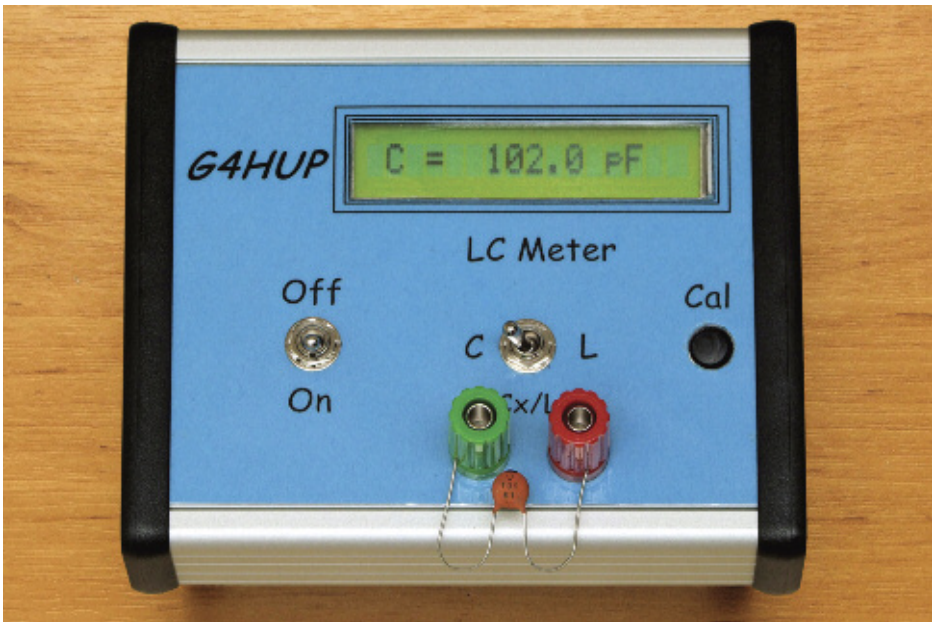
G4HUP L-C meter kit

Build yourself an accurate tester at an affordable price.



The finished L-C meter looks professional and would grace any collection of test gear.

INTRODUCITON. An L-C meter is almost as useful as the resistance ranges on your multimeter. Until you've used one you don't really appreciate how handy it can be to be able to check read off an inductor or capacitor value as easily as a resistor. No more struggling with arcane colour codes!

The G4HUP Inductance and Capacitance Meter kit is based on the proven PIC design by VK3BHR, with G4HUP contributing the PCB layout and mechanical design. The quoted measuring ranges are 0pF to >0.1μF and 0μH to >10mH, with a basic accuracy of 1% and resolution of 0.1pF / 10nH. Impressive stuff.

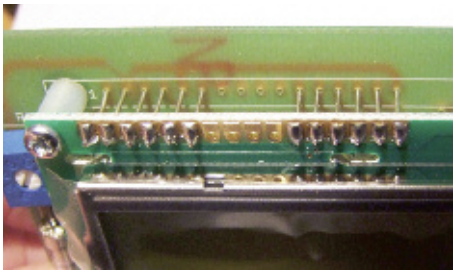
WHAT'S IN THE BOX? The kit came packaged within its case, a robust design largely of extruded aluminium. There is a screen printed PCB plus all components, screws, etc. There was even a set of four self-adhesive feet. No socket is provided for the PIC because there isn't enough vertical space on the PCB; this is explained in the detailed instruction manual. A printed version is not included with the kit: instead, you download the up-to-the-minute version from the G4HUP website.

CONSTRUCTION. There are two basic parts to the construction: electronic and metal-bashing. I had no great problems constructing the PCB, although most of the component pads are really small. This makes soldering quite tricky, even for someone who is adept with the soldering iron. I found it paid to go over every joint a second time when the board was complete. The board is organised so that you can optionally include several components (not supplied) to enable in-circuit programming (ICSP) of the PIC, so that software updates could be applied. In the components list these components – two resistors and a diode – were listed "ICSP Only". But the instructions that they should be replaced by wire links if you're not using the ICSP option were a bit buried (I missed them) and this caused me some headaches when I tried to get the board to operate. I understand that the latest issue of the manual includes more prominent instructions plus a mention in the very useful Troubleshooting section.

