K8098

ILLUSTRATED ASSEMBLY MANUAL H8098IP'1

AUDIO ANALYZER

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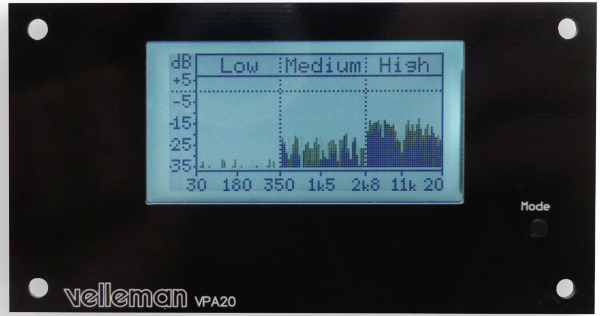

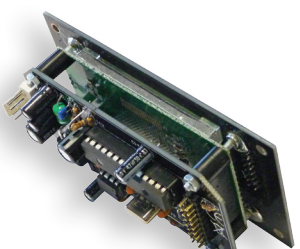

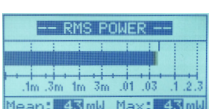

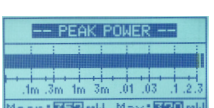

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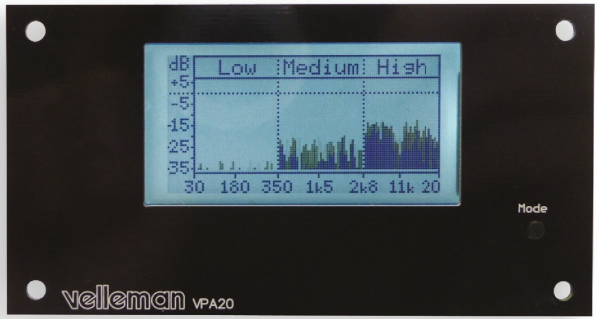

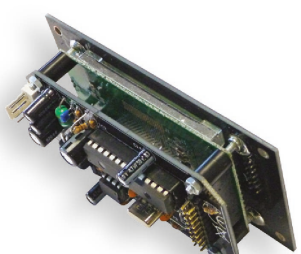

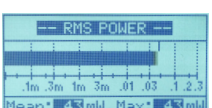

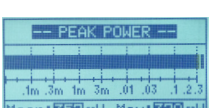

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Velleman N.V.
Legen Heirweg 33
9890 Gavere
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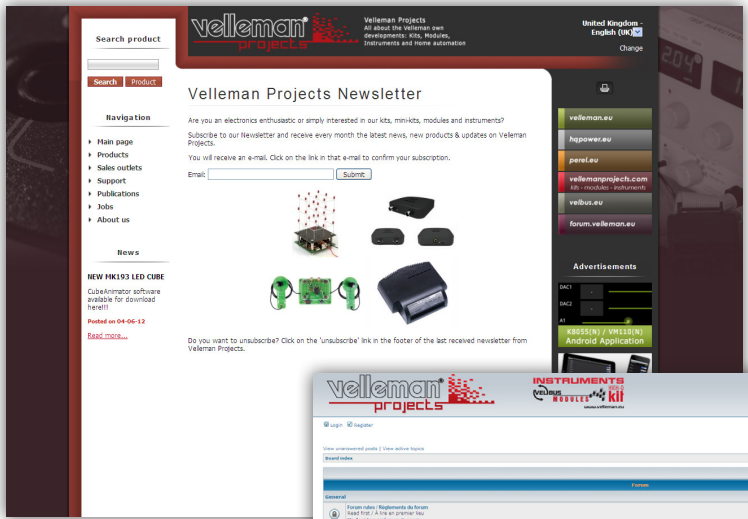

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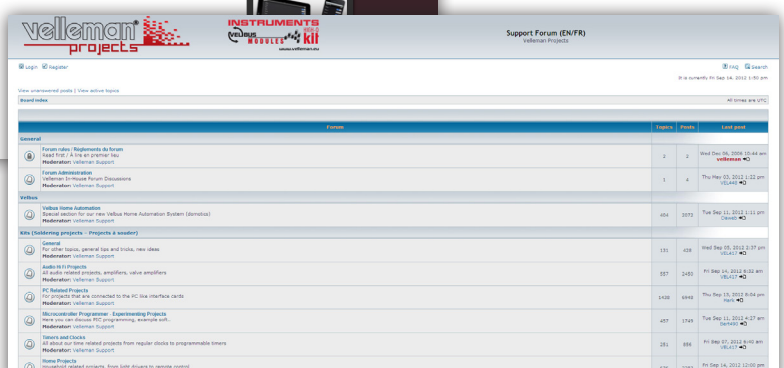

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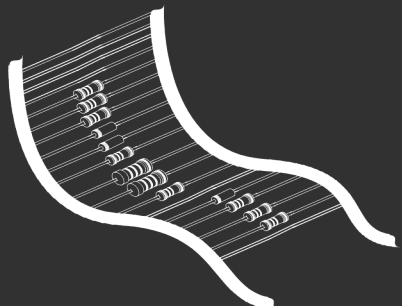
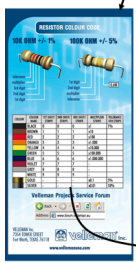
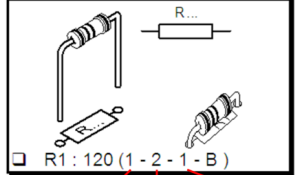


REMOVE THEM FROM THE TAPE ONE AT A TIME !

Included in this kit



2. RESISTOR



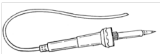
COLOUR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOLE 4TH
	BLACK	0	0	0	x1	1%
	BROWN	1	1	1	x10	
	RED	2	2	2	x100	
	ORANGE	3	3	3	x1.000	
	YELLOW	4	4	4	x10.000	
	GREEN	5	5	5	x100.000	
	BLUE	6	6	6	x1.000.000	

DO NOT BLINDLY FOLLOW THE ORDER OF THE COMPONENTS 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 raisin-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

- measure:
  - » peak power (fig.1)
  - » RMS power (fig.2)
  - » mean dB (fig.3)
  - » peak dB (fig.4)
  - » linear audio spectrum (fig.5)
  - » 1/3 octave audio spectrum (fig.6)
- auto or manual range selection
- peak-hold function
- speaker impedance selection
- language selection
- white backlit LCD
- easy panel mounting

Specifications

- power measurement into 2, 4 or 8 ohms + bridged amp option
- range: 300mW to 1200W @ 2 ohms
- sensitivity: -34dBu (15.5 mVrms)
- max. input level: 50Vrms @ 220k
- frequency range: 20Hz to 20kHz
- power supply: 12VDC / 75mA
- dimensions:
  - » display: 128 x 64pixels (46 x 23mm / 1.8 x 0.90")
  - » front panel: 98 x 51mm / 3.8 x 2"
  - » mounting depth: 35mm / 1.37"

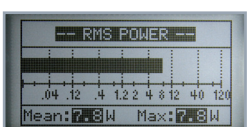


Fig.1

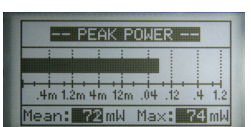


Fig.2

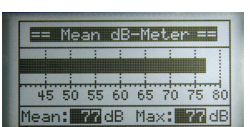


Fig.3

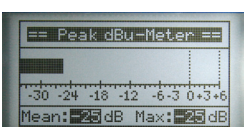


Fig.4

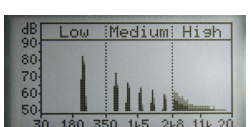


Fig.5

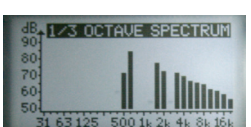
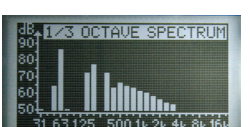


Fig.6



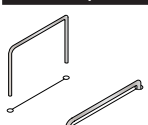
reversed

I. CONSTRUCTION

The audio analyzer consist of three parts: the basic module, the display module and the front panel. If required you can mount this kit into a housing, panel, ...
In this case use the display gap as a marker reference.
First we assemble the basic module.

