# Lightning distance meter

## Schematic description

This construction measures and displays the distance between lightning and thunder within range of 0 to 9.9km

When lightning occurs the user presses Start button, and the counter starts to count in a period of 100m (291ms). When thunder occurs the user presses Stop button and counting stops. Left LED column displays lightning distance with 1km resolution and right column with 100m resolution.

Construction is based on 555 timer connected as astable flip flop with approximately 291ms period. Clock signal is connected to 2 4017 Johnson counters connected in cascade.

Start and Stop buttons control bistable flip flop created of Q2 and Q3 transistors. Start button also resets the 555 timer.

Reset button resets both 4017 timers to 0m state and also switches the bistable flip flop to Stop state.

## Construction

Construction has components placed on both sides of the PCB. We populate components from bottom PCB side first. We start with resistors, then continue with diodes D21 and D22, then IC sockets. Then we populate ceramic capacitors, transistors and finish with terminal.

Then we continue with other side of PCB – top. We populate LED diodes that are placed in plastic spacers. Its better to place all LED diodes to PCB with spacer and then solder them all - we avoid melting and moving plastic spacers.

Finally, we populate buttons and switch. Caution – take care of switch orientation – see picture.

## How to get it into service

It should work on the first try when everything was soldered well. The device should show 0km and 0m distance after turning on.

## Bill of materials

|  |  |  |
| --- | --- | --- |
| **Annotation** | **Value** | **Qty** |
| C1,C3 | 1uF | 2 |
| C2 | 10nF | 1 |
| D1,D2,D3,D4,D5,D6,D7,D8,D9,D10 | LED 3mm Y | 10 |
| D11,D12,D13,D14,D15,D16,D17,D18,D19,D20 | LED 3mm G | 10 |
| D21,D22 | 1N4148 | 2 |
| J1 | Terminal RM3.5 | 1 |
| Q1,Q3,Q4 | BC546 | 3 |
| Q2 | BC556 | 1 |
| R1,R3,R5,R8 | 150k | 4 |
| R2,R4,R6,R9,R10,R11 | 10k | 6 |
| R7 | 120k | 1 |
| R12,R13 | 680R | 2 |
| SW1,SW2,SW3 | 6mm | 3 |
| SW4 | 7x7mm | 1 |
| U1 | NE555P | 1 |
| U2,U3 | 4017 | 2 |

## Switch orientation

Obsah obrázku Elektronické inženýrství, obvod, elektronika, Elektronická součástka

Obsah generovaný pomocí AI může být nesprávný.

## LED diodes spacers

Obsah obrázku obvod, Elektronické inženýrství, Elektronická součástka, elektronika

Obsah generovaný pomocí AI může být nesprávný.

## PCB assembly

Obsah obrázku text, vzor

Obsah vygenerovaný umělou inteligencí může být nesprávný.Obsah obrázku text, diagram, účtenka

Obsah vygenerovaný umělou inteligencí může být nesprávný.

## Schematic

Obsah obrázku diagram, Plán, mapa, schématické

Obsah vygenerovaný umělou inteligencí může být nesprávný.