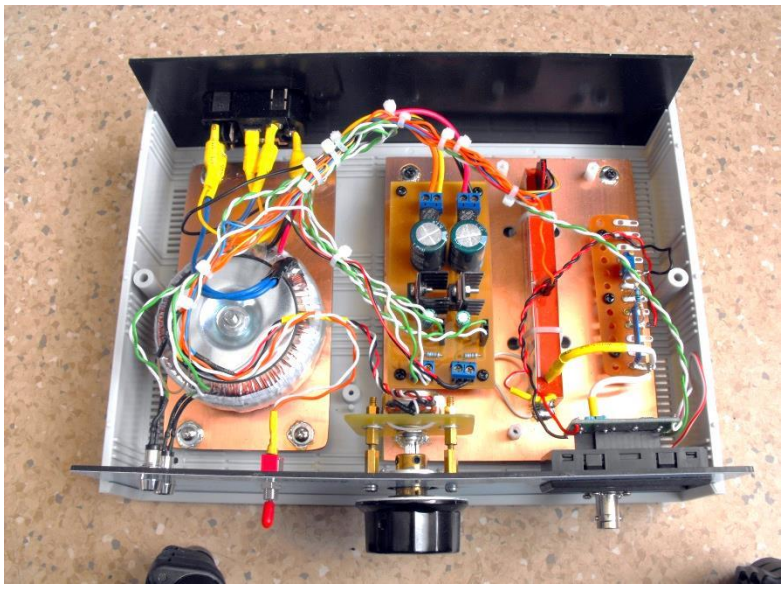
CONSTRUCTION MANUAL

HOME MADE HIGH VOLTAGE POWER SUPPLY FOR PHOTOMULTILPLIER TUBE EXPERIMENTS BUILT ON THE KITCHEN TABLE



Completed unit showing all subsections inside the cabinet. There is a separate ground plane for the AC and DC sections made from copper clad fibre glass board. The components are housed in a ABS plastic instrument case with external measurements of 260 x 190 x 80mm. On the bottom of the case I attached square rubber feet – the stick-on type.

Front of Power supply showing controls. The large knob controls a 5K linear pot via a 6:1 reduction drive giving a greater control over voltage selection.

Rear of Power supply showing mains input. The IEC module incorporates a switch, fuse and 240V AC "male" input plug.