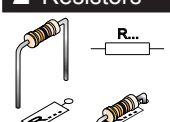
Basic module

1 Jumper wire



- ❑ J1
- ❑ J2
- ❑ J3
- ❑ J4
- ❑ J5
- ❑ J6

2 Resistors



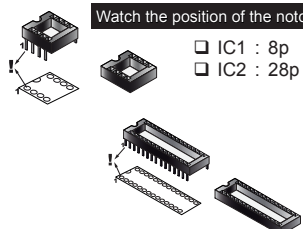
- ❑ R1 : 470 (4 - 7 - 1 - B)
- ❑ R2 : 1K (1 - 0 - 2 - B)
- ❑ R3 : 1K (1 - 0 - 2 - B)
- ❑ R4 : 220K (2 - 2 - 4 - B)
- ❑ R5 : 33K (3 - 3 - 3 - B)
- ❑ R6 : 33K (3 - 3 - 3 - B)
- ❑ R7 : 22K (2 - 2 - 3 - B)
- ❑ R8 : 750 (7 - 5 - 1 - B)
- ❑ R9 : 180K (1 - 8 - 4 - B)
- ❑ R10 : 2K2 (2 - 2 - 2 - B)
- ❑ R11 : 6K8 (6 - 8 - 2 - B)
- ❑ R12 : 6K8 (6 - 8 - 2 - B)
- ❑ R13 : 680 (6 - 8 - 1 - B)
- ❑ R14 : 3K3 (3 - 3 - 2 - B)
- ❑ R15 : 750 (7 - 5 - 1 - B)
- ❑ R16 : 5K6 (5 - 6 - 2 - B)
- ❑ R17 : 220 (2 - 2 - 1 - B)
- ❑ R18 : 22K (2 - 2 - 3 - B)

3 Diode

Watch the polarity!

- ❑ D1 : 1N4007

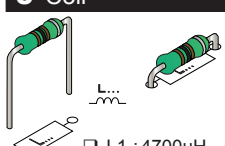
4 IC-socket



Watch the position of the notch!

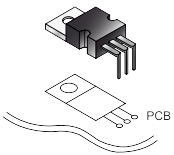
- ❑ IC1 : 8p
- ❑ IC2 : 28p

5 Coil



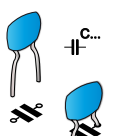
- ❑ L1 : 4700µH (4 - 7 - 2 - B)

6 Voltage regulator

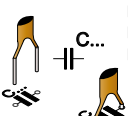


❑ VR1 : LM317

7 Ceramic Capacitors



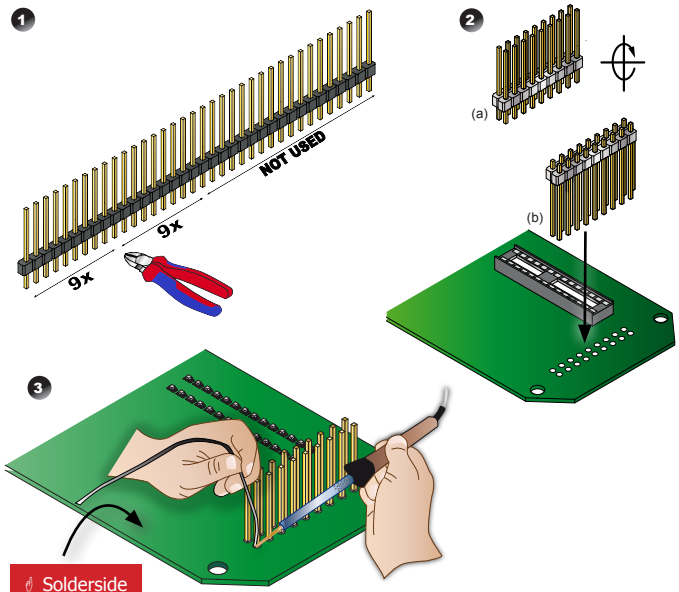
❑ C1 : 100nF (104)
❑ C2 : 100nF (104)
❑ C3 : 100nF (104)



❑ C9 : 4.7nF (472)
❑ C10 : 470pF (471)
❑ C11 : 47pF (47)

✐ C12,C13 & X1 are not mounted !

8 Pin header

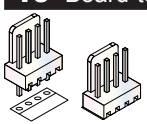


9 Electrolytic Capacitor

Watch the polarity!

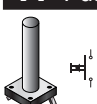
- ❑ C4 : 10µF
- ❑ C5 : 10µF
- ❑ C6 : 220µF
- ❑ C7 : 220µF
- ❑ C8 : 4,7µF
- ❑ **C14 : 4,7µF**

10 Board-to-wire connector

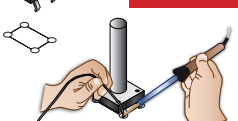


❑ SK1

11 Push button

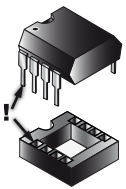


Mount the button on the solderside!



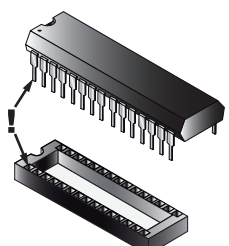
❑ SW1

12 IC's



Watch the position of the notch!

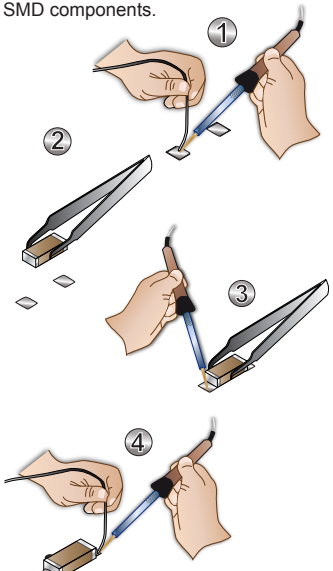
❑ IC1 : MCP6002-E/P



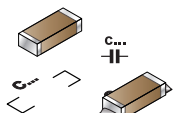
❑ IC1 : VKVPA20
(programmed DSPIC33FJ32I/SP)

Display module

Follow these steps for correct soldering SMD components.

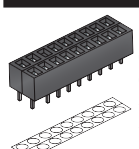


1 Capacitors



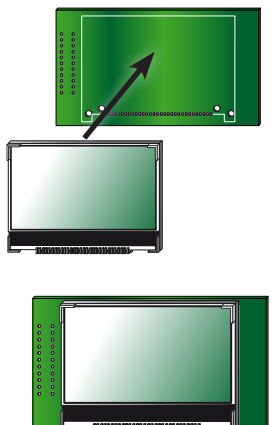
- ❑ C1 : 1µF
- ❑ C2 : 1µF
- ❑ C3 : 1µF
- ❑ C4 : 1µF
- ❑ C5 : 1µF
- ❑ C6 : 1µF
- ❑ C7 : 1µF
- ❑ C8 : 1µF
- ❑ C9 : 1µF
- ❑ C10 : 1µF

2 Male header



Mount the female connector on the component side, solder on the display side !

