

# CK216 - 6 - 15V ALARM MODULE

Do you want to know what 110dB of noise sounds like? Well now you can easily find out. This Kit gives out between 108 & 111 db at 1 meter distance when we measured it using a sound meter. The variation is caused by natural fluctuations of the resultant sound pattern in space caused by constructive & destructive interference of the two sound sources.

We have supplied two piezo sounders preglued into their own resonant cavities with presoldered wires attached. The PCB in the kit fits into the back of the box and gives you a nice alarm module. All you have to do is connect between 5V and 15V to the positive (red) and earth (black) wire, and stand back. (Maximum voltage rating for the LM/NE556 is 18V.)

The kit is constructed on a single-sided printed circuit board (PCB). Protel for DOS was used.

## ASSEMBLY INSTRUCTIONS

Check off the components in the kit against the Component listing above. Especially make sure to the correctly identify the resistors. It is generally best to add the lowest height components first to the board. So place the resistors first. Look at the circuit schematic diagram, identify the resistor component number, find that resistor then place it in the board. Next place the capacitors. The two monoblock and the two mylar capacitors can be placed either way around. However, make sure to get the electrolytic capacitor, C3, and the transistors around the correct way.

Then, place the two autotransformers. Look at the overlay on the PCB and the schematic diagram. You should be able to work out how to bend the leads and insert them into the PCB. Use proper needle-nosed pliers to bend the leads 90° about 4mm from the base. Two tie-down pads have been provided next to the body of each auto-transformer if you want to secure them to the PCB. (But we found that the legs themselves were strong enough to stop them moving.) Finally, solder the six wires to the PCB. Connect the red wire from the two piezos to the positive piezo pads and the black wire to the negative piezo pads. Solder the red hookup wire to the V+ pad in the top centre of the PCB and the green hookup wire to the negative pad next to it.

Take these two wires out of the box at the side notch as you put the PCB into the box. Screw on the back cover. (If it does not fit properly trim off more solder joints on the back of the PCB. Use a DC plug pack or power supply to test the Screamer. We suggest you start at around 5V. Once you have heard the sound level we suggest you wrap the whole box in a towel to damp out the sound as you test it further. (Note we are now using a nmos LM or NE556. Disregard the PCB overlay which says 'cmos 556'.)

The 556 IC contains two 555 timers. In this circuit the IC1:B closest to the piezo elements is set to oscillate around their resonant frequency. The frequency is then varied via input pin 11 from the other 555, IC1:A. This modulating input is a low frequency oscillation. However, instead of using the square wave output from the first 555, the step function is converted to a triangular wave by the RC network R3 & C3. The result of this is a frequency swept output which ensures that the output frequency definitely passes through the resonant frequency of the piezo elements sometime during each modulation cycle. Thus no trimpot is required in the circuit for frequency calibration.

The output causes Q1 & Q2 to turn on and off. When the transistors turn on current flows in the 220 turn coil of the autotransformers. When the transistors turn off the magnetic field collapses and induces a potential in the high turn side of both coils which deflects the piezo element which causes a noise. A potential of over 200 volts can be induced which can give you quite a shock.

The piezo element is certainly overdriven to give maximum noise output. We have run this circuit for several hours in test circuits without anything burning out. It is hard to see how more sound could be generated from such an element.

The sound level generated is **very** loud. It can hurt your ears. It is actually louder than the commercial units which use the same box! (They measured at 103dB to 106dB.) Even though there is 'only' a 3 to 6 db numeric difference between this unit and the commercial units it is the nature of the logarithmic scale that this corresponds to a big difference in sound energy, and in the current drawn by the circuit. Three db is a doubling of the sound energy which draws 4 times the current. The commercial units draw around 60 to 100mA. Our unit draws 400 - 500 mA.

## WHAT TO DO IF IT DOES NOT WORK

Poor soldering is the most likely reason that a kit circuit does not work. Check all solder joints carefully under a good light. Next check that all components are in their correct position on the PCB especially IC, electrolytic capacitor and the autotransformers.

## WHAT TO LEARN FROM THIS KIT

- sound generation and resonant cavities. Without the cavity the sound generated by the piezo in the open air is a barely audible click-click.
- the 556 IC
- autotransformers

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<http://www.electronickits.com>

## CIRCUIT DESCRIPTION & OPERATION

# CK216 6 - 15V ALARM MODULE

## COMPONENTS

Resistors, 5%, 1/4W carbon:		
1K (brown, black, red)	R6 R7	2
1K5 (brown, green, red)	R3	1
27K (red, violet, orange)	R4 R5	2
1M5 (brown, green, green)	R1 R2	2
Capacitors:		
100uF/16V electro	C3	1
100nF (104) mono	C1 C5	2
10nF (103) mylar	C2 C4	2
1N4148 Diode	D1 D2	2
BC639	Q1 Q2	2
Autotransformer	T1 T2	2
LM/NE 556	IC1	1
14 pin IC socket		1
Hookup wire, red		6"
Hookup wire, green		6"
Box with two piezo elements, plus 4 screws.		1
Kit 15 PCB		1

