

# K8093

ILLUSTRATED ASSEMBLY MANUAL H8093IP'1

Remote controlled  
home alarm



velleman®  
projects





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NEW HK193 LED CUBE

CubeXimator software  
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Posted on 04-06-12

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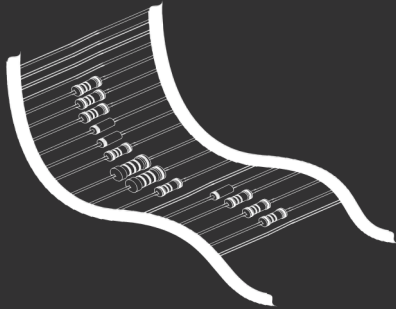
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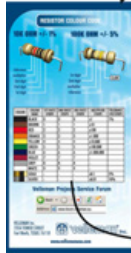


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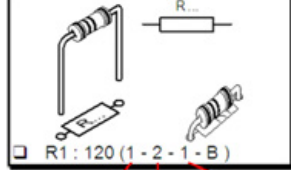


REMOVE THEM FROM THE TAPE ONE AT A TIME !

Included in  
this kit



## 2. RESISTOR



COLOUR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOLERANCE 4TH
Black	BLACK	0	0	0	x1	1%
Brown	BROWN	1	1	1	x10	
Red	RED	2	2	2	x100	
Orange	ORANGE	3	3	3	x1.000	
Yellow	YELLOW	4	4	4	x10.000	
Green	GREEN	5	5	5	x100.000	
Blue	BLUE	6	6	6	x1.000.000	

DO NOT BLINDLY FOLLOW THE ORDER OF THE COMPONENTS ONTO THE TAPE. ALWAYS CHECK THEIR VALUE ON THE PARTS LIST!



## assembly hints

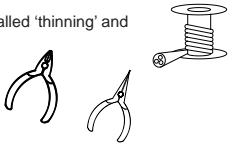
### 1. Assembly (Skipping this can lead to troubles !)

Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.



#### 1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip.
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin rosin-core solder. Do not use any flux or grease.
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.
- Needle nose pliers, for bending leads, or to hold components in place.
- Small blade and Phillips screwdrivers. A basic range is fine.



For some projects, a basic multi-meter is required, or might be handy



#### 1.2 Assembly Hints :

- Make sure the skill level matches your experience, to avoid disappointments.
- Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- Perform the assembly in the correct order as stated in this manual
- Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
- Values on the circuit diagram are subject to changes, the values in this assembly guide are correct\*
- Use the check-boxes to mark your progress.
- Please read the included information on safety and customer service

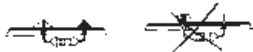
\* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

#### 1.3 Soldering Hints :

1. Mount the component against the PCB surface and carefully solder the leads



2. Make sure the solder joints are cone-shaped and shiny



3. Trim excess leads as close as possible to the solder joint



## features

- can store up to 4 remote controls (FIFO)
- chime function
- built-in pre-alarm
- always armed after power outage
- the built-in relay can switch a regular alarm (not included) (3 A 125 VAC) after 20 s pre-alarm
- arm time:
  - slow with indication: if the door is open or closed (time to leave the room)
  - quickly
- magnetic door contact included

## Specifications

- power supply: 12V DC
- consumption:
  - armed: 20 mA
  - alarm relay powered: 50 mA
- relay: 3 A - 125 VAC
- frequency: 433.92 MHz
- 32-bit code technology
- more than 1.000.000.000 unique codes
- code can easily be changed for safety purposes
- transmitter: R&TTE compliant (ETS 300-220) \*
- open field range of up to 30 m possible
- external antenna wire
- receiver dimensions: 108 x 102 x 45 mm / 4.25 x 4 x 1.77"

\* ETS 300 -220:only for EU countries

### **Compatible remotes (not included):**



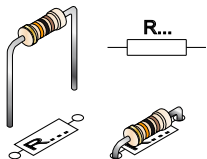
VM166T: 2-channel transmitter with LED light



VM130T: 2-channel RF remote control transmitter

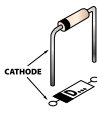
# 1. CONSTRUCTION

## 1 Resistors



- R1 : 47K (4 - 7 - 3 - B)
- R2 : 560 (5 - 6 - 1 - B)
- R3 : 560 (5 - 6 - 1 - B)
- R4 : 47K (4 - 7 - 3 - B)
- R5 : 560 (5 - 6 - 1 - B)
- R6 : 1K (1 - 0 - 2 - B)
- R7 : 10K (1 - 0 - 3 - B)
- R8 : 10K (1 - 0 - 3 - B)
- R9 : 2K2 (2 - 2 - 2 - B)
- R10 : 560 (5 - 6 - 1 - B)

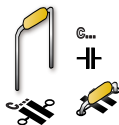
## 2 Diodes



Watch the polarity!