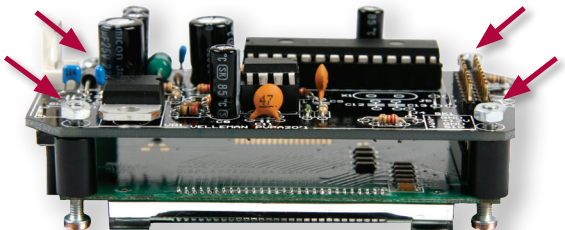
3 LCD



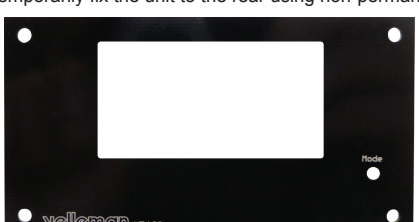
Be careful when soldering the LCD connections. Overheating will damage the LCD screen.

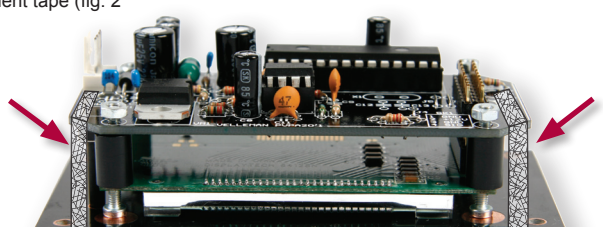
II. ASSEMBLY

1. Roughen the 4 bolts with a knife, a file or some abrasive paper so it will be easier to solder them to the front panel.
2. Assemble the unit but do not yet tighten the bolts (fig.1).

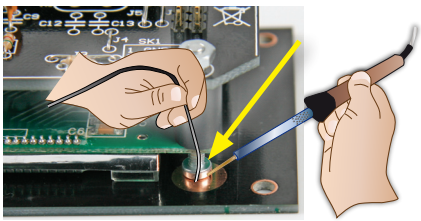


3. Position the unit onto the rear of the front panel with the display is centred in the cut-away.
   Temporarily fix the unit to the rear using non-permanent tape (fig. 2

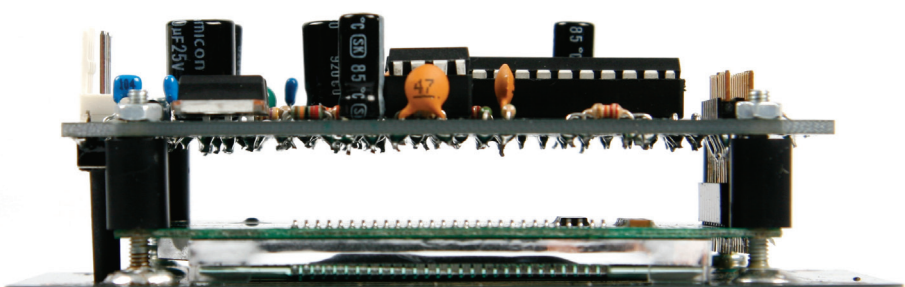




4. Solder 2 diagonal bolts to the front panel. Check if the display is still centred in the cut-away. Solder the remaining 2 bolts (fig. 3).

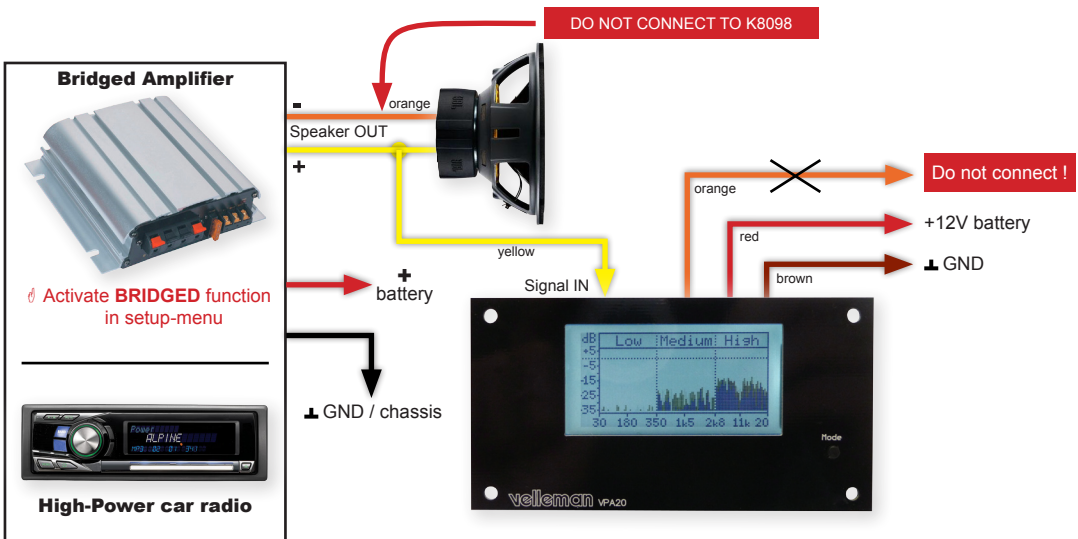


5. Now, fix the whole unit using the 4 nuts and remove the tape.



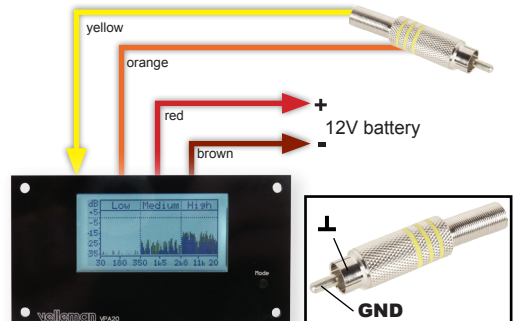
III. CONNECTION

EX. "BRIDGED" AMPLIFIER OR HIGH POWER RADIO

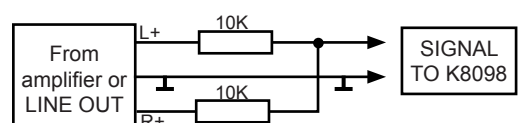


EX. CONNECTED TO SPEAKER OUTPUT

EX. CONNECTED TO SPEAKER OUTPUT



HINT FOR STEREO CONNECTION



IV. USE

Short press on the 'mode' button: selecting a meter-display.
Long press on the 'mode' button: opening the set-up menu.

SET-UP MENU

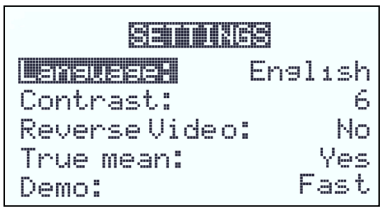
Access to the Set-up menu by a "long" push on the 'mode' button.

