6)/0.56 = 0.7 ohms (maximum brightness)

I happened to have a 1 ohm, 1/4 watt resistor handy. It is a little smaller than I would like as far as power rating, but it should be OK.

I would recommend a 1 ohm 1 watt resistor. You can find one if you go to http://www.digikey.com, type "BC1.0W-1CT-ND" into the "Parts Search" box and click on the "Go" button. The actual current through the backlight for the 1.0 ohm resistor we selected will be:

Iled = (5 - 4.6)/1.0 = 400mA

2/12/2016

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Now we need to make sure that the power dissipated (as heat) in the resistor will not create any of that nasty blue smoke.

$P_{resistor} = V_{resistor} * I_{resistor} = (5 - 4.6) * 0.400 = 0.160$ watts.

I like to "derate" a resistor's power rating by at least 50%. This keeps the resistor a bit cooler. So for this case a 1/2 watt resistor would probably be fine, and the 1 watt resistor that from Digi-Key will be in great shape.

It seems with all the empty space on the BPK-000, Seetron could have added a place to put a resistor on the PCB, and brought pins 15 and 16 up from the LCD, through the resistor and to the power connector. Oh well, nothing some wire, soldering and heat shrink can't fix.
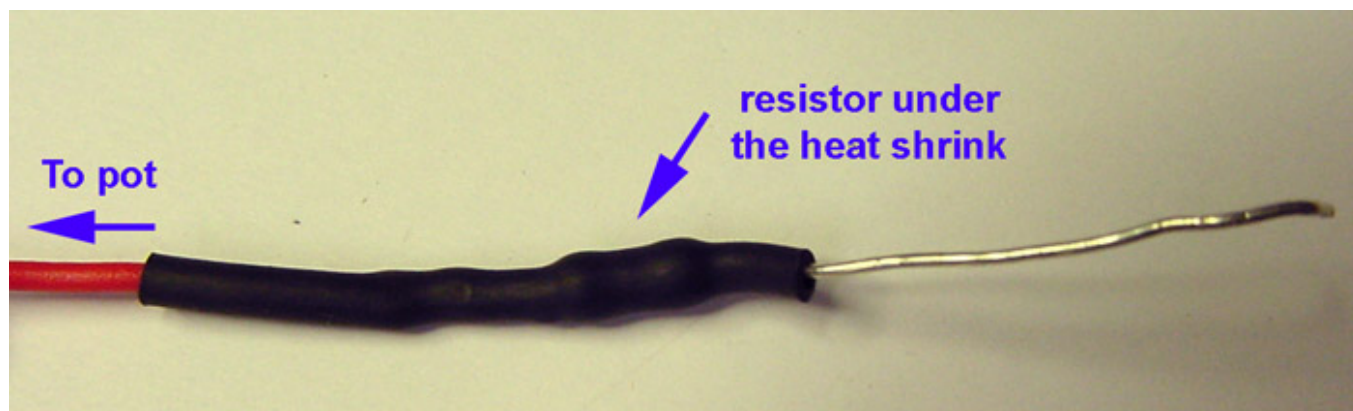
So I decided to put a potentiometer on this one to be able to vary the brightness of the backlight:

Every pot on every LED back light also needs a limiting resistor:

Which I put under heat shrink:

https://forum.crystalfontz.com/showthread.php/395-Tutorial-Connecting-a-Seetron-BPK-000-to-a-CFAH*-Series-Display?highlight=seetron   9/13