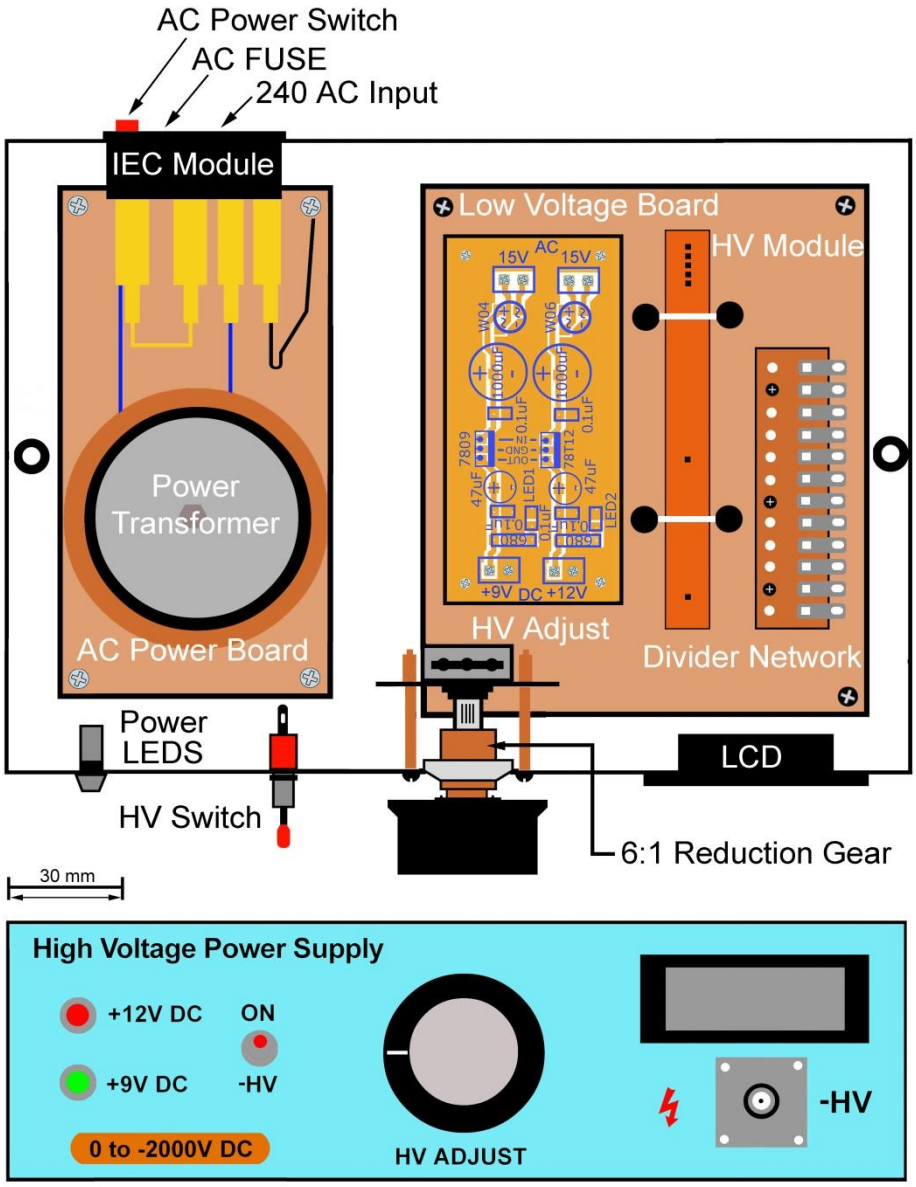
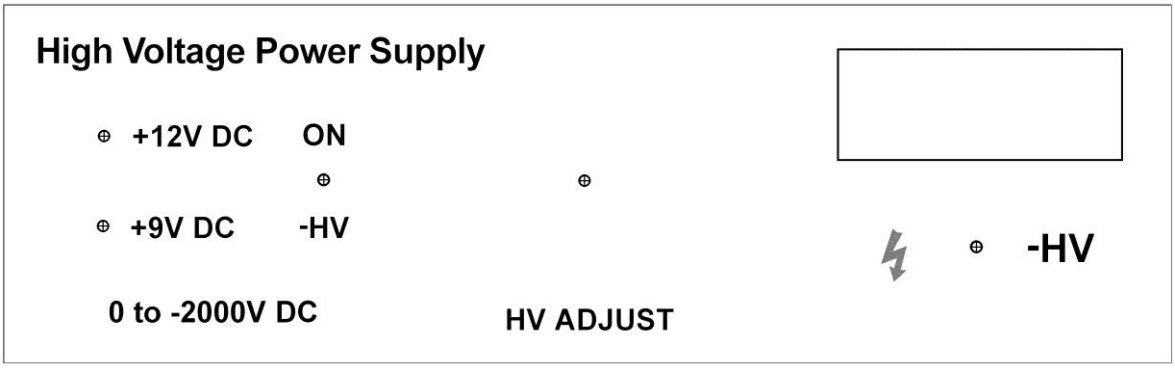
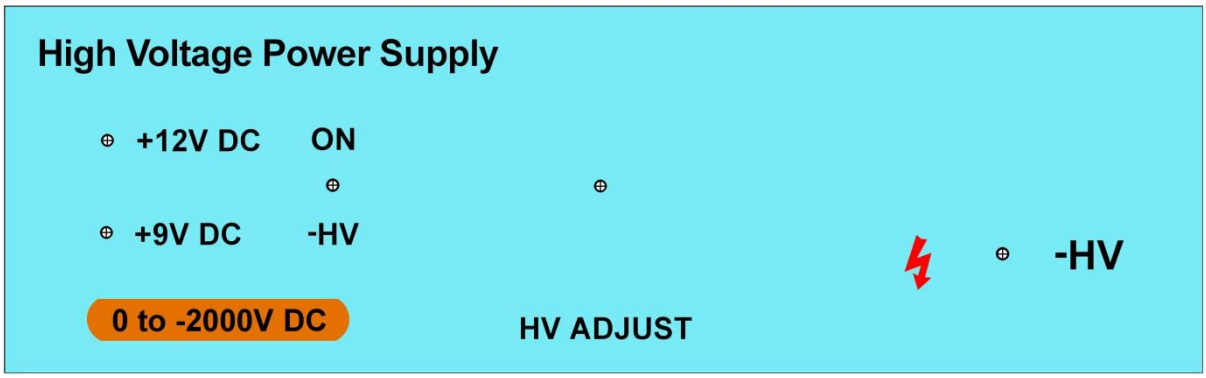