- **Short press**: changing settings
- **long press**: next function
- **Keep pressed**: save changes and exit

Speed: refreshing the screen (Fast - Mid - Slow)
Impedance: "2", "4" or "8" ohms for speaker output power calculation, in case the unit is connected to speaker output.
Power: "AUTO" range or a maximum value that depends on the chosen impedance.
- *For impedance = 2: Possible choices are "1200 mW", "12W", "120W" or "1200W"*
- *For impedance = 4: Possible choices are "600 mW", "6W", "60W" or "600W"*
- *For impedance = 8: Possible choices are "300 mW", "3W", "30W" or "300W"*

Sticky Bar: "Yes" or "No". When selected, small residual sticky bars appear also on the third octave spectrum screen.
Spectrum dB: "dBu" or "110 dB". (110 dB stands for the "Power dB" display which can range from 80dB to 110dB max, depending on the selected Power range).
Advanced settings: see pag. 16

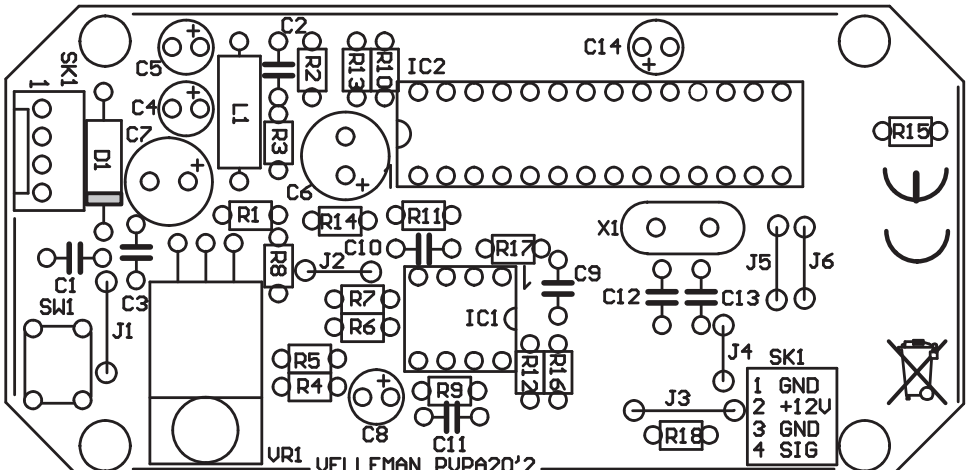
ADVANCED SETTINGS

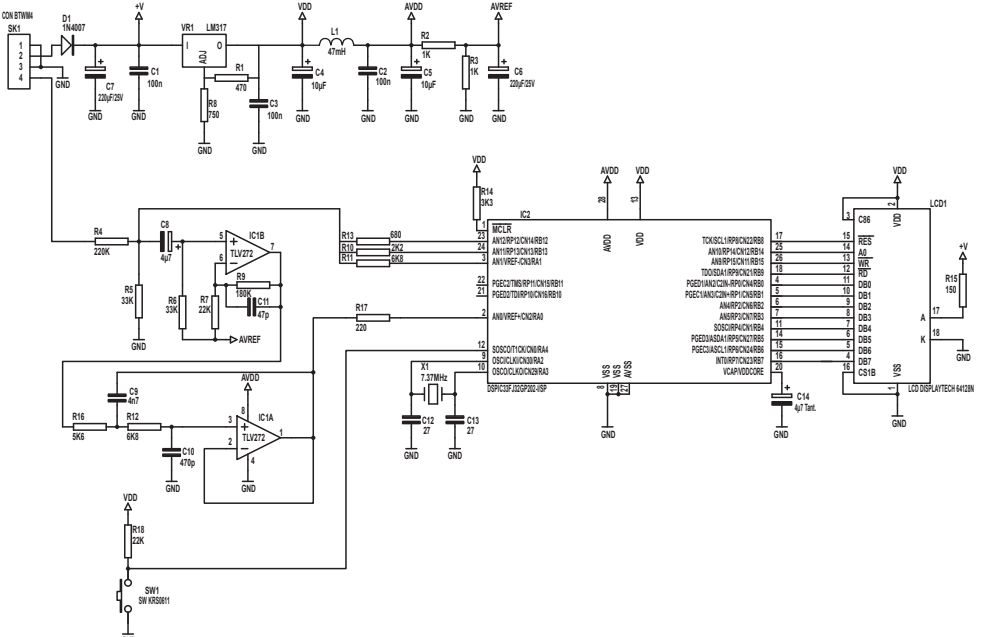


First open the set-up menu with a long press on the 'mode' button and choose the mode "advanced settings".

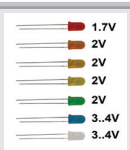
- **Short press:** changing settings
- **long press:** next function
- **Keep pressed:** save changes and exit

Language: UK / NL / FR / DE / ES
Contrast : choose a contrast between 1 - 20
Reverse video: normal or reverse display
True mean: Yes or no. If 'no' is selected then the display gives the integrated "peak values". If a pure sine wave is used both values will be the same.
Bridge amplifier: Turn on in case of in car use with high power radio or amplifier.
Demo: showing the different screen layouts, you can choose (slow - fast - off)

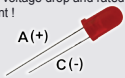

SK1
1
C5
C4
C7
D1
L1
C2
R2
R3
C6
R13
R10
IC2
C14
R15
R1
R14
R11
X1
J5
J6
C1
C3
SW1
J1
R8
J2
C10
R17
C9
C12
C13
R7
R6
IC1
J4
SK1
1 GND
2 +12V
3 GND
4 SIG
R5
R4
R9
R12
R16
J3
R18
C8
C11
VR1
VELLEMAN PVPA20'2

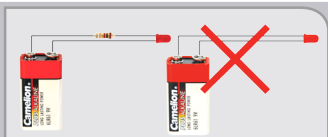

CON.STWIN4
SK1
D1
1N4007
+V
VR1
LM317
ADJ
L1
47mH
VDD
AVDD
AVREF
R1
470
R2
1K
R3
1K
R8
750
C1
100n
C2
100n
C3
100n
C4
10µF
C5
10µF
C6
220µF/25V
C7
220µF/25V
GND
R4
220K
C8
4µ7
IC1B
TLV272
R9
180K
C11
47p
R5
33K
R6
33K
R7
22K
AVREF
R13
680
R10
2K2
R11
6K8
R14
3K3
IC2
MCLR
AN2/RP12/CN14/RB12
AN1/RP13/CN13/RB13
AN1VREF-/CN2/RA1
PGEC2/TMS/RP11/CN15/RB11
PGED2/TDI/RP10/CN16/RB10
AN0/VREF+/CN2/RA0
OSCO/CLKO/CN29/RA3
OSCI/CLKI/CN30/RA2
DSPIC33FJ32GP202-I/SP
TCK/SCL1/RP8/CN22/RB8
AN9/RP14/CN12/RB14
AN8/RP15/CN11/RB15
TDO/SDA1/RP9/CN21/RB9
PGED1/AN3/C2IN-/RP0/CN4/RB0
PGEC1/AN2/C2IN+/RP1/CN5/RB1
AN4/RP2/CN6/RB2
AN5/RP3/CN7/RB3
SOSCI/RP4/CN1/RB4
PGED3/ASDA1/RP5/CN27/RB5
PGEC3/ASCL1/RP6/CN24/RB6
INT0/RP7/CN23/RB7
VCAP/VDDCORE
R17
220
X1
7.37MHz
C12
27
C13
27
C14
4µ7 Tant.
LCD1
C86
VDD
RES
A0
WR
RD
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
CS1B
VSS
A
K
R15
150
LCD DISPLAYTECH 64128N
C9
4n7
R16
5K6
R12
6K8
C10
470p
IC1A
TLV272
R18
22K
SW1
SW KRS0811

Leds and how to use them

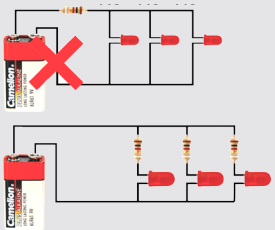


Leds feature a specific voltage drop, depending on type and colour. Check the datasheet for exact voltage drop and rated current !





