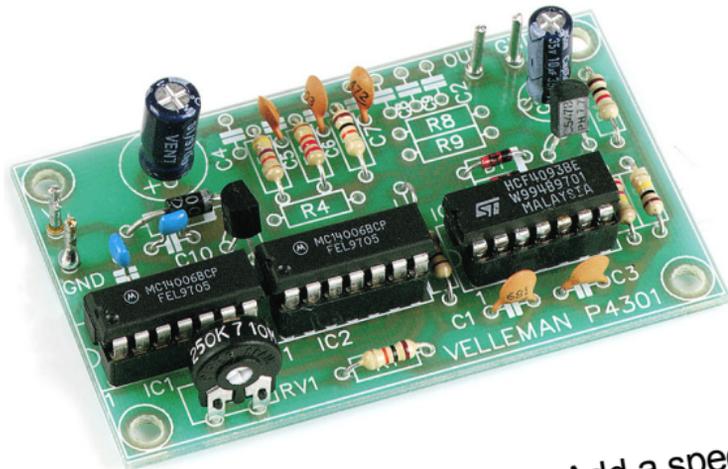


Total solder points: 108

Difficulty level: *beginner* 1  2  3  4  5  *advanced*

## PINK NOISE GENERATOR



# K4301

Add a spectrum analyser with a microphone and check your audio system performance.



**VELLEMAN NV**

**Legen Heirweg 33**

**9890 Gavere**

**Belgium Europe**

**[www.velleman.be](http://www.velleman.be)**

**[www.velleman-kit.com](http://www.velleman-kit.com)**

To analyse the acoustic properties of a room (usually a living- room), a good pink noise generator together with a spectrum analyser is indispensable. Moreover you need a microphone with as linear a frequency characteristic as possible (from 20 to 20000Hz.). If, in addition, you dispose of an equaliser, then you can not only check but also correct reproduction.

**Features:**

- Random digital noise.
- 33 bit shift register.
- Clock frequency adjustable between 30KHz and 100KHz.
- Pink noise filter: -3 dB per octave (20 .. 20000Hz.).
- Easily adaptable to produce "white noise".

**Specifications:**

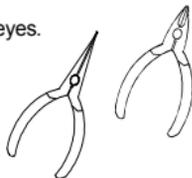
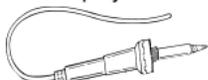
- Output voltage: 150mV RMS./ clock frequency 40KHz.
- Output impedance: 1K ohm.
- Power supply: 9 to 12VAC, or 12 to 15VDC / 5mA.

## 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 'tinning' 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



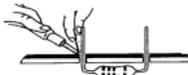
### 1.2 Assembly Hints :

- ⇒ 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

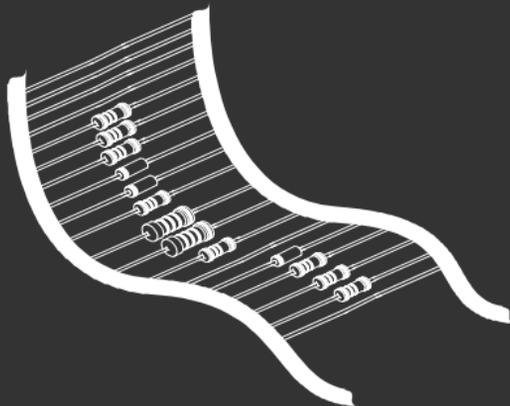


2- Make sure the solder joints are cone-shaped and shiny



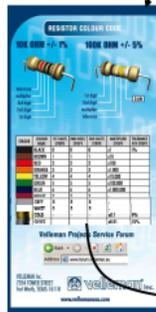
3- Trim excess leads as close as possible to the solder joint



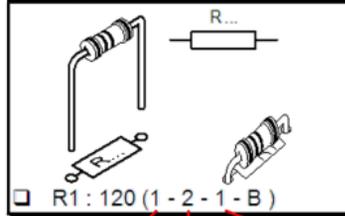


REMOVE THEM FROM THE TAPE ONE AT A TIME !