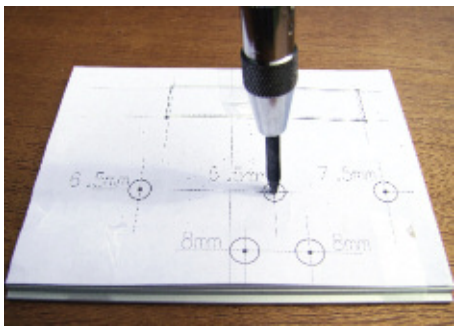
The LCD is attached to the motherboard with four screws and nylon spacers; electrical connections are made using recycled resistor leads. This design works very well and is simple to put together.

The metalwork was another matter altogether. The front panel requires five round holes plus a rectangular slot for the LCD. A drilling template is provided, but apart from that you're on your own. Drilling round holes isn't especially challenging but rectangular metalworking drills are fairly rare: I chose to cut the slot using a miniature cuting disc in a high speed drill, though the traditional methods of drilling a line of overlapping holes and then filing, or simply jigsawing your way through, would also have been acceptable. It's a pity that a ready-punched panel couldn't have been made available, either made from metal or PCB material. This would have saved me an awful lot of time.

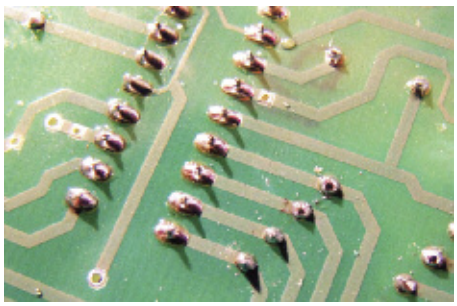
Once the panel is machined, the supplied laminated front sheet is fitted over the metal, so if you have made a bit of a mess of the drilling it doesn't matter so much. However,



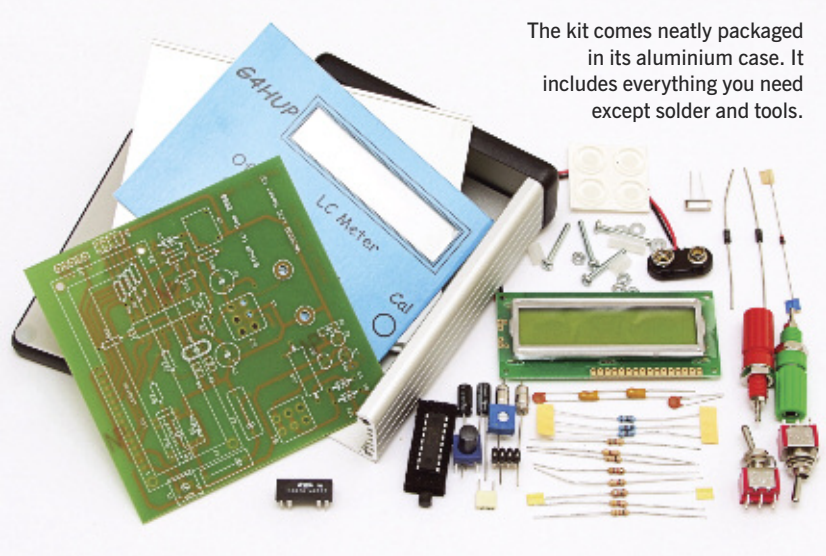
Four sets of nuts and bolts with nylon spacers secure the LCD to the PCB. Resistor lead offcuts make the connections.



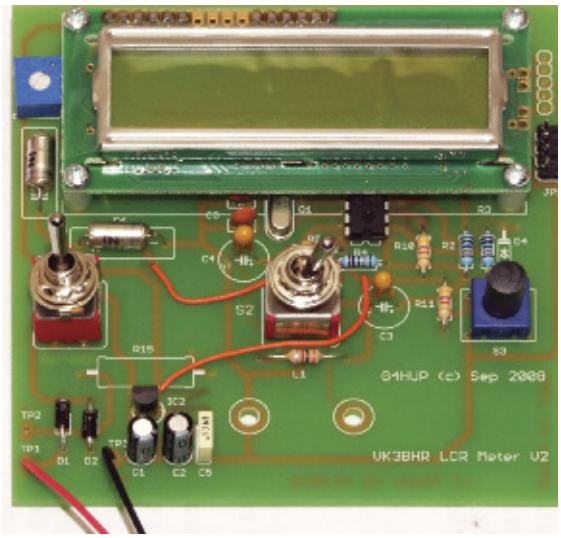
The supplied drilling template lets you mark centres accurately.



