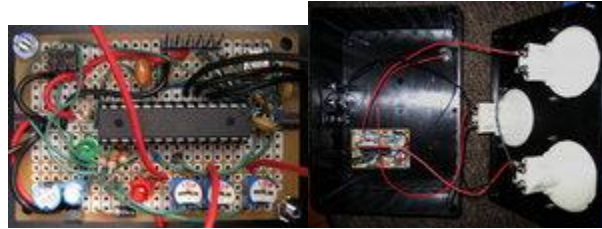


PANEL METER CLOCK



There are several versions of this project, including one which can be purchased as a kit (The Chronulator). In this case I based it off of the one featured in Issue 13 of Make Magazine(original code and schematics). I liked this iteration as opposed to The Chronulator because not only can I easily build it from scratch using an Arduino board, it also has a seconds display. In order for panel meters to tell time the Arduino pulses three of its outputs according to what the clock demands. For example, if it is 6:45 the Arduino will pulse the hour meter output 50% of the time and the minutes meter output 75% of the time. The pulses occur so fast that the meters can't react in time, consequently it appears as if they are receiving a constant supply of current. Since the Arduino's outputs are 5VDC and the meters were chosen to read 1mA maximum, then a resistance of 5000 Ohms is necessary between the outputs and the meters. 5000 Ohms is not a standard resistor size so I used some parts I had lying around in my junk box, in this case 4700 Ohm resistors and 1000 Ohm potentiometers.

The potentiometers allow you to adjust the total resistance of the circuit enabling you to set the peak value of the meter to the correct reading (1mA).

To finish the project I took an 8"x6"x3" plastic enclosure from Radioshack and cut holes in the lid to mount the meters. I also placed the mode, hour set, and minute set buttons on the top of the enclosure. To finish it off I added a power connector for a 9V power brick which will be the power supply for the clock (in the lower left corner of the circuit board you can see the power circuit consisting of a protection diode, a 5V regulator and 2 capacitors which together supply 5V to the Arduino from the incoming 9V supply).



In order to make the panel meter faceplates read time instead of current I had to make a new set of scales for the three gauges. I started with the templates available on The Chronulator website (I particularly liked the VU meter as you can see in the photo). Since these are vector graphics images you can easily resize them without losing detail like you would in a bitmap image. I used a free conversion tool called FreeSVG to convert the files from PDF to SVG (Scalable Vector Graphics) format which can be read by the free, open source vector graphics editor Inkscape. Note: I believe that the new version of Inkscape will include the ability to open PDFs.

I used Inkscape to resize the faceplates to match the dimensions of the panel meters I had purchased (which were larger than the template). I also inverted the color scheme of the template since text on a white background is more visible than with a black background. I printed the new faceplates out on 4"x6" glossy photo paper (which really shows off the colors of the scale better than regular paper). After cutting out the new gauges with a razor blade, I then used rubber cement to glue each of the completed faceplates onto the original aluminum gauges. I allowed the finished gauges to dry overnight and they went on without issue.

Source: <http://www.highonsolder.com/blog/2008/3/12/panel-meter-clock.html>