Included in  
this kit



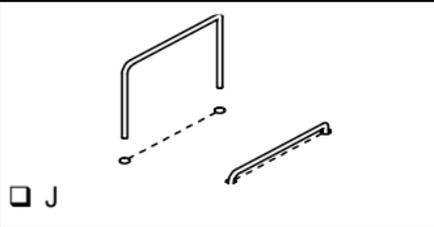
## 2. RESISTOR



EDLDR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOL 4TH:
	BLACK	0	0	0	x1	1%
	BROWN	1	1	1	x10	
	RED	2	2	2	x100	
	ORANGE	3	3	3	x1.000	
	YELLOW	4	4	4	x10.000	
	GREEN	5	5	5	x100.000	
	BLUE	6	6	6	x1.000.000	

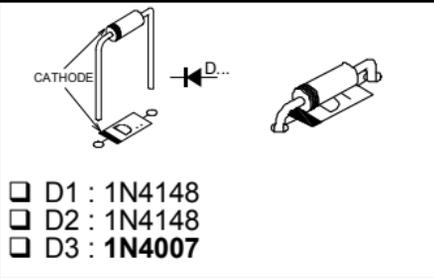
**DO NOT BLINDLY FOLLOW THE ORDER OF THE COMPONENTS ON THE TAPE.  
ALWAYS CHECK THEIR VALUE ON THE PARTS LIST!**

## 1. Jumper wire



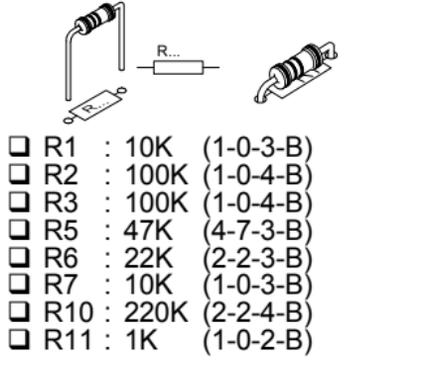
## 2. Diodes.

Watch the polarity !



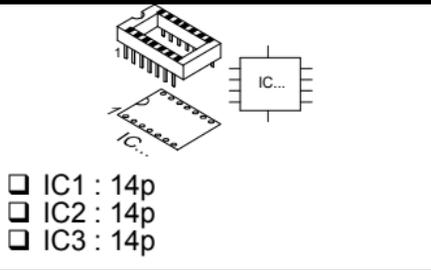
- D1 : 1N4148
- D2 : 1N4148
- D3 : **1N4007**

## 3. Resistors



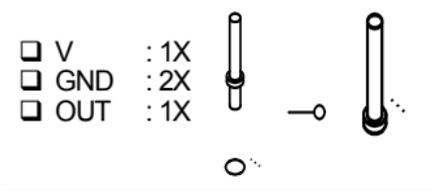
- R1 : 10K (1-0-3-B)
- R2 : 100K (1-0-4-B)
- R3 : 100K (1-0-4-B)
- R5 : 47K (4-7-3-B)
- R6 : 22K (2-2-3-B)
- R7 : 10K (1-0-3-B)
- R10 : 220K (2-2-4-B)
- R11 : 1K (1-0-2-B)

## 4. IC sockets. (check the position of



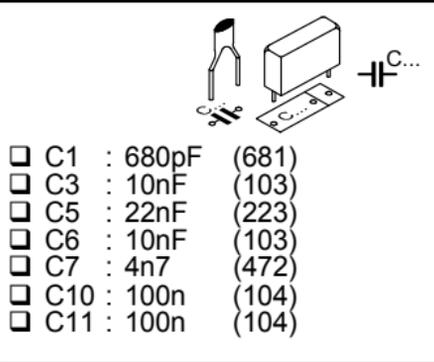
- IC1 : 14p
- IC2 : 14p
- IC3 : 14p

## 5. PCB tabs



- V : 1X
- GND : 2X
- OUT : 1X

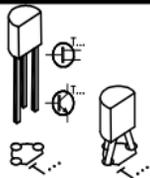
## 6. Capacitors



- C1 : 680pF (681)
- C3 : 10nF (103)
- C5 : 22nF (223)
- C6 : 10nF (103)
- C7 : 4n7 (472)
- C10 : 100n (104)
- C11 : 100n (104)