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)

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

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

closest value : use a 1k5 resistor

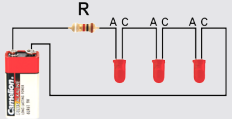
Required resistor power handling=
voltage over resistor x current passed trough resistor

$\rightarrow$ (9V - 1.7V) x 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)



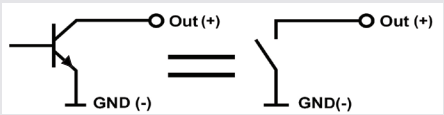
$$\frac{\text{Supply voltage (V) - (number of leds x led voltage (V))}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

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

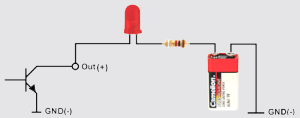
use an 820 ohm resistor

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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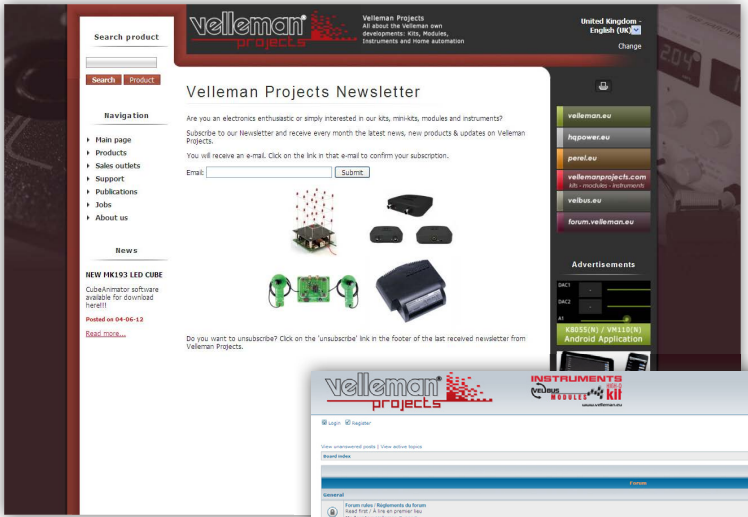
9890 Gavere
(België)



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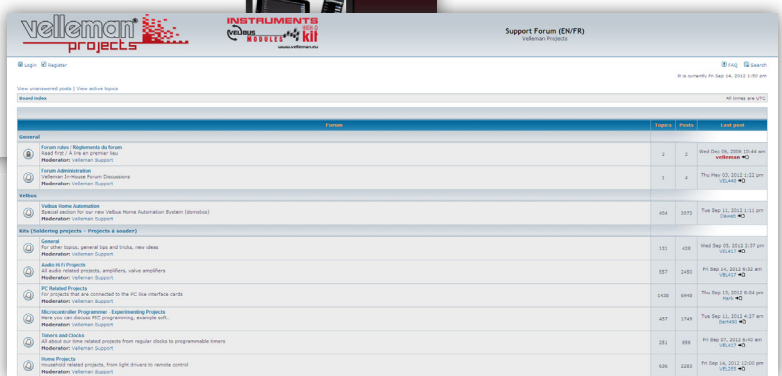
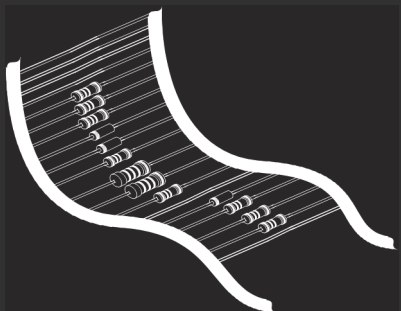
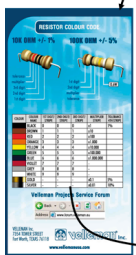


Participate our Velleman Projects Forum

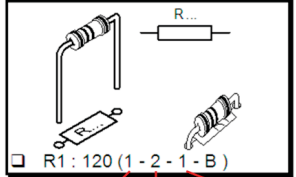


REMOVE THEM FROM THE TAPE ONE AT A TIME !

Included in this kit



2. RESISTOR



COLOUR	COLOUR NAME	1ST DIGIT/ STRIPE	2ND DIGIT/ STRIPE	3RD DIGIT/ STRIPE	MULTIPLIER STRIPE	TOLE 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 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 raisin-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.

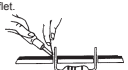
For some projects, a basic multi-meter is required, or might be handy

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

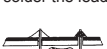
* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

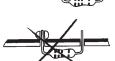
1.3 Soldering Hints :



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

- measure:
  - » peak power (fig.1)
  - » RMS power (fig.2)
  - » mean dB (fig.3)
  - » peak dB (fig.4)
  - » linear audio spectrum (fig.5)
  - » 1/3 octave audio spectrum (fig.6)
- auto or manual range selection
- peak-hold function
- speaker impedance selection
- language selection
- white backlit LCD
- easy panel mounting

Specifications

- power measurement into 2, 4 or 8 ohms + bridged amp option
- range: 300mW to 1200W @ 2 ohms
- sensitivity: -34dBu (15.5 mVrms)
- max. input level: 50Vrms @ 220k
- frequency range: 20Hz to 20kHz
- power supply: 12VDC / 75mA
- dimensions:
  - » display: 128 x 64pixels (46 x 23mm / 1.8 x 0.90")
  - » front panel: 98 x 51mm / 3.8 x 2"
  - » mounting depth: 35mm / 1.37"

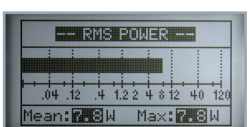


Fig.1

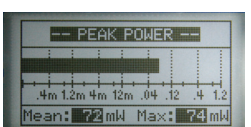


Fig.2

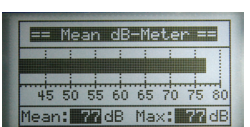


Fig.3

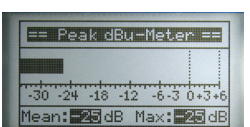


Fig.4

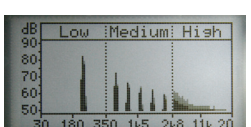


Fig.5

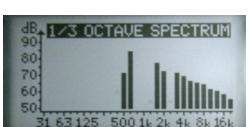
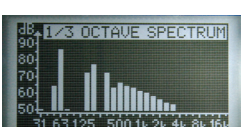


Fig.6



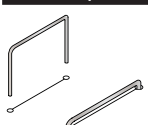
reversed

I. CONSTRUCTION

The audio analyzer consist of three parts: the basic module, the display module and the front panel. If required you can mount this kit into a housing, panel, ...
In this case use the display gap as a marker reference.
First we assemble the basic module.

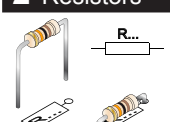
Basic module

1 Jumper wire



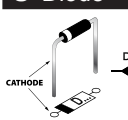
- ❑ J1
- ❑ J2
- ❑ J3
- ❑ J4
- ❑ J5
- ❑ J6

2 Resistors



- ❑ R1 : 470 (4 - 7 - 1 - B)
- ❑ R2 : 1K (1 - 0 - 2 - B)
- ❑ R3 : 1K (1 - 0 - 2 - B)
- ❑ R4 : 220K (2 - 2 - 4 - B)
- ❑ R5 : 33K (3 - 3 - 3 - B)
- ❑ R6 : 33K (3 - 3 - 3 - B)
- ❑ R7 : 22K (2 - 2 - 3 - B)
- ❑ R8 : 750 (7 - 5 - 1 - B)
- ❑ R9 : 180K (1 - 8 - 4 - B)
- ❑ R10 : 2K2 (2 - 2 - 2 - B)
- ❑ R11 : 6K8 (6 - 8 - 2 - B)
- ❑ R12 : 6K8 (6 - 8 - 2 - B)
- ❑ R13 : 680 (6 - 8 - 1 - B)
- ❑ R14 : 3K3 (3 - 3 - 2 - B)
- ❑ R15 : 750 (7 - 5 - 1 - B)
- ❑ R16 : 5K6 (5 - 6 - 2 - B)
- ❑ R17 : 220 (2 - 2 - 1 - B)
- ❑ R18 : 22K (2 - 2 - 3 - B)

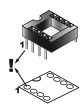
3 Diode



Watch the polarity!