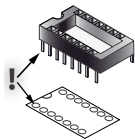
- D1 : 1N4148
- D2 : 1N4148

## 3 Ceramic Capacitors

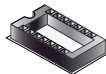


- C1 : 100nF (104)
- C2 : 100nF (104)
- C3 : 100nF (104)

## 4 IC socket

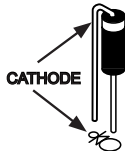


Watch the position of the notch!



- IC1: 14p

## 5 Vertical diode



Watch the polarity!



- D2 : 1N4007

## 6 Transistors



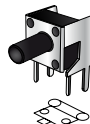
- T1 : BC547
- T2 : BC547
- T3 : BC547

## 7 TVoltage regulator



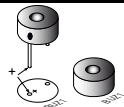
- VR1 : UA78L05

## 8 Push button



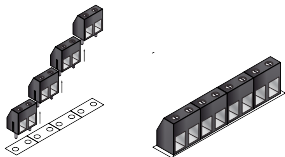
- SW1:LEARN BUTTON

## 9 Sounder



□ BUZ1

## 10 Terminal blocks



- SK2 : 2p (Relais)
  - SK3 : 2p (N.O. / N.C.)
  - SK4 : 2p (COM / -)
  - SK5 : 2p (power supply)
- } Output

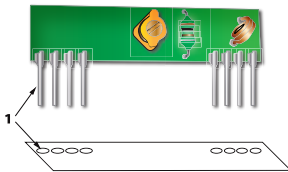
## 11 Electrolytic capacitors



Watch the polarity!

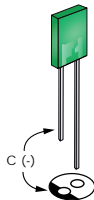
- C4 : 470 $\mu$ F
- C5 : 10 $\mu$ F

## 12 RF-receiver



□ RX1 : RX433N

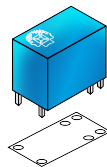
## 14 LED's



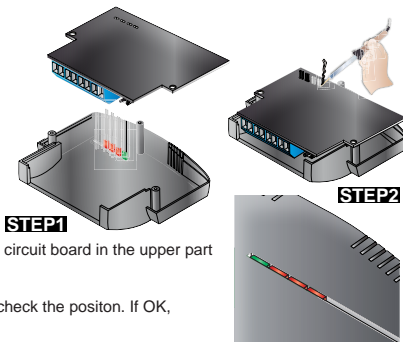
Watch the polarity!

- LD1: Red (power)
- LD2: Red (status)
- LD3: Red (alarm)
- LD4: Green (relais)

## 13 Relay



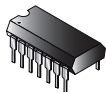
□ RY1



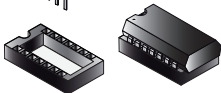
**STEP1:** Place the LEDs together with the circuit board in the upper part of the housing.

**STEP2:** Solder one lead of each led and check the position. If OK, solder the second lead.

## 15 IC

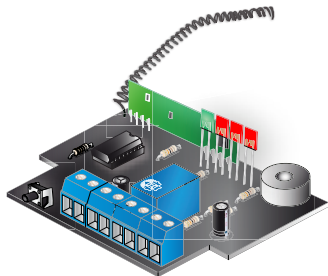


Watch the position of the notch!

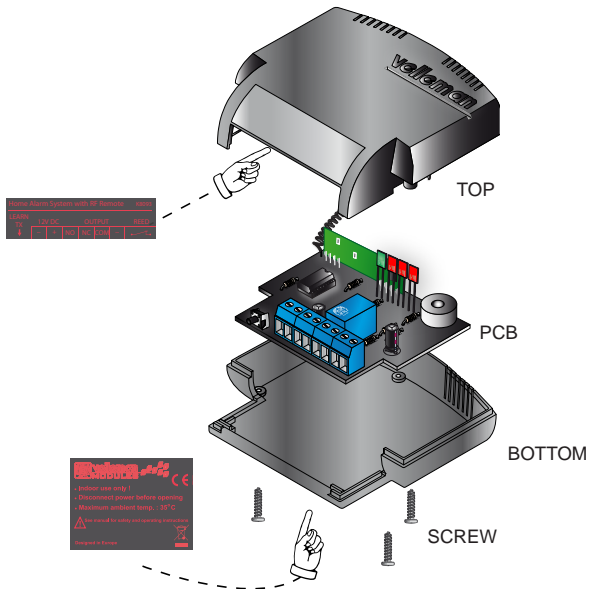


□ IC1: VK8093  
(programmed PIC16F1503-I/P)

