

## Clap switch project, order code 70-2570

Assemble the clap switch following the assembly instructions. Connect the unit to a power supply via the 2-pin header. This can be any DC power supply that provides 100mA or more at 6-20V. When the power is connected you are ready to use. When you clap once the red LED will light, this shows that the unit is armed. If you clap again the green light will light. This shows that the relay is also energised and the common and NC connection will now be made. Further to this, clap and the red LED will light once more. This in the same way can be complimented by another clap and the unit deactivate or left and the unit will remain active.

The output 3-pin header, H2, is directly connected to a relay. The contact rating of the relay and header is 3A 24VDC or 240VAC.

### Assembly instructions

Refer to component table for components and board references. Place all components carefully observing polarity where appropriate. For the ICs it is recommended that you solder the IC sockets to the board and then insert the ICs last of all.

### Polarised components

The components on the board that are polarised are as follows, you will need to make sure that you follow the precautions for each and place them the right way around.

**555** timers – Both of these are facing different directions. The notch indicated on the board should match up to both the notch in the socket and in the IC package.

**4017B** – This has the notch position indicated on the board. The IC holder and the chip should all be fitted in this direction.

**D1/2** – These are LEDs, the positive mark is on the board. This is the side for the longer leg and the curved side of the LED.

**D3** – This diode has a band round one end, this should correlate with the single solid band on the diode symbol.

**Capacitors** – There are a number of round electrolytic capacitors on the board. The black side of the capacitor should be inserted to the positive hole. Like the LEDs this will also be the longer lead.

**T1/7805** – These are all half round TO-92 packages, the boards are marked with the shape to match up.

**T2** – This is a TO-18 round metal can with a tab indicating the emitter, this should line up with the tab on the board legend.

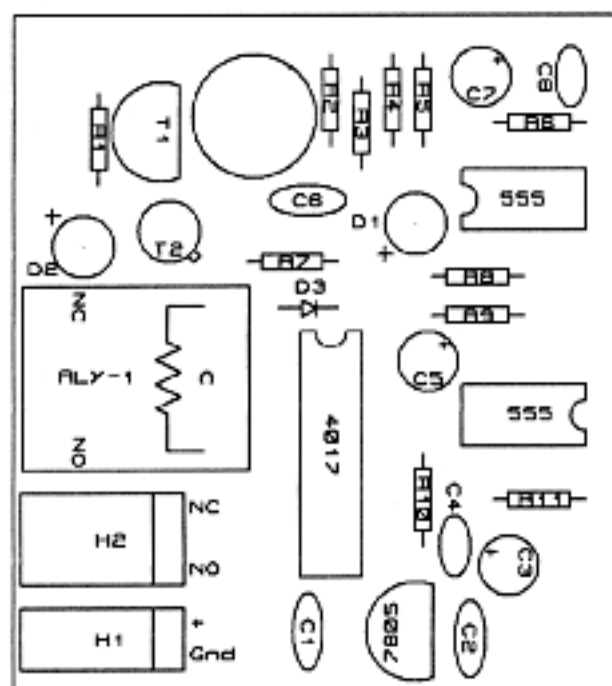
### Power

H1 is for power to the board. The supply needs to be 100mA or greater at 6-12V observing polarity. If you are using the battery clip provided with a 9V PP3, then crimp a terminal to each wire and insert into the 2-pin housing so that when it mates the + is in line with the red wire.

## Component table

Description	Order code	Board reference	Device markings
555	82-0336	555	555
4017B	83-0340	4017	4017B
8 Pin IC socket	22-0150	555	
16 Pin IC socket	22-0160	4017	
Electret microphone	35-0192		
BC549B	81-0068	T1	BC549B
BC108	81-0066	T2	BC108
3M3 resistor	62-0454	R2	Orange Orange Green
56K resistor	62-0412	R3	Green Blue Orange
330Ohm resistor	62-0358	R1+8	Orange Orange Brown
100k resistor	62-0418	R6+11	Brown Black Yellow
10k resistor	62-0394	R4+9+10	Brown Black Orange
3k3 resistor	62-0382	R5+7	Orange Orange Red
7805 regulator	47-3278	7805	7805
Relay	60-0300	RLY-1	
1N4001	47-3130	D3	
3 Pin header	22-1010	H2	
3 Pin housing	22-0910		
2 Pin header	22-1005	H1	
2 Pin housing	22-0905		
10 crimps	22-1096		
LED red	55-1790	D1	
LED green	55-1792	D2	
10N capacitor	08-0230	C4+8	103
100N capacitor	08-0235	C1+2+6	104
22uF capacitor	11-0230	C5	22uF
10uf capacitor	11-0220	C3+7	10uF

## Board layout



## How it works

The clap switch works by sending a signal through a pre-amp to two 555 timers. This is the input side of the circuit and consists of the electret microphone, the potential divider and the input transistor, T1.

The first timer receives a signal and sends its output high for a timed period, this is determined by the resistor and capacitor combination attached to it, R6 and C7. The second 555-timer is then activated as the output of the first is connected to the reset pin, pin 4 of the second. This connection also has a capacitor, which will charge, this means that the second timer will be activated shortly after the first pulse is received. The unit is now armed. There are now two possible outcomes. If the unit does not receive a second signal within the first timed period then the second timer will be deactivated once again and it will return to its stand-by state. If the unit receives another signal within the timed period then the output of the second timer will turn high.

The output of the second timer is linked to a counter that resets at 2 so there are effectively only two output states, 1 or 0. This could also have been done using a flip-flop. The output relay and LED will be energised when the counter is in its 1 state. The second timer uses the same value components within its timing circuit, this means that once the unit is armed it can only advance the counter once as after the unit has stood down from the armed stage the second counter is deactivated.

In summary the output relay will be activated and deactivated for every signal from the second timer, which is in turn operated every two hand claps that are within the preset time period that are determined by R6 and C7. To increase the time period, increase the capacitance or the resistance, alternatively to decrease this time reduce either component a lower value.

You may find that the echo created when you clap is activating both timers and hence turning the unit on and off with only one handclap. If this is the case then the capacitor C5 will need to be increased.