

1. TASK

After switching on the battery supply an LED should be slowly started up to full brightness.

**2. SOLUTION APPROACH**

The transistor should not light the LED immediately but the collector current is slowly increased over time. This is achieved by the RC element consisting of R1 and C.

**3. EXPERIMENT DESCRIPTION**

First short the capacitor by bridging the two terminals on its contacts to fully discharge it. Then press the switch S (*). Resistor R3 is already mounted on the LED module and doesn't need to be placed on the board.

**LEARNING SUCCESS**

With an RC element a time delay can be realized. This makes it possible to influence electronic switch-on in the timing.

(*) A switch can be realized via two magnetic contacts and one magnetic wire.

**4. OBSERVATION AND EXPLANATION**

After closing the switch S the capacitor C is charged via the resistor R1 to the voltage of about 9V. At the beginning the LED lights up quite weak then it is getting brighter.

Shortly after switching on, the voltage at C is still insufficient to generate a base current. After about 1-2s a sufficient base current flows and the LED lights up with full brightness.

Connect the multimeter to the 2V voltage range and observe the voltage when charging and discharging the capacitor. About 1-2 s after the switch is closed the capacitor voltage is approx. 1V and the LED lights up.