### 7. Transistor

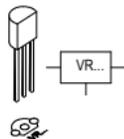
- T1 : BC547B



### 8. Voltage regulator

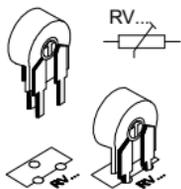
Mind the orientation !

- VR1 : UA78L08



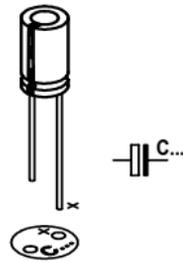
### 9. Trimmer

- RV1 : 220K

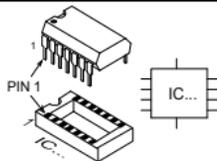


### 10. Capacitors. Watch the polarity !

- C12 : 10 $\mu$ F
- C13 : 100 $\mu$ F

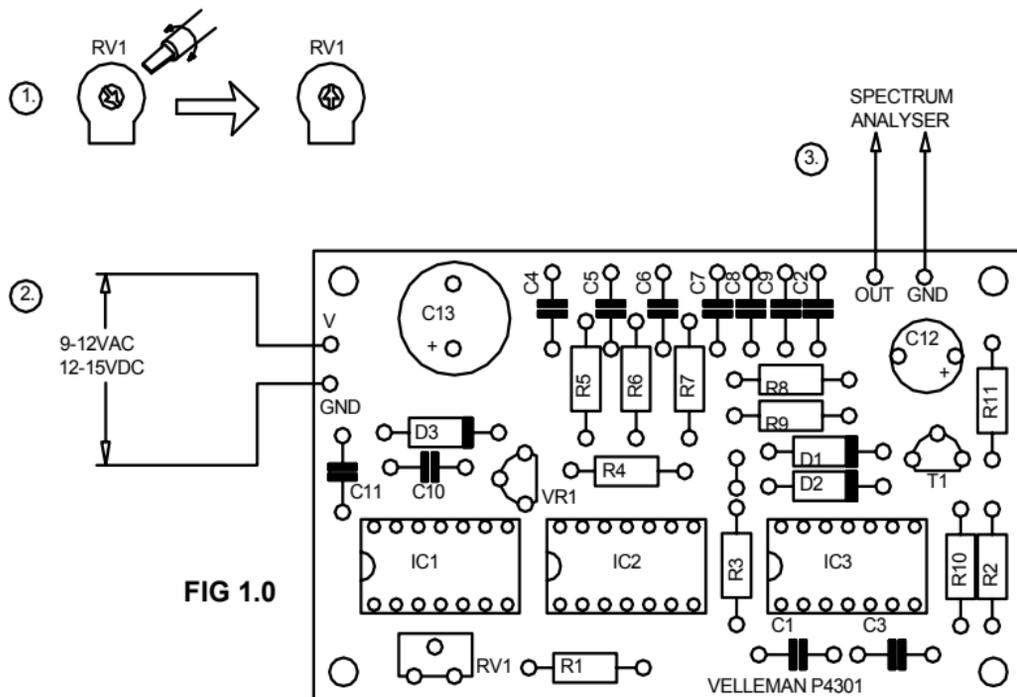


### 11. ICs. (check the position of the notch)



- IC1 : CD4006
- IC2 : CD4006
- IC3 : CD4093

## 12. TEST &amp; ADJUSTMENT

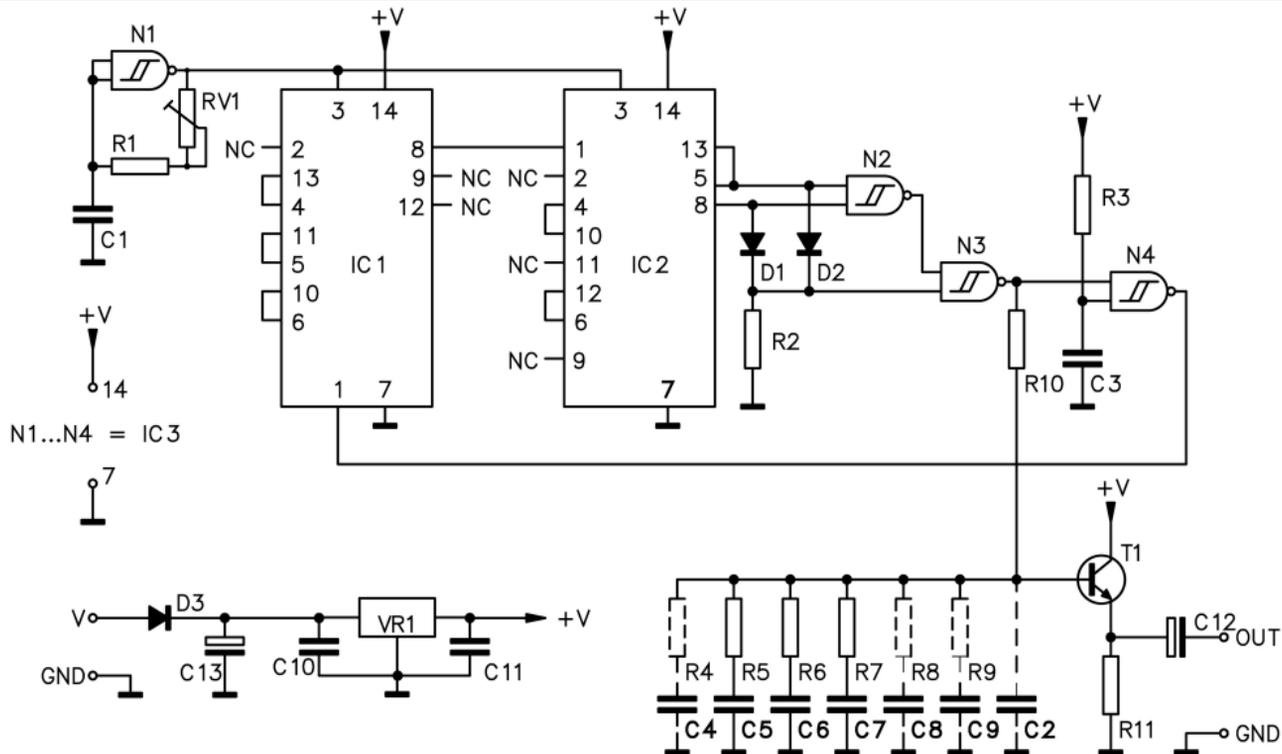


1. Turn trimmer RV1 to its centre position.
  2. Connect a power supply :
    - AC, 9 to 12 V then between points GND and V.
    - DC, 12 to 15 V (battery or power supply) then - to GND and + to V.
  3. Connect the output (OUT, GND) to the input of a spectrum analyser, using a screened flex (screen to GND).
- Now adjust the noise signal using trimmer RV1 so as to obtain as flat a reproduction characteristic as possible. Especially pay attention to the higher frequencies (adjust spectrum analyser sensitivity if necessary).

