

UExperiment 4: Alarm Circuit

Goal

This experiment shows you how to build a burglar alarm circuit, with a trip-wire. If a burglar breaking into your house breaks the trip-wire, an alarm will go off, alerting you and maybe the guards. What components do you think we will need to build this circuit?

Components

1. An alarm. We need something that can generate lots of noise. We'll use the Alarm IC (IC stands for Integrated Circuit).
2. A speaker. The speaker converts the signal from the Alarm IC into sound which we can hear.
3. Tripwire. When the robber breaks the tripwire, then the alarm will go off. We'll just use one of the connectors for this, but you could use any piece of wire.
4. Thyristor and resistor. We'll use the thyristor and 5.1k resistor to sense if the tripwire has been broken, which will send a signal to the alarm IC.
5. Battery pack, switch, and connectors.

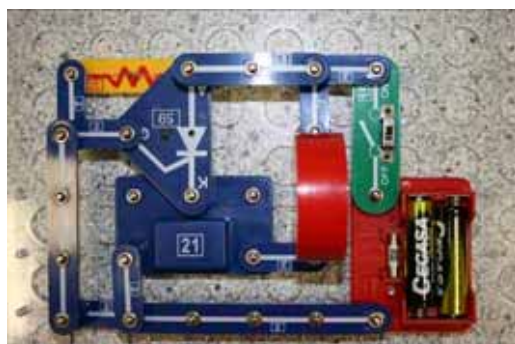
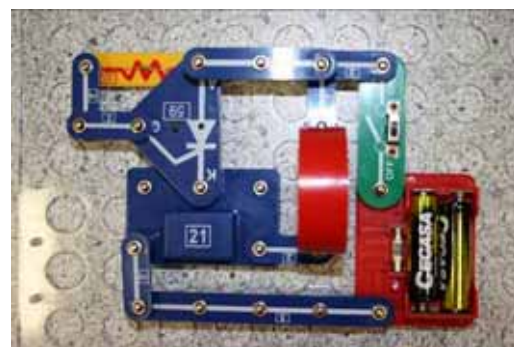
Build it!

We'll build this circuit up in stages, because there are quite a few components in it.



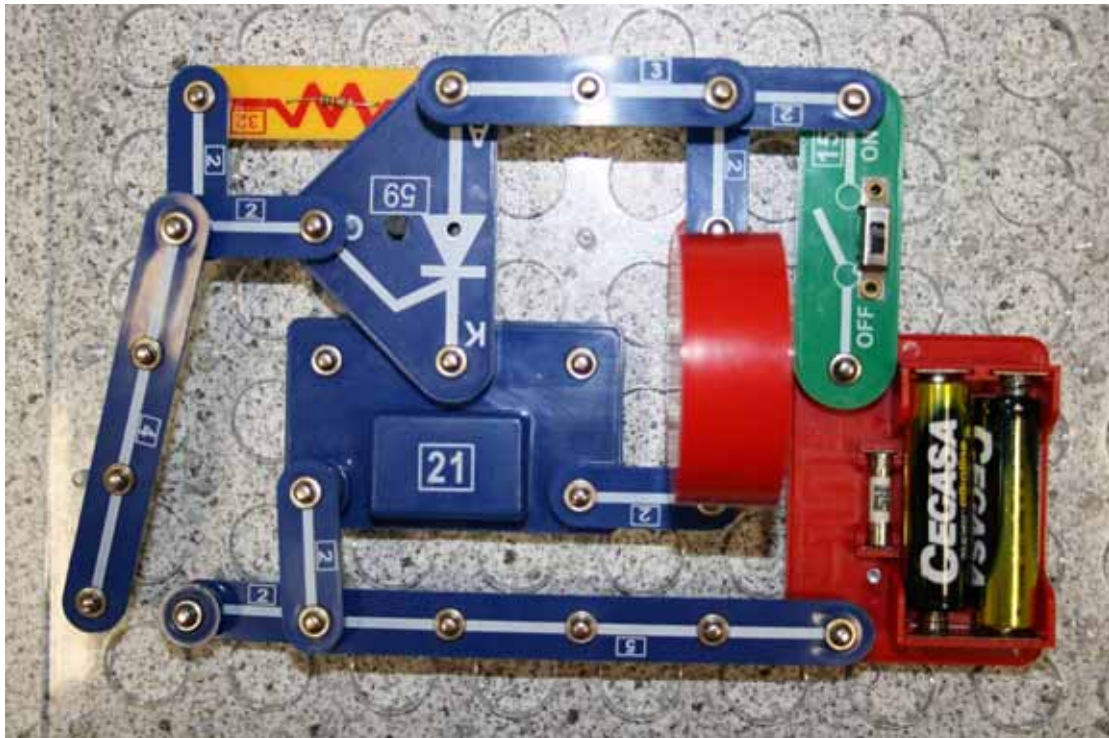
On the left of the circuit we'll have the resistor (in yellow) and the thyristor (triangle), making up the sensor part of the circuit. They are connected to the Music IC (or Alarm IC), which generates the noise when the alarm is set off. The red speaker is in the middle, and the switch and battery are on the right.

Now add in the connectors. There are quite a few of them, and it can be difficult to get them all to snap together. Sometimes when you snap one in, another pops out! Be patient and use the one-snap connectors to give extra height to connectors, so that none of the connectors are slanting upward or downward.



Now if you switch on the circuit at this stage, the alarm will go off. At least we know it's working, but this no good – we can't have the alarm sounding all the time. It would drive the neighbours crazy! We must add in the trip wire, like in the picture on the left. If everything is snapped together securely, the alarm will not go off when you switch the circuit on.

What happens when we break the connection made by the trip-wire? The alarm goes off. The resistor and thyristor have sensed that the connection is broken, and activated the alarm IC. This sends a signal to the speaker, which we can hear.



Real World

You could use this kind of circuit to secure your bedroom, for example if your little brother or sister kept coming in uninvited. Instead of using a connector as the trip wire, you could just use a piece of wire, and stretch the wire in front of the door. Now if someone opens the door, they will hit the wire. The wire will disconnect from the circuit, setting off the alarm!

This kind of alarm could also be used for security in banks and museums. Instead of a metal trip-wire, they could use an invisible laser to make the connection. When a burglar steps through the laser, he will break the connection and set off the alarm.