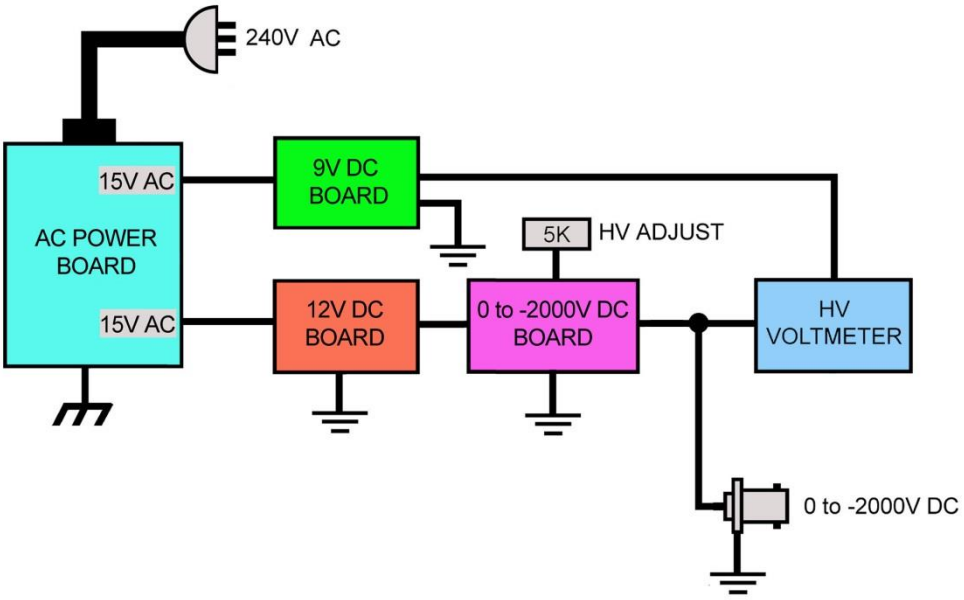
Diagram showing the placement of each of the main subunits and controls. For wiring see the schematics for each unit. The HV module is held against the copper board with cable ties and secured with solder.



This drilling panel measures 248 x 76mm and it is used to locate the holes for drilling. It is printed in the exact size of the panel to be used and it sets the locations of the holes to be drilled and cut. It is first printed on an A4 size sticky label - those used for labelling parcels. It is then carefully placed on the plastic panel and the panel is drilled and cut. When complete it is washed off in soapy water.



Once the plastic panel is drilled and cut, another panel cover is printed using an A4 sized sticky label, but this time it is printed in a colour of your choice. In my case aqua blue. This print out is then covered in a layer of clear plastic sheet like that used to cover school books. Once the excess sheet is trimmed off, it is carefully placed on the plastic panel so the printing aligns with the holes that have been previously drilled or cut. The drilled or cut holes are then exposed, by removing with caution, the excess print out with a small craft knife. You are then left with a beautiful panel and holes to mount the components!



The block diagram of the unit showing all subsections and their connections to each other.

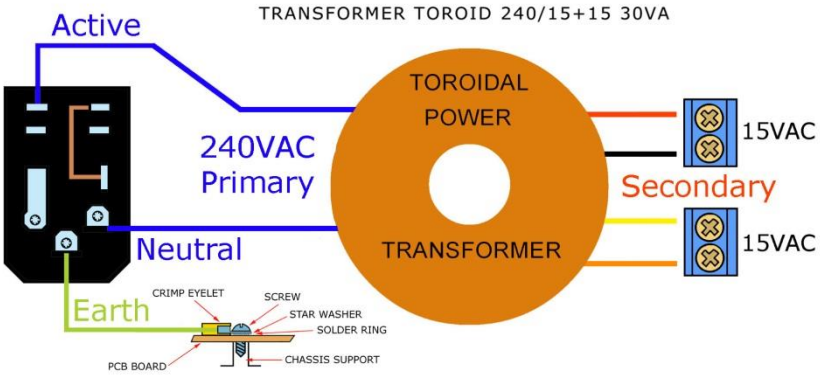
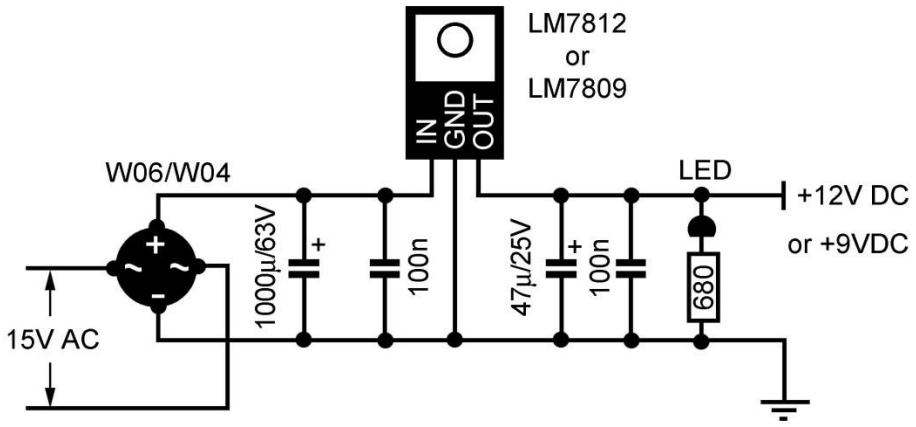
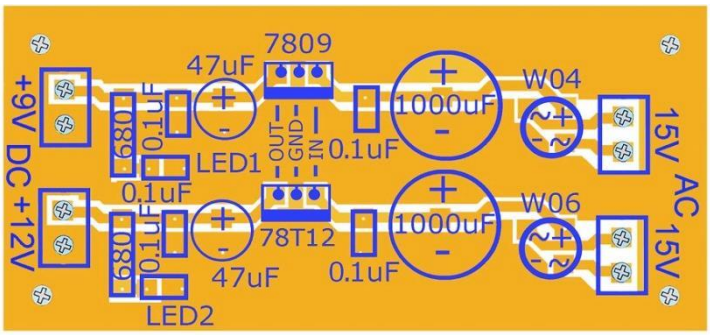