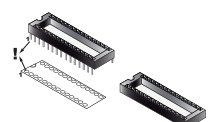
- ❑ D1 : 1N4007

4 IC-socket



Watch the position of the notch!

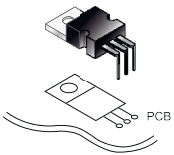
- ❑ IC1 : 8p
- ❑ IC2 : 28p



5 Coil

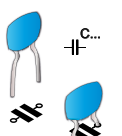
- ❑ L1 :4700µH (4 - 7 - 2 - B)

6 Voltage regulator



❑ VR1 : LM317

7 Ceramic Capacitors

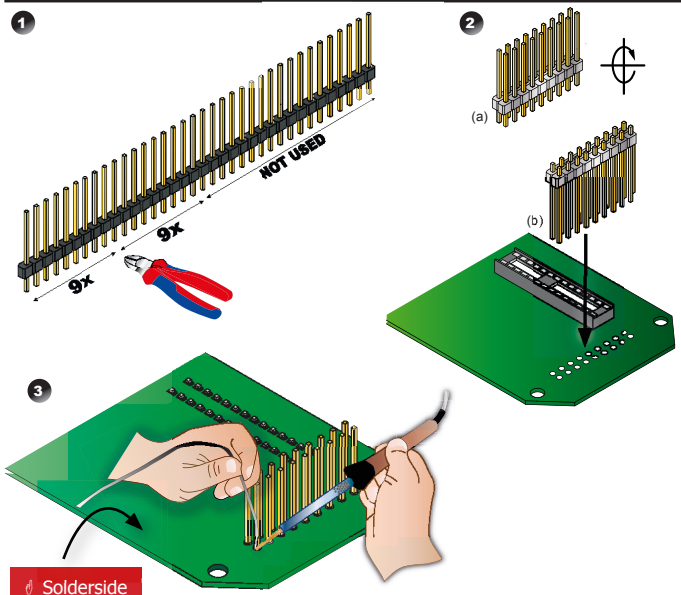


❑ C1 : 100nF (104)
❑ C2 : 100nF (104)
❑ C3 : 100nF (104)

❑ C9 : 4.7nF (472)
❑ C10 : 470pF (471)
❑ C11 : 47pF (47)

✐ C12,C13 & X1 are not mounted !

8 Pin header

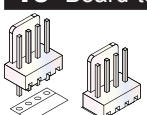


9 Electrolytic Capacitor

Watch the polarity!

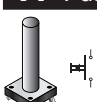
- ❑ C4 : 10µF
- ❑ C5 : 10µF
- ❑ C6 : 220µF
- ❑ C7 : 220µF
- ❑ C8 : 4,7µF
- ❑ **C14 : 4,7µF**

10 Board-to-wire connector



❑ SK1

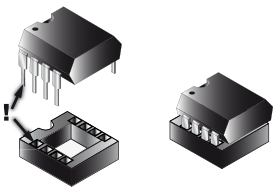
11 Push button



Mount the button on the solderside!

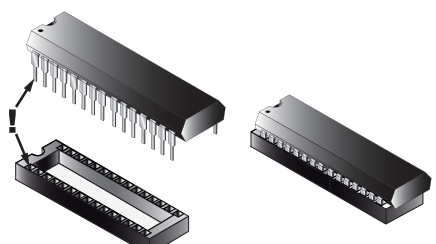
❑ SW1

12 IC's



Watch the position of the notch!

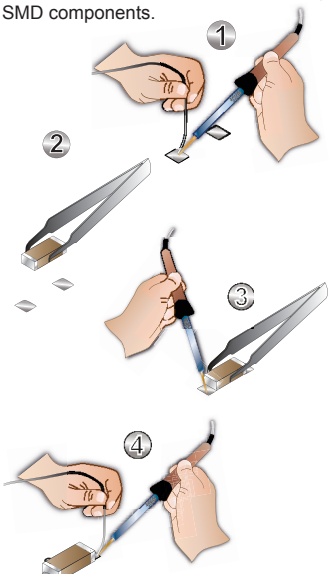
❑ IC1 : MCP6002-E/P



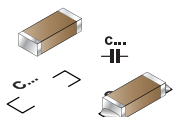
❑ IC1 : VKVPA20
(programmed DSPIC33FJ32I/SP)

Display module

Follow these steps for correct soldering SMD components.

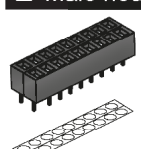


1 Capacitors

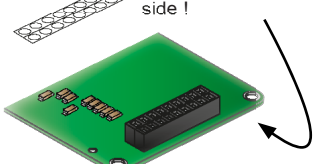


- ❑ C1 : 1µF
- ❑ C2 : 1µF
- ❑ C3 : 1µF
- ❑ C4 : 1µF
- ❑ C5 : 1µF
- ❑ C6 : 1µF
- ❑ C7 : 1µF
- ❑ C8 : 1µF
- ❑ C9 : 1µF
- ❑ C10 : 1µF

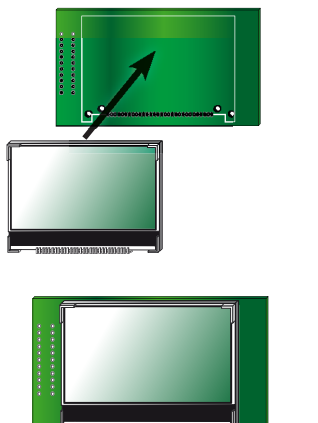
2 Male header



Mount the female connector on the component side, solder on the display side !



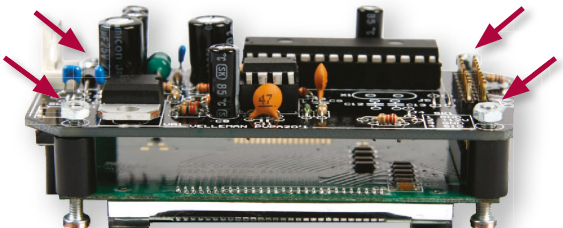
3 LCD



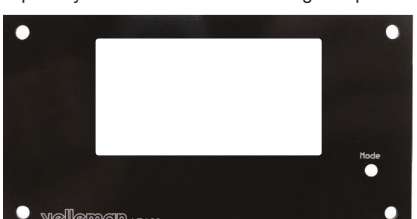
Be careful when soldering the LCD connections. Overheating will damage the LCD screen.

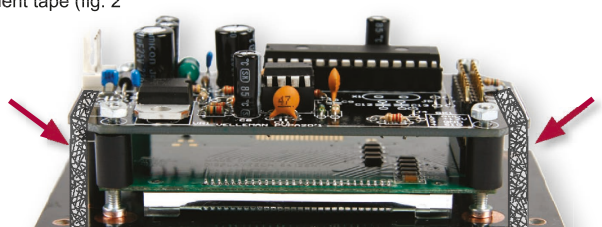
II. ASSEMBLY

1. Roughen the 4 bolts with a knife, a file or some abrasive paper so it will be easier to solder them to the front panel.
2. Assemble the unit but do not yet tighten the bolts (fig.1).