This gets kinda silly here, because I did not pay much attention to the backlight connection until after the BPK-000 and the display had already been soldered together. Well, the resistor goes into the display's pin 16 (K).
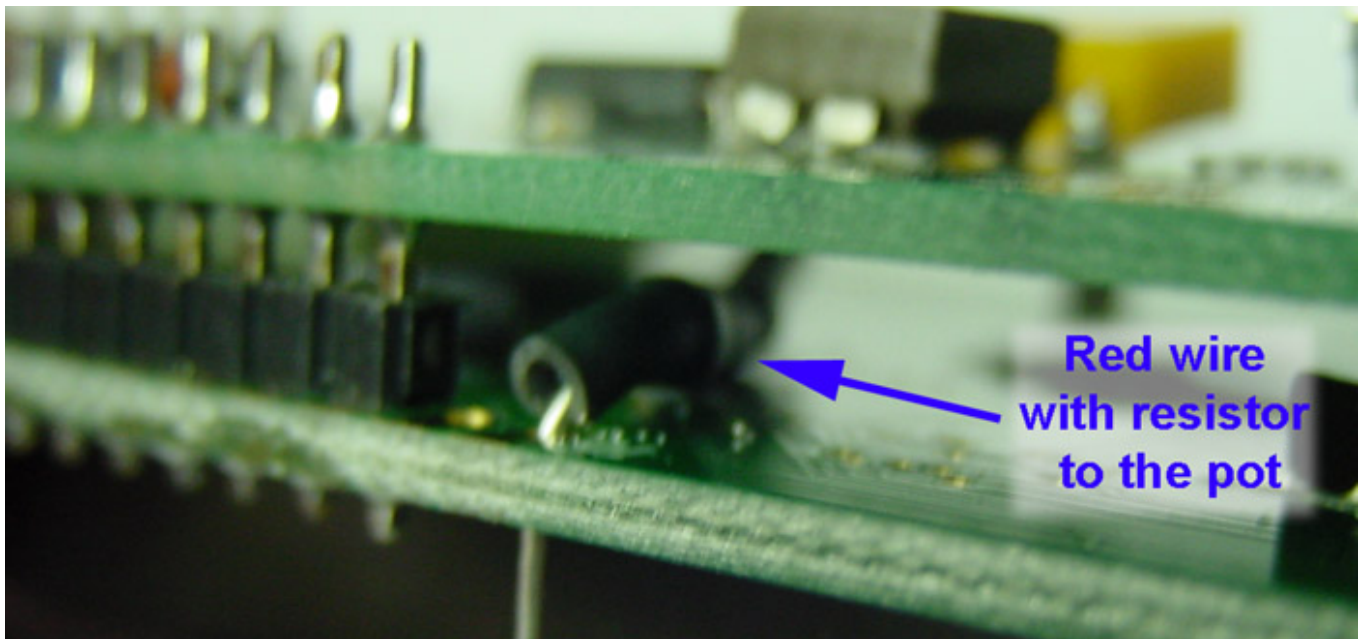
The black wire from the pot needs to go to ground. I know pin 1 of the LCD is ground, and it is about as handy as any place--considering I already soldered the boards together:
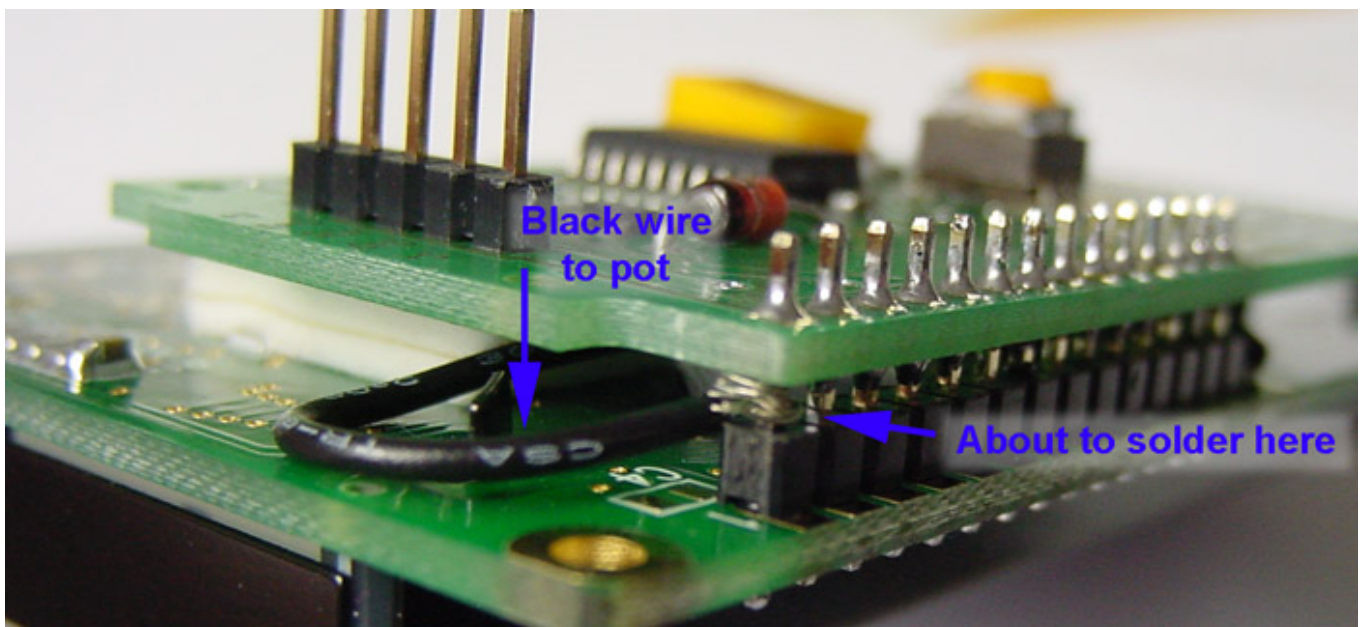
Last off we need to connect pin 15 of the display to +5v. Here is the LCD end:
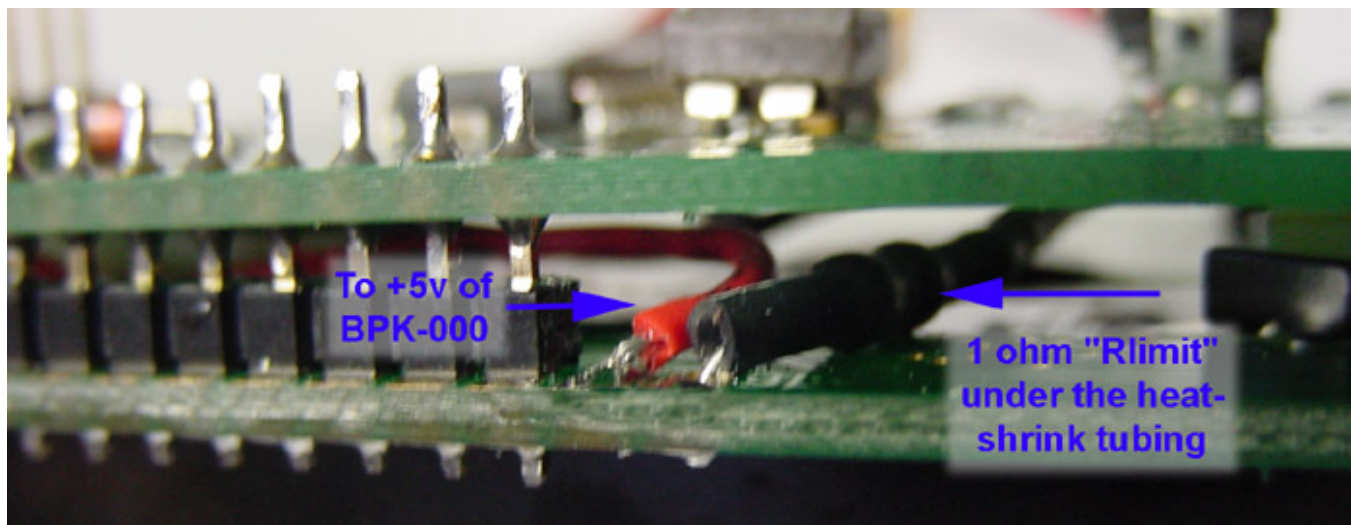
Here is the BPK-000 end:
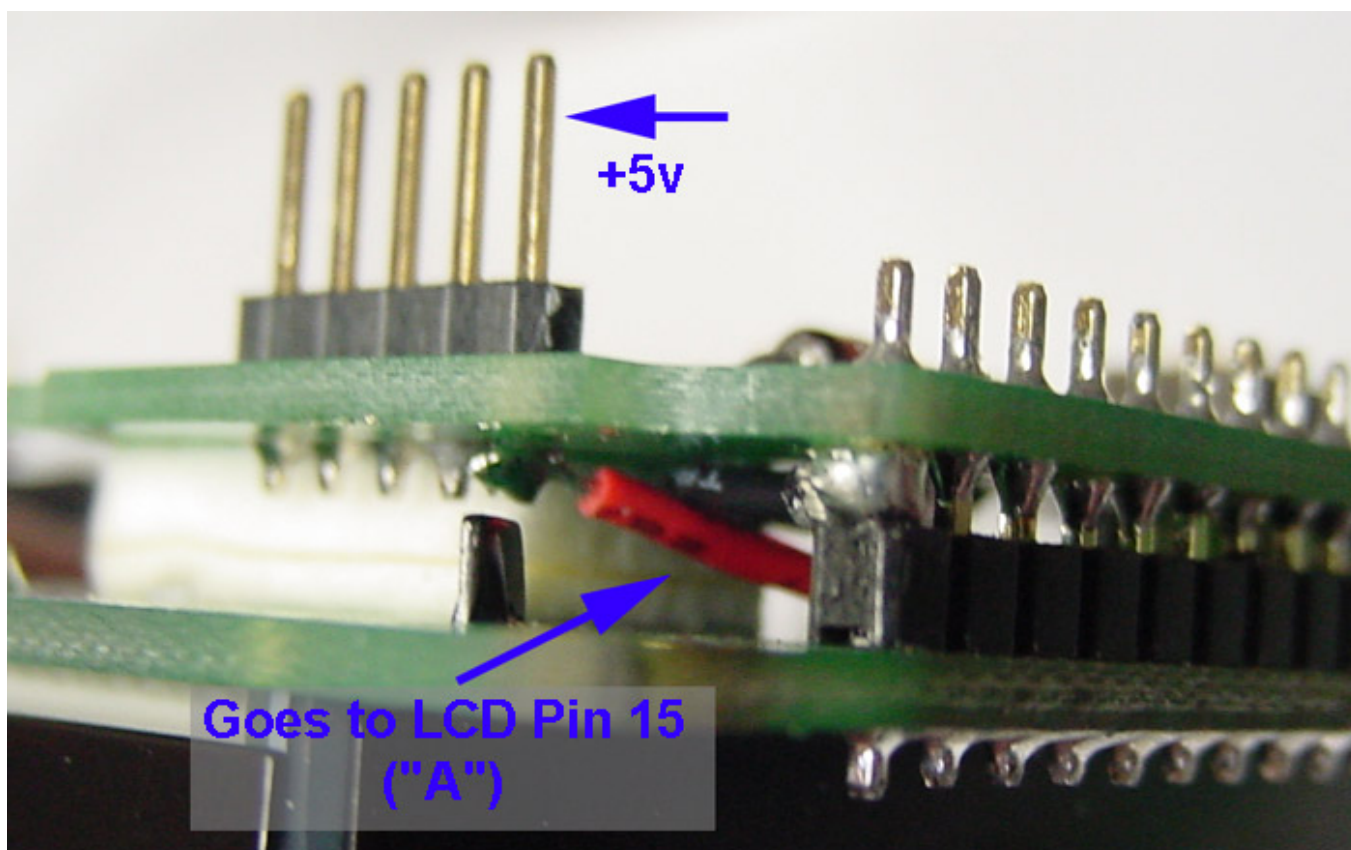
OK. That works pretty good. The 25 ohm pot does not let the backlight go completely off, but it gets pretty dim. I made a cable out of a WR232Y02 and some ribbon cable that I had laying around. Here is the result:

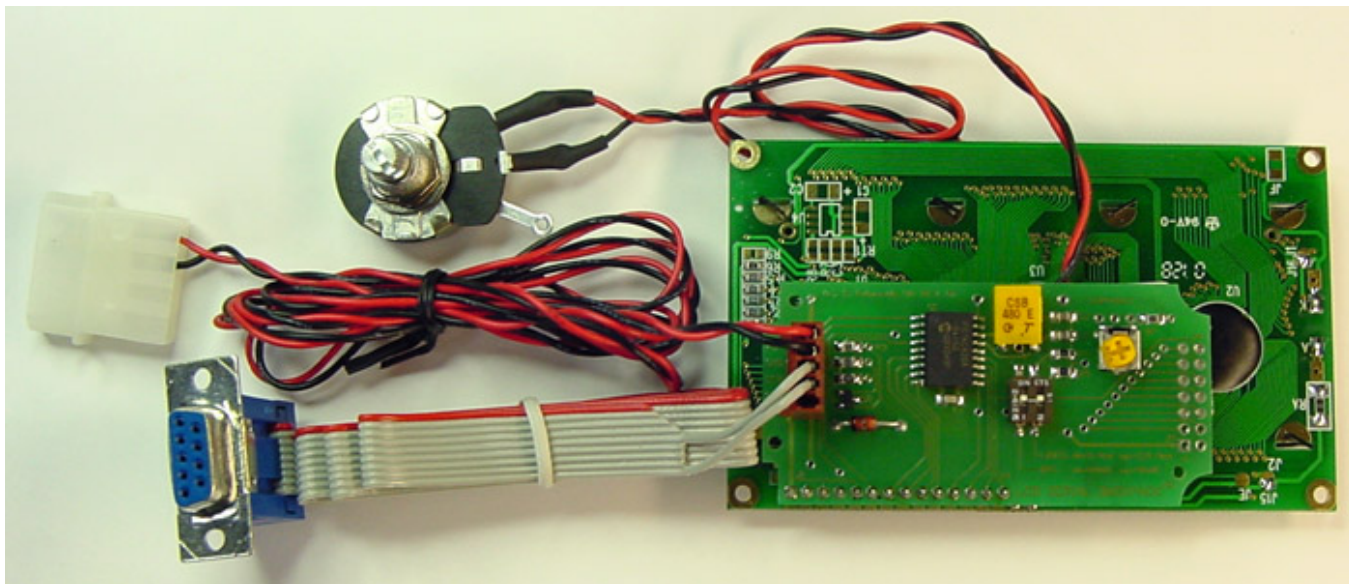I needed some way to dump text and control characters to the the LCD+BPK. I tried WinTest. It is designed for our serial displays, but worked fine at 9600 to talk to the BPK+LCD. You can copy and (right-click, paste) each of these lines into WinTest:

\254\001 ** CRYSTALFONTZ **
\254\192 CFAH2004A-RMC-JP
\254\148www.crystalfontz.com
\254\212With Seetron BPK-000

Closing:

I was bit disappointed when I looked at the BPK-000's command set, I'd seen (and cursed at) that command set before--on every "HD44780" display ever made. No big deal, that command set does allow the display do everything it is capable of, and it would make the code in the BPK-000 simpler--at the expense of making your code more complex. For instance, having to know the address map of your LCD controller is a bit of a nuisance. Granted, the map for common displays is included in the manual and seems to be correct, but it seems like something ugly that the controller could easily "hide" behind a nicer interface.

When I sent the first demonstration line above I got the next unexpected surprise: the PBK-000 does not buffer its data. If you send it a clear command, you have to wait a bit until the LCD controller finishes clearing the display before you can send the next character. Again, no big deal, but it seems like the the controller on the BPK could buffer up a couple of bytes while the LCD controller is busy so the host software does not have to delay.

It would also be nice if it displayed *something* at power up. The screen is entirely blank, which made me wonder if I had connected it properly at all. Well, it did work fine once I sent some data to it, but it did make me a bit uncomfortable when it did not spring to life with power applied.

The contrast should have more range. You should be able to adjust the display from all the way light to all way black--IMO. This would probably mean making a negative voltage generator on the BPK-000, which would only take a few passive components and a toggling port pin . . .

That said, there is a series resistor with the contrast pot that makes the range of the pot more useful.

Other than the above caveats, BPK-000 does seem to work as it should.

Thanks to Jonathan Leung for letting us use his BPK-000 as the guinea pig for this tutorial. 🙂

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| January 15, 2002,   04:59 PM | #2 |

justnic ○
Registered

Join Date:	2002/01
Location:	PA
Posts:	24

looks good but i think i like the wirx sli-oem backpack better because it has the built in backlight but looks like a good job tho 🙂

IM A LITTLE BIT OF A NEWBI BUT NOT TO MUCH

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