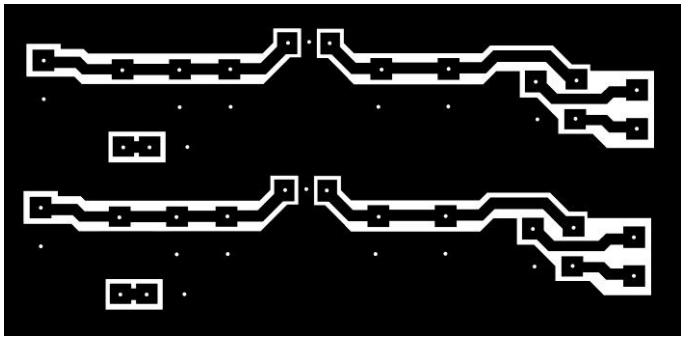
Diagram for the 240V AC input. The switch, socket and fuse are contained within the same IEC module. The toroidal transformer provides the two independent 15V AC outputs.



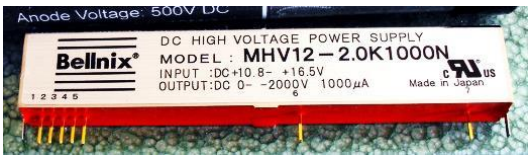
Schematic Diagram for the Low Voltage board, which provides the voltage for the HV module and the Panel Meter.



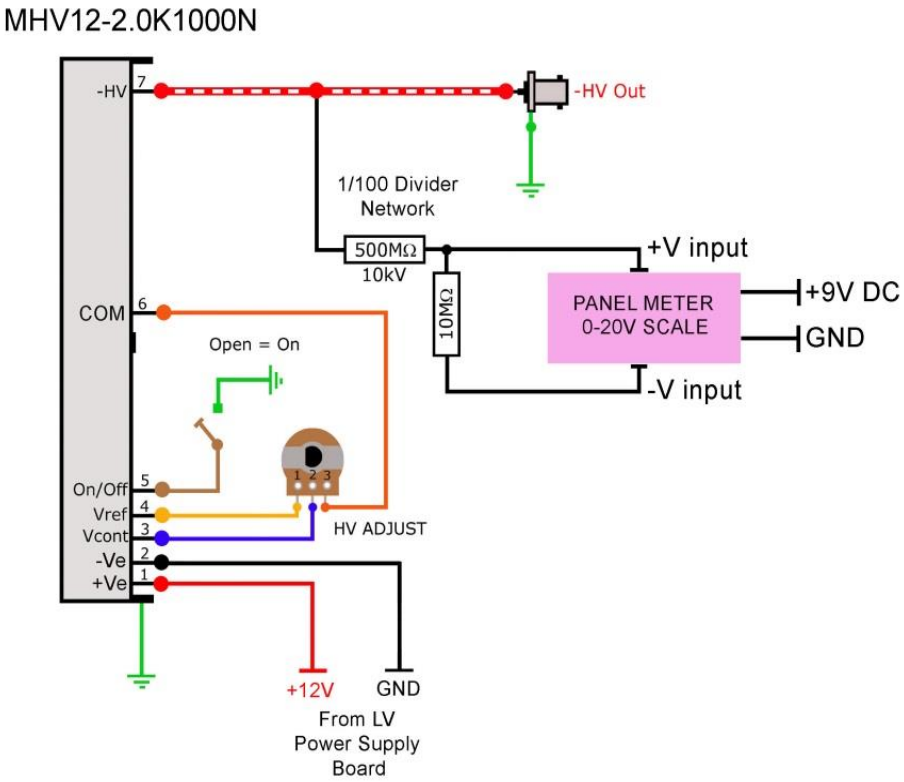
Parts layout diagram for the Low Voltage subsection.