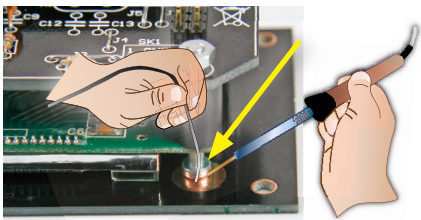


3. Position the unit onto the rear of the front panel with the display is centred in the cut-away.
   Temporarily fix the unit to the rear using non-permanent tape (fig. 2

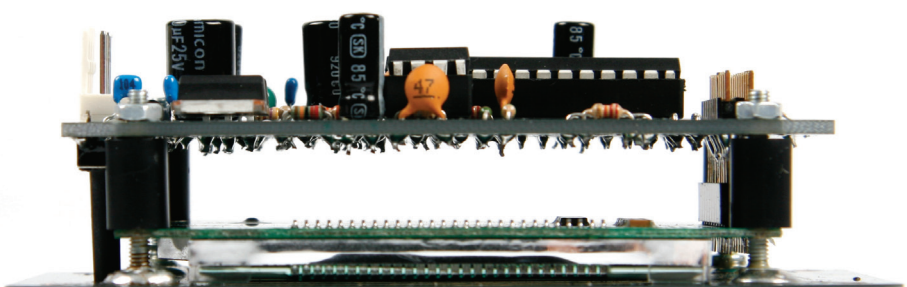




4. Solder 2 diagonal bolts to the front panel. Check if the display is still centred in the cut-away. Solder the remaining 2 bolts (fig. 3).

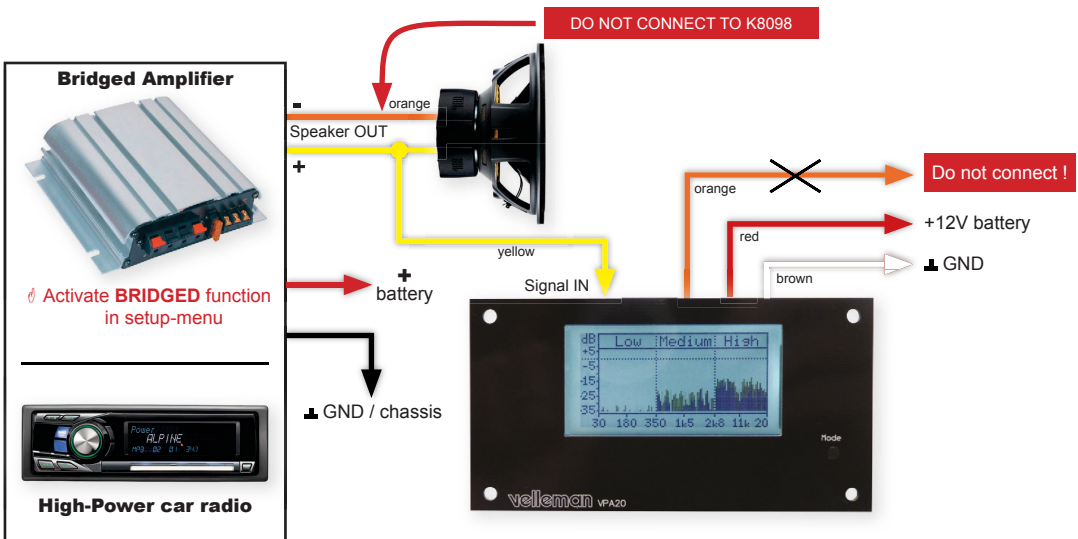


5. Now, fix the whole unit using the 4 nuts and remove the tape.

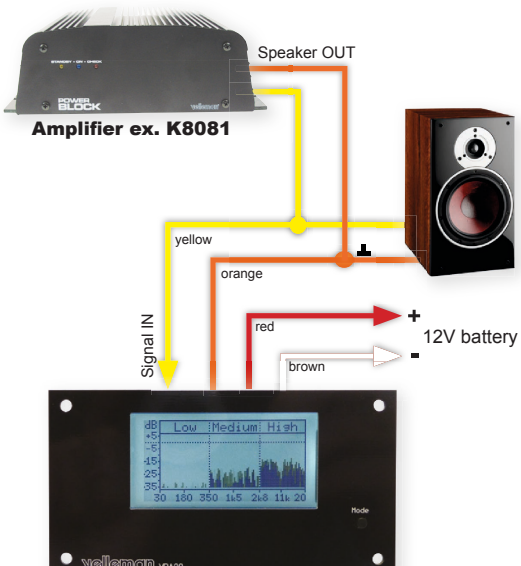


III. CONNECTION

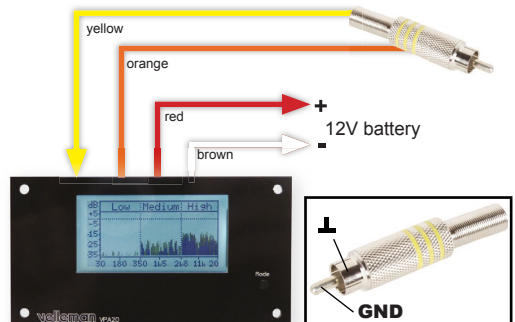
EX. "BRIDGED" AMPLIFIER OR HIGH POWER RADIO



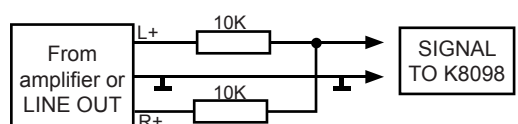
EX. CONNECTED TO SPEAKER OUTPUT



EX. CONNECTED TO SPEAKER OUTPUT



HINT FOR STEREO CONNECTION



IV. USE

Short press on the 'mode' button: selecting a meter-display.
Long press on the 'mode' button: opening the set-up menu.

SET-UP MENU

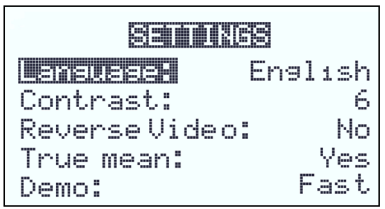
Access to the Set-up menu by a "long" push on the 'mode' button.

- **Short press**: changing settings
- **long press**: next function
- **Keep pressed**: save changes and exit

Speed: refreshing the screen (Fast - Mid - Slow)
Impedance: "2", "4" or "8" ohms for speaker output power calculation, in case the unit is connected to speaker output.
Power: "AUTO" range or a maximum value that depends on the chosen impedance.
- *For impedance = 2: Possible choices are "1200 mW", "12W", "120W" or "1200W"*
- *For impedance = 4: Possible choices are "600 mW", "6W", "60W" or "600W"*
- *For impedance = 8: Possible choices are "300 mW", "3W", "30W" or "300W"*

Sticky Bar: "Yes" or "No". When selected, small residual sticky bars appear also on the third octave spectrum screen.
Spectrum dB: "dBu" or "110 dB". (110 dB stands for the "Power dB" display which can range from 80dB to 110dB max, depending on the selected Power range).
Advanced settings: see pag. 16

