ESD detectors are useful in correlating unusual circuit upsets with specific ESD events. The following is based on a simple lightning detector circuit by Charles Wenzel and written up later by Bob Radmore in the April 2002 issue of QST Magazine. It was since improved by Wenzel and described on his Web site. It turns out this circuit also makes a great ESD detector. I took the original circuit, added an LED lamp, piezo beeper and LCD counter to record the number of ESD events.

I'll usually set up the detector in "quiet mode" at the start of my seminars and then when we get to the module on ESD, I'll walk over and show the attendees how many ESD events it's counted. Depending on the venue, there may be several hundred events recorded.

The circuit is comprised of a low-frequency tuned circuit connected to amplifying stages. Lightning has much of it’s energy around 200 to 300 kHz and the front end is tuned there. The 270 k-Ohm resistor serves to decrease the Q a bit. The tuned circuit feeds into an amplifier transistor and then on to a quasi-Darlington pair with pulse-stretching circuitry. The 82 k-Ohm resistor and 10 uF capacitor determine the pulse width. I modified the pulse stretcher circuit a little to give a more observable indication. The link referenced above shows several more circuit options that may be added to the basic detector.
The LCD counter is an Omron H7EC, which is available from a number of surplus outlets. I bought mine for about $30. If you can't find it surplus, they are available new for about double that. I added an extra switch transistor (not shown) to drive the LED, beeper and LCD counter. For maximum range for my demos, I use a Diamond RH789 telescoping antenna, but any similar telescoping antenna will work. For best sensitivity, a length of 2-3 feet is best. For casual ESD detection, the “rubber duck” antenna (shown above) also works OK. The detector will sense ESD events within several feet and lightning within 2-3 miles. It makes a great tool when demonstrating circuit upsets by ESD to your colleagues.

![Diagram of the basic lightning detector circuit.](image)

*Figure 2 - The basic lightning detector circuit also works well for detecting ESD.*

The circuitry for the detector is housed in a small plastic project box and powered by a 6V battery (4-AA cells). Switches control power on/off, beeper on/off, and a small button that resets the LCD counter. By using a BBQ lighter (available in most hardware stores) you can trigger the detector as a test.