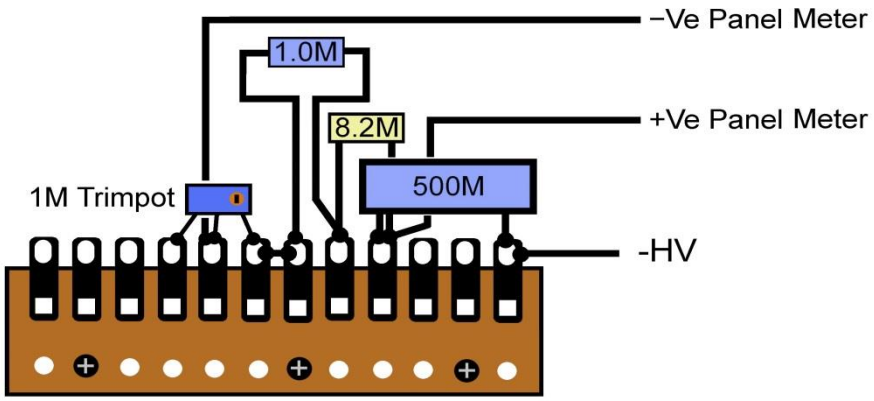
PCB for the Low Voltage subsection. The size is 56 x 100 mm and the X-ray view is shown.



The Bellnix HV module, which produces 0 to -2000V DC output.

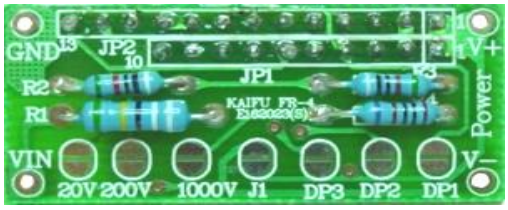


Schematic diagram for the HV module unit.

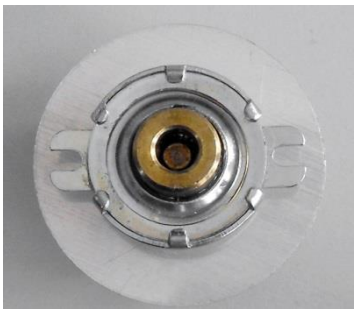


The Voltage divider used with the 20V Panel meter. The display voltage is trimmed with a 25-turn 1M trimpot and calibrated against a meter of known accuracy.

SOME OF THE OTHER BITS AND PIECES



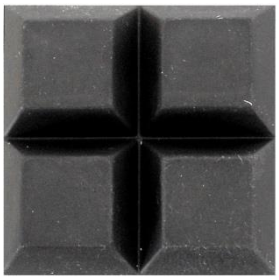
The Panel meter used in this project was the 9V version of the CX101 series. There are pins on the back of the Panel meter so an Add-on board can be attached. The add-on board is used to expand the measuring range from ±200mV DC to ±20V, ±200V or ±500V DC. I set the panel meter to the 20V range, but did nothing to the DP (decimal point) jumpers. This procedure allows the panel meter to display total volts. There is a trim pot inside the LCD housing, but once the add-on board is attached access to this trimpot is very difficult.



To control the HV I used a 6:1 reduction gear unit made by Jackson Brothers in the UK. These were purchased about 10 years ago. The drives were originally intended for a VHF radio. The knob and dial were replaced with a large "Ham radio" style tuning knob.

A BNC-Female 4-Hole Panel Mount Coaxial Connector was used for the HV output. The BNC connector is more than adequate for a negative 2000V DC output at 1mA. I have about 20 of these connectors; again purchased for the construction of a VHF Radio some ten years ago.

To give the front panel a bit of sparkle I added these LED Bezels, red for 12V and green for 9V. They do give a "professional" look to the panel, and are attached with a nut and washer.



For the bottom of the ABS plastic instrument case I used the stick-on style rubber feet. The feet measure about 20 x 20 mm and stand about 8 mm high.

Fused Snap In IEC Chassis Plug with Switch. I used an 800mA fuse. Input is 240V AC.

The wires used to connect the individual subsections were salvaged from old computers. Old computers, printers, scanners and other electronic devices are great sources of many components including hardware and components that can be used for other projects like hard drive magnets and DVD laser diodes.