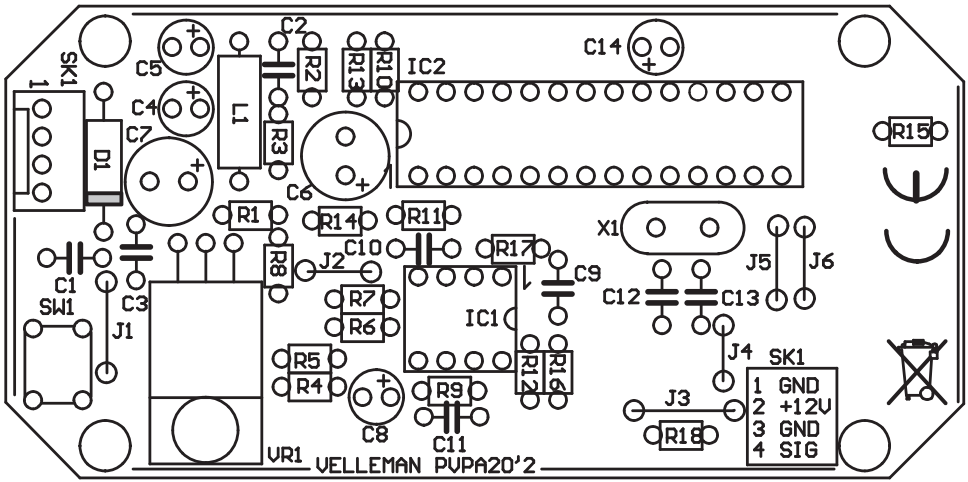
ADVANCED SETTINGS

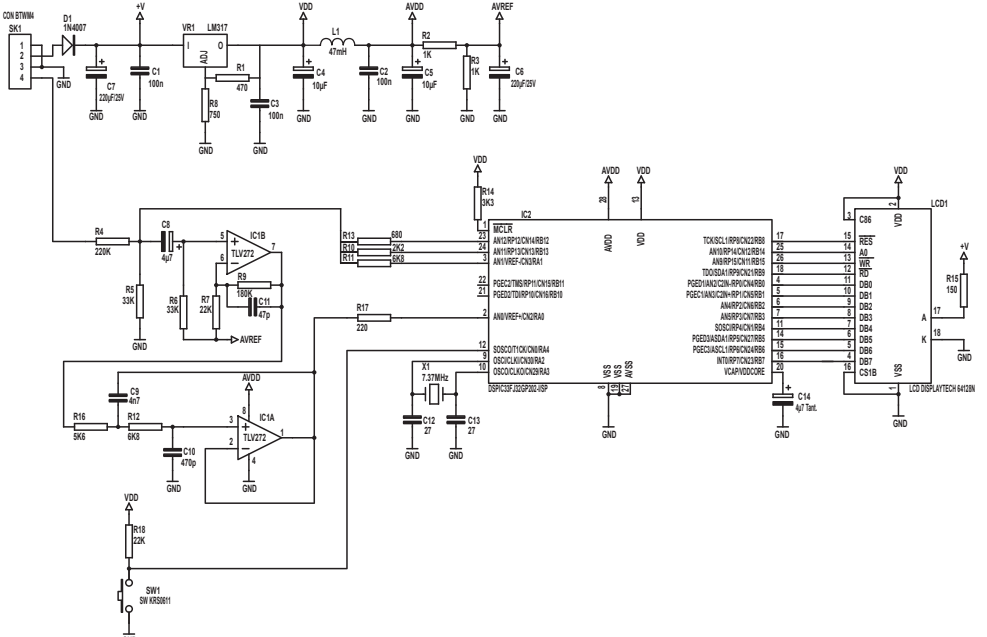


First open the set-up menu with a long press on the 'mode' button and choose the mode "advanced settings".

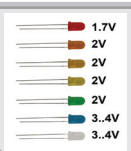
- **Short press:** changing settings
- **long press:** next function
- **Keep pressed:** save changes and exit

Language: UK / NL / FR / DE / ES
Contrast : choose a contrast between 1 - 20
Reverse video: normal or reverse display
True mean: Yes or no. If 'no' is selected then the display gives the integrated "peak values". If a pure sine wave is used both values will be the same.
Bridge amplifier: Turn on in case of in car use with high power radio or amplifier.
Demo: showing the different screen layouts, you can choose (slow - fast - off)

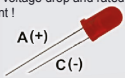

SK1
1
C5
C4
C7
D1
L1
C2
R2
R3
C6
R13
R10
IC2
C14
R15
R1
R14
R11
X1
J5
J6
C1
C3
SW1
J1
R8
J2
C10
R17
C9
C12
C13
R7
R6
IC1
J4
SK1
1 GND
2 +12V
3 GND
4 SIG
R5
R4
R9
R12
R16
J3
R18
C8
C11
VR1
VELLEMAN PVPA20'2

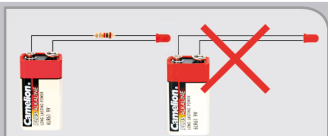

CON.STWIN4
SK1
D1
1N4007
+V
VR1
LM317
ADJ
L1
47mH
VDD
AVDD
AVREF
R1
470
R2
1K
R3
1K
R8
750
C1
100n
C2
100n
C3
100n
C4
10µF
C5
10µF
C6
220µF/25V
C7
220µF/25V
GND
IC1B
TLV272
R4
220K
C8
4µ7
R5
33K
R6
33K
R7
22K
R9
180K
C11
47p
AVREF
R10
2K2
R11
6K8
R13
680
R14
3K3
IC2
MCLR
AN2/RP12/CN14/RB12
AN1/RP13/CN13/RB13
AN1VREF-/CN2/RA1
PGEC2/TMS/RP11/CN15/RB11
PGED2/TDI/RP10/CN16/RB10
AN0/VREF+/CN2/RA0
OSCO/CLKO/CN29/RA3
OSCI/CLKI/CN30/RA2
DSPIC33FJ32GP202-I/SP
X1
7.37MHz
C12
27
C13
27
R17
220
C14
4µ7 Tant.
TCK/SCL1/RP6/CN22/RB6
AN9/RP14/CN12/RB14
AN8/RP15/CN11/RB15
TDO/SDA1/RP8/CN21/RB8
PGED1/AN3/C2IN-/RP0/CN4/RB0
PGEC1/AN2/C2IN+/RP1/CN5/RB1
AN4/RP2/CN6/RB2
AN5/RP3/CN7/RB3
SOSCI/RP4/CN1/RB4
PGED3/ASDA1/RP5/CN27/RB5
PGEC3/ASCL1/RP9/CN8/RB9
INT0/RP7/CN23/RB7
VCAP/VDDCORE
LCD1
C86
VDD
RES
A0
WR
RD
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
CS1B
VSS
A
K
R15
150
LCD DISPLAYTECH 64128N
IC1A
TLV272
C9
4n7
R16
5K6
R12
6K8
C10
470p
R18
22K
SW1
SW KRS0811

Leds and how to use them

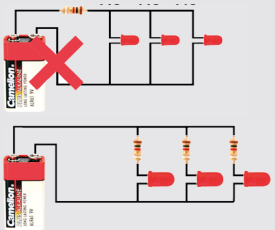


Leds feature a specific voltage drop, depending on type and colour. Check the datasheet for exact voltage drop and rated current !





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)

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

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

closest value :
use a 1k5 resistor

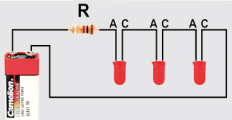
Required resistor power handling=
voltage over resistor x current passed trough resistor

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

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)



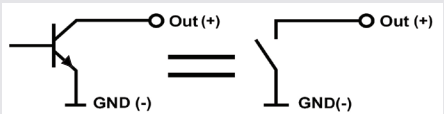
$$\frac{\text{Supply voltage (V) - (number of leds x led voltage (V))}}{\text{required current (A)}} = \text{series resistance (ohms)}$$

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

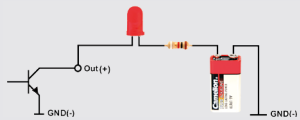
use an
820 ohm resistor

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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