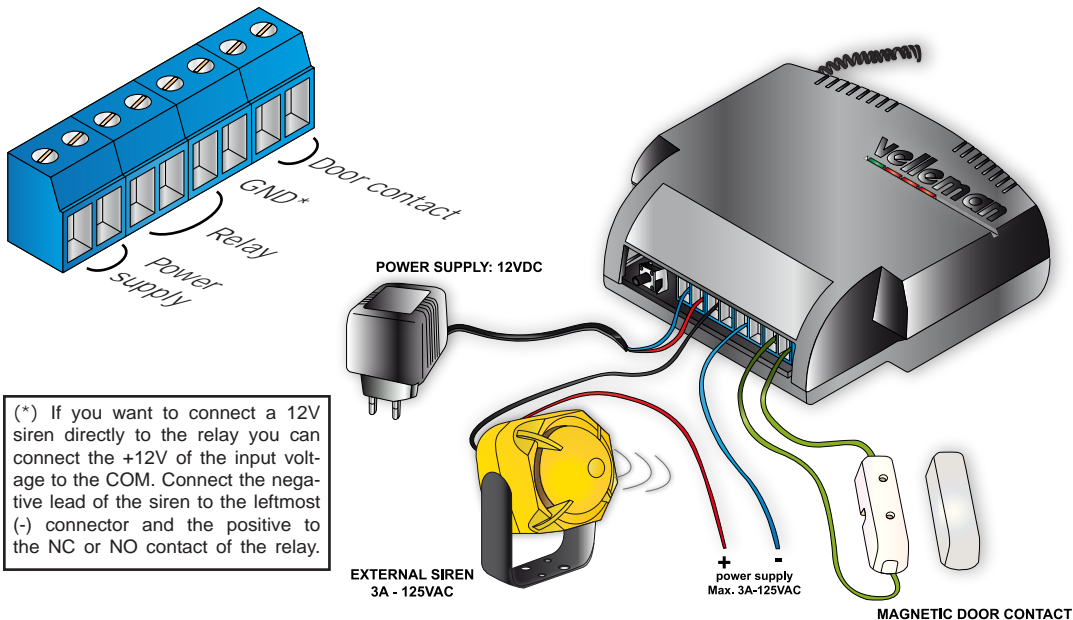
## 16 Antenna



## II. ASSEMBLY



### III. CONNECTION DIAGRAM



(\*) If you want to connect a 12V siren directly to the relay you can connect the +12V of the input voltage to the COM. Connect the negative lead of the siren to the leftmost (-) connector and the positive to the NC or NO contact of the relay.

## IV. ARMING THE UNIT

Out of the box no remotes are assigned for safety reasons. When the unit powers up it is always armed!  
Unit is capable of storing 4 remotes, FIFO.

The stored remotes can be cleared from memory by holding the LEARN button while powering up, The unit will beep 10 times (fast) to indicate the erasing process.

### STATUS INDICATION (LD3)

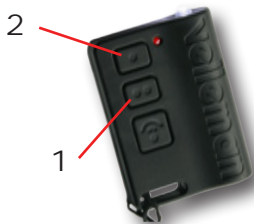


### LEARNING A REMOTE:

1. Press the "Learn"-button once, the status LED light continuous. The unit is ready for learning a remote (there is a timeout!).
2. Hold the 2 buttons of the remote pressed. Release the buttons when the status LED turns off , the remote is learned.

### REMOTE CONTROL:

1. DISARM
2. ARM



## How to arm?

There are 3 methodes for arming your unit:

- Arming with open door
- Quickly arming with open door
- Arming with closed door

### Arming with open door:

*When the door is open, the unit beeps for prox. 20seconds before actually arming. Closing the door will the unit beeps faster. After the delay periode the unit is armed.*

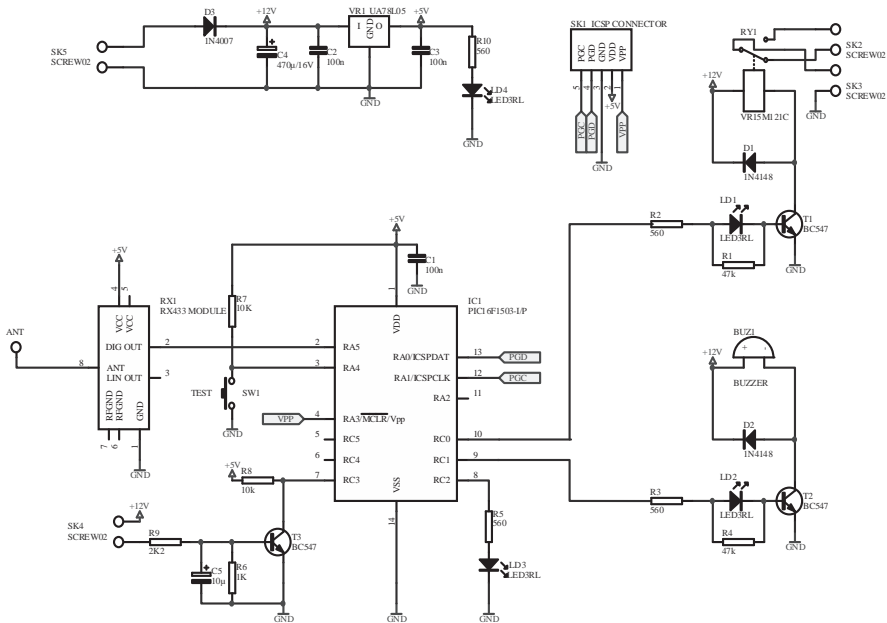
### Quickly arming with open door:

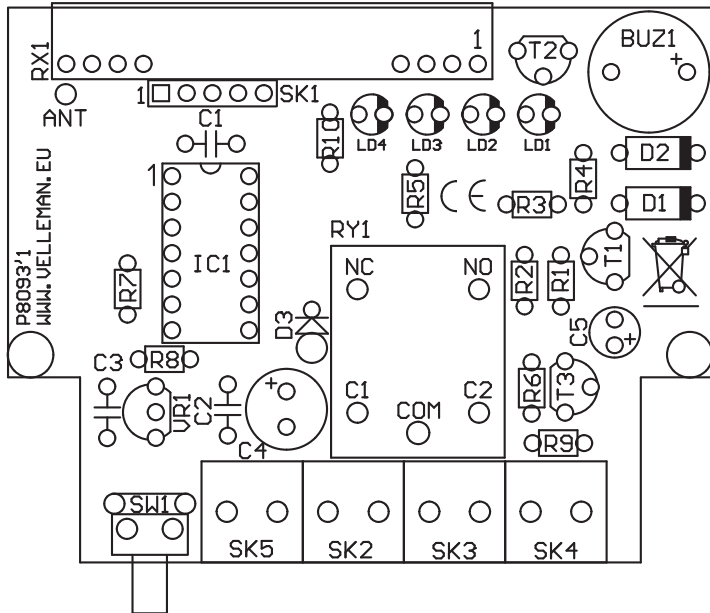
*During the arming delay periode of 20 seconds you can arm instant by pressing the arm button again (door must be closed!).*

### Arming with closed door:

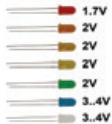
*At closed door and unarmed unit you can arm it by holding the alarm button pressed, there is no arming delay time of 20 seconds.*



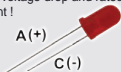




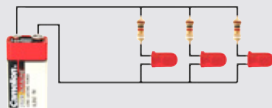
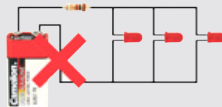
# Leds and how to use them



Leds feature a specific voltage drop, depending on type and colour. Check the datasheet for exact voltage drop and rated current !



Never connect leds in parallel



How to Calculate the series resistor:

Example: operate a red led (1.7V) on a 9Vdc source.

Required led current for full brightness: 5mA (this can be found in the datasheet of the led)

$$\frac{\text{Supply voltage (V) - led voltage (V)}}{\text{required current (A)}} = \text{series resistance (ohms)}$$



$$\frac{9V - 1.7V}{0.005A} = 1460 \text{ ohm}$$

closest value :  
use a 1k5 resistor

Required resistor power handling=  
voltage over resistor x current passed trough resistor

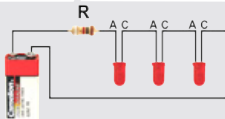


$$(9V - 1.7V) \times 0.005A = 0.036W$$

a standard 1/4W resistor  
will do the job

LEDs in series:

Example: 3 x red led (1.7V) on 9V battery  
Required led current for full brightness: 5mA  
(this can be found in the datasheet of the led)



$$\frac{\text{Supply voltage (V) - (number of leds x led voltage (V))}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

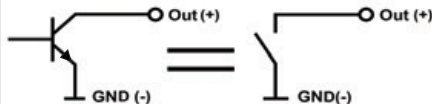


$$\frac{9V - (3 \times 1.7V)}{0.005A} = 780 \text{ ohm}$$

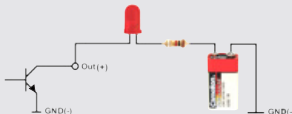
use an  
820 ohm resistor

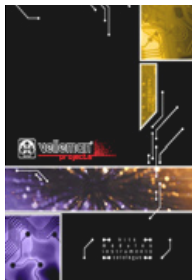
## open collector outputs

An open collector output can be compared to a switch which switches to ground when operated



Example: How to switch an LED by means of an open collector output





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