Geiger Counter

Update - December 20, 2018. I added a new feature. If you connect a, say, 3.5 volt, LED light between pin 6 on the A-Star 32U4 and ground, the LED light will flash a high radiation level warning if ever the counts per minute is 100 or greater -- on for a second then off for a second continuously, until the geiger counter is turned off. You could also use a buzzer instead of a LED light. End of update.

I'm quite happy with the Geiger counter I recently built. I found many of the ideas for the electronic circuit I used on the internet, and I added some of my own ideas that significantly improved what I found on the internet. Here is a link to the circuit:

https://www.keepandshare.com/doc6/18672/geiger-counter-circuit-v3-jpg-172k?da=y

I connect the output of the circuit to an interrupt input of an Arduino Micro microcontroller. What I like about the circuit is that for every alpha, beta or gamma particle the Geiger tube detects, the circuit sends a single, very clean, pulse about four microseconds wide to the microcontroller, so that each particle detection is counted once and only once. That is in contrast with many other circuits I tried that often count a particle detection multiple times.

Currently I'm using an LND 7313 Geiger tube (which, except for the style of its connectors, is the same as the more common 7317) instead of the LND 712 that I used originally. The 7313 is a lot more sensitive to radiation than the 712. It also runs at 550 volts, but R7 should be 4.7 megohms instead of 10 megohms. The circuit should also run higher voltage tubes -- it can easily be adjusted to provide more that 1000 volts.

For the MCU (microcontroller), I'm using a Pololu A-Star 32U4 Micro (item #3101), which is Arduino compatible.

For a display, I use a serial 20x4 LCD display, a sparkfun #LCD-09568.

The power supply consists of three 1.5v batteries in series connected to an adjustable step-up/step-down voltage regulator (pololu item #2118) adjusted to have a 5 volt output.

These four components, the Geiger counter circuit, the MCU, the LCD display, and the 5 volt power supply share a common ground, which I'll refer to as "GND". The positive output of the power supply I'll call "POS". POS is also common among the components.

The connections among the components are as follows:

From the Geiger counter circuit: Vcc 5V and Vcc go to POS, "to MCU interrupt" goes to pin 3 on the MCU, and ground goes to GND.

From the LCD display: RX goes to pin 2 on the MCU, VDD goes to POS, and GND goes to GND.

From the MCU (for the connections not previously listed): the 5V pin goes to POS, and the GND pin goes to GND.

Here is a link to the program I use in the Arduino Micro:

https://www.keepandshare.com/doc6/26853/sparkfun-geiger-counter-lcd-display-v2-ino-5k?da=y