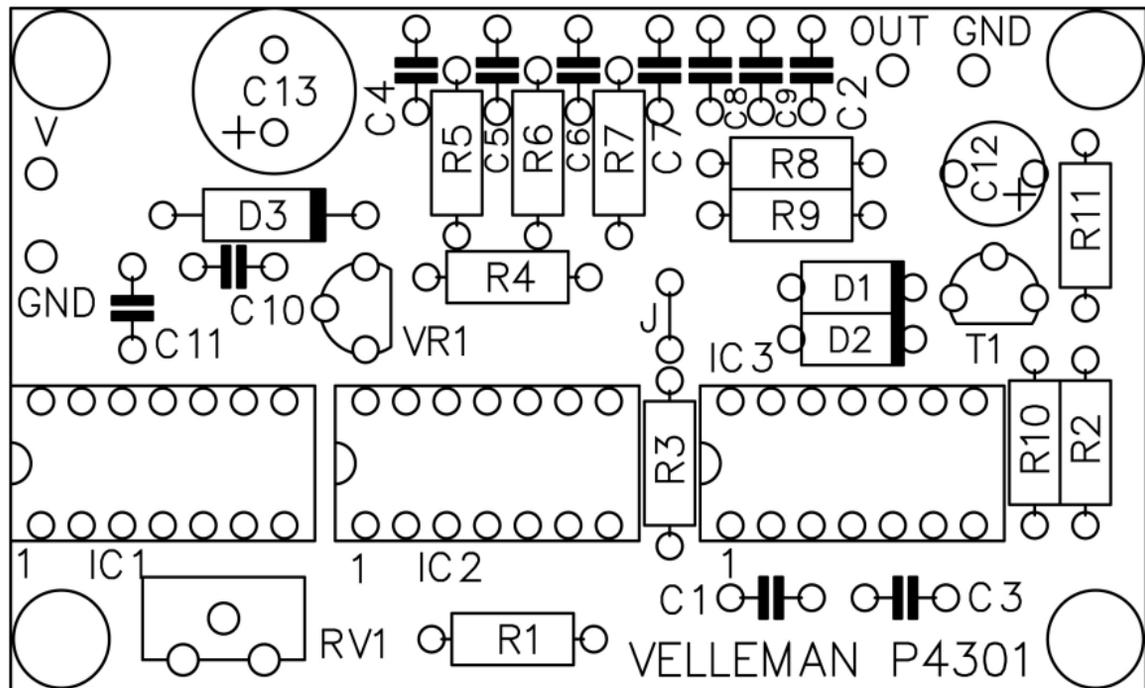
 **Remark:** *the nature of the lower frequencies (32 and 64Hz) makes their read-out unstable.*

**FOR THOSE WHO LIKE TO EXPERIMENT** : By adapting C1 you can also modify the clock frequency (pin 3 of IC2) of the shift register (e.g. C1=18pF for a clock frequency up to and beyond 500KHz), so as to obtain a "white noise" at 500KHz and to adapt the filter (C2=100pF, do not fit C4 through C9). Output voltage will drop down to +/- 100mV RMS.

## 13. Schematic diagram.



14. PCB



**EDU 01****SOLDERLESS EDUCATIVE STARTERBOX**

The EDU01 basic experiment kit is the first step into the world of modern electronics. Build your own circuits in a fun, safe and educative way.

**EDU 02****SOLAR ENERGY EXPERIMENT KIT**

Fun solar powered projects. Learn all about solar energy.

**EDU 03****SOLDER EDUCATIVE STARTER BOX**

Learn how to solder, build different exciting projects. Includes spare components and demo boards.

**EDU 05****USB TUTOR BOARD**

Learn how to connect your computer with the outside world, master the USB communication with tutorial examples. Play with LED indicators and learn how to drive LCD displays.

**EDU 06****SCOPE EDUKIT**

This board with different signals will teach you how to use an oscilloscope. Optimized instructions for use of our HPS140 oscilloscope. YouTube demo movies.

**EDU 10****PIC™ TUTOR KIT**

Enter the world of microcontroller programming, easy step by step instructions. Includes programmer and test board.

**COMING SOON**