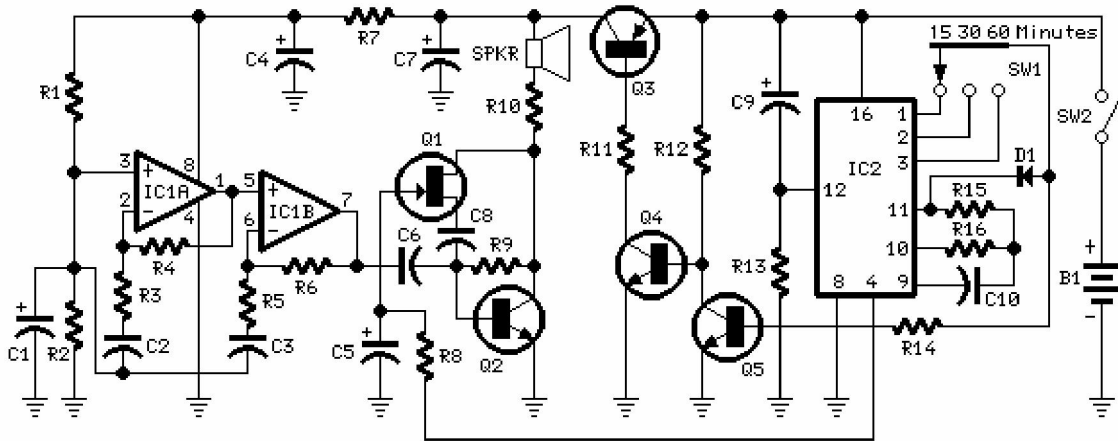


Rain sound effect Generator

Agreeable, relaxing effect, helping to fall asleep
 Small portable unit, 3V battery powered



- R1,R2,R13 _____ 10K 1/4W Resistors
- R3,R5 _____ 33K 1/4W Resistors
- R4,R6 _____ 1M 1/4W Resistors
- R7 _____ 100R 1/4W Resistor
- R8 _____ 330K 1/4W Resistor
- R9 _____ 100K 1/4W Resistor
- R10 _____ 47R 1/4W Resistor
- R11 _____ 1K 1/4W Resistor
- R12 _____ 15K 1/4W Resistor
- R14 _____ 47K 1/4W Resistor
- R15 _____ 10M 1/4W Resistor
- R16 _____ 1M8 1/4W Resistor
- C1,C4,C7 _____ 100 μ F 25V Electrolytic Capacitors
- C2,C3,C6 _____ 100nF 63V Polyester or Ceramic Capacitors
- C8,C10 _____ 100nF 63V Polyester or Ceramic Capacitors
- C5 _____ 47 μ F 25V Electrolytic Capacitor
- C9 _____ 10 μ F 63V Electrolytic Capacitor
- D1 _____ 1N4148 75V 150mA Diode
- Q1 _____ 2N3819 General-purpose N-Channel FET
- Q2 _____ BC337 45V 800mA NPN Transistor
- Q3 _____ BC327 45V 800mA PNP Transistor
- Q4,Q5 _____ BC547 45V 100mA NPN Transistors
- IC1 _____ TL062 Low current BIFET Dual Op-Amp
- IC2 _____ 4060 14 stage ripple counter and oscillator IC (See Notes)
- SW1 _____ 1 pole 3 ways Rotary Switch
- SW2 _____ SPST Slider Switch
- SPKR _____ 8 Ohm Loudspeaker (40 to 85mm. diameter)
- B1 _____ 3V Battery (two AA or AAA cells wired in series etc.)

Comments:

Sound effects generators trying to imitate rain sound or sea surf are well known to hobbyists from many years: their purpose is to induce relaxation and sleep or to help in concentration and study.

The sound generated is restrained to a background level and these devices are frequently kept on the night table.

Common designs use invariably Zener diodes or reverse-biased transistors base-emitter junctions as white noise generators. The main snag of these circuits is that a supply of at least 12V is required, therefore a big battery pack or (more commonly) mains supply is used as power source.

The aim of this project was to design a small, portable unit, powered by a 3V battery and capable of shutting-down after a preset delay, in order to save power.

Circuit operation:

Two BIFET Op-Amps are used as a good, low voltage supply, very low current, white noise source. A sound resembling to a rain shower is reproduced by the speaker after being amplified by Q2.

The higher part of the white noise spectrum is attenuated by C8, slowly driven into operation by means of Fet Q1 acting as a variable resistor. Therefore, a sort of automatic tone control is obtained.

IC2 provides all the timings: it auto-resets at switch-on, shutting-down the generator after one of three time-delays, chosen by means of SW1. It provides also, through R8, slow charge and discharge of C5, in order to change smoothly high-frequency attenuation. Q3 is used as a dc switch for the generator circuit. Q4 and Q5 are its drivers.

Notes:

Different operating delays can be chosen by changing R16 and/or C10 value.

4060 ICs by some manufacturers are unable to oscillate at 3V supply. Motorola's MC14060 is therefore highly recommended for IC2.

If a fixed operating delay is desired, SW1 can be omitted and R14 and D1 anode can be hard wired to the proper pin of IC1.

Output volume can be increased lowering R9 value to about 47K. On the other hand it can be reduced increasing R9 value to about 150K.

If variable high-frequency attenuation is not needed, C5, C8, Q1 and R8 may be omitted.

If auto shut-down is not needed, omit R11, R12, R13, R14, Q3, Q4, Q5, C9, D1 and SW1, connecting pin #12 of IC2 to negative ground.

If only a straightforward white noise generator is required, omit also IC2, R15, R16 and C10 besides the above listed parts.

Current consumption is about 7mA and less than 600 μ A when in stand-by mode.

After shut-down, the circuit can be restarted opening SW2, then closing it again.