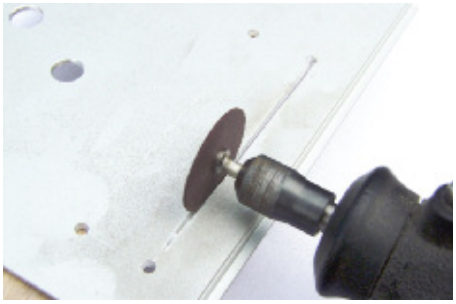
The component pads were very small, which made it quite a challenge to solder the board. The IC pads were normal size.



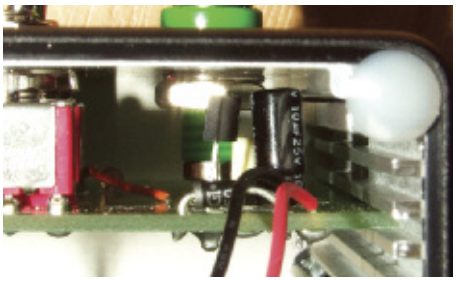
The kit comes neatly packaged in its aluminium case. It includes everything you need except solder and tools.



The completed PCB is quite neat.



Cutting out the LCD slot could be difficult without suitable tools.



The black electrolytic capacitors are a bit snug to the edge of the lid. The PCB slides easily in to the case guides.

when I put mine together I found that I'd managed to get the hole for the Cal button a couple of millimetres out.

FINAL ASSEMBLY. Putting it all together requires you to marry up the PCB with the front panel and adjust the nuts on the two toggle switches so that the PCB is held at the right position to align with the guides in the side of the case. A bit of trial and error is required, but it's not difficult. One thing I noticed was that the two electrolytic capacitors next to the voltage regulator are perilously close to the side of the case. Again, I understand that the documentation has been altered to suggest a method of avoiding this issue. Once everything is adjusted, the board is fastened to the lid using the switch nuts and the two binding posts can be soldered into position. Finally, the end cheeks are screwed on. There's space inside the case for a PP3 battery, making the unit conveniently self-powered.

IN USE. The nice thing about this meter is that it is intended to deal with small value capacitors and inductors, the sort that you're likely to see in a radio environment. Its out-of-the-box accuracy and resolution is more than adequate for amateur service, and indeed the manual contains simple details of how its calibration can be improved.

Leaded components can be checked by simply attaching them to the binding posts. The top photo shows a 100p capacitor under test – it wasn't far off, unlike some of the other caps I tried, which were a long way from the values printed on their cases. Most instructive was watching the value of ceramic capacitors vary with even the slightest change in temperature: holding a finger underneath was enough to make a significant difference.

You can also measure components away from the unit, via a pair of test leads: this is where the Cal button comes into its own. It can automatically compensate for additional capacitance or inductance of test leads (within reasonable limits) and lets you make measurements of relatively small values at a distance. Indeed, one optional accessory available for the meter is a pair of SMD test leads that will work with very small components.

CONCLUSION. The couple of issues I had during construction were swiftly dealt with by G4HUP and the documentation has been amended. There is even talk of an updated PCB overlay to address some of the layout issues I've mentioned. Overall, this is a very useful project. In my opinion it poses more mechanical than electrical problems to the average constructor, but the laminated front panel helps hide a multitude of sins. Once built and tested it is a great addition to your shack. It would also make an ideal item for a club to have and make available to its members.

THANKS. We are very grateful to Dave, G4HUP who supplied the kit for us to evaluate. The complete kit (as reviewed) currently costs £42.50; the PCB is £7.50 on its own and the pre-programmed PIC £3.50. Full details of these and other projects are on Dave's website at http://G4HUP.com.

The ends of the case attach neatly and are a nice finishing touch to the project.