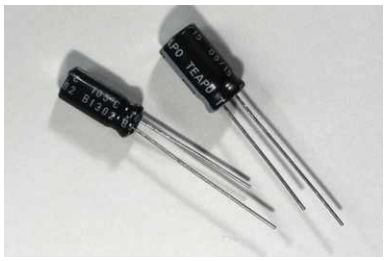
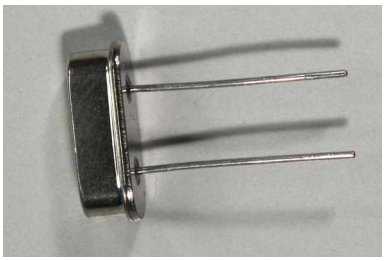
Solder and Assemble Instruction

Components:

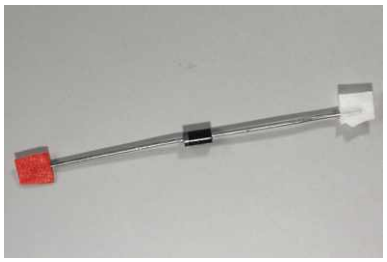


C Electrolytic Capacitor

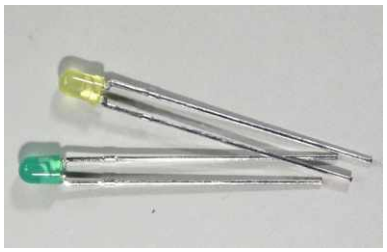
C Ceramic Capacitor



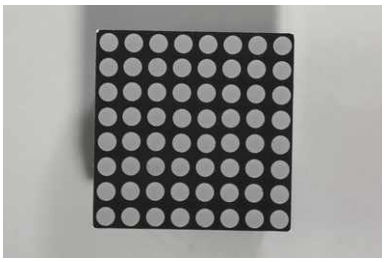
X Crystal



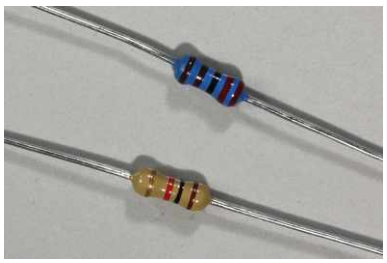
D Diode



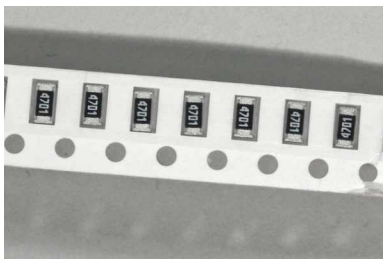
LD LED



LD LED Matrix

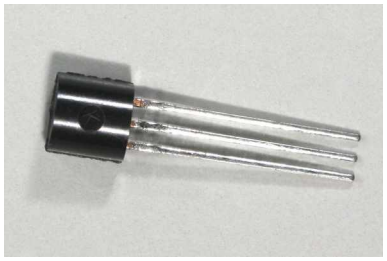


R Resistor



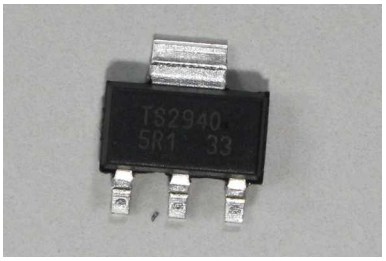
R SMD Resistor

F Fuse

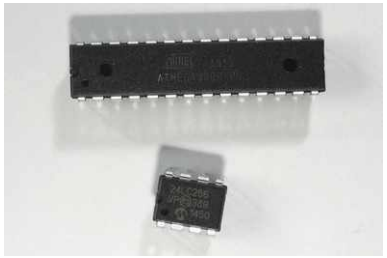


Q MOSFET (N)

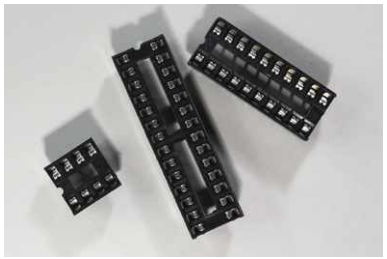
SPK Buzzer



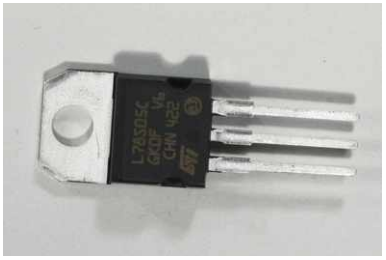
U SMD Regulator



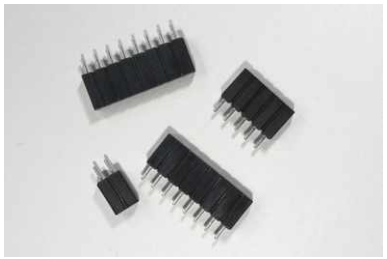
U IC



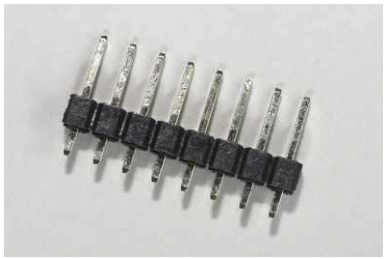
J IC Socket



U 5V Regulator



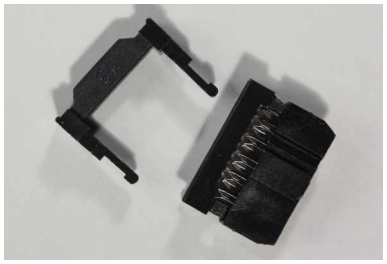
J Pin Head Female



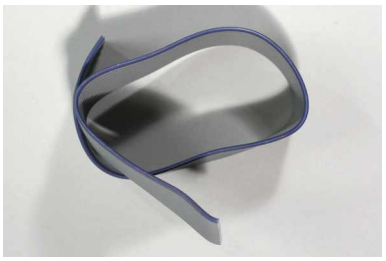
J Pin Strip Male

CON Barrel Jack

CON Pin Head Male



CON Pin Head Connector



J Bus Cable

S Switch

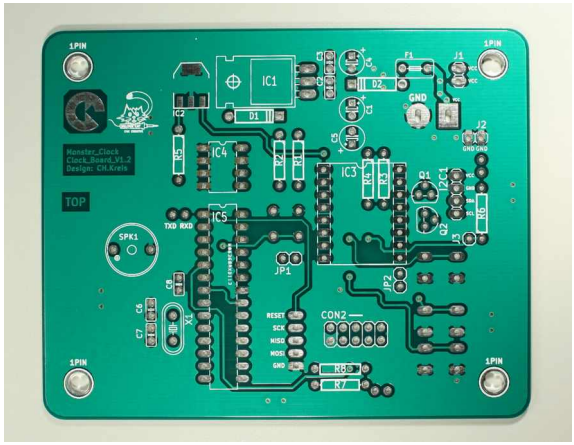
S Switch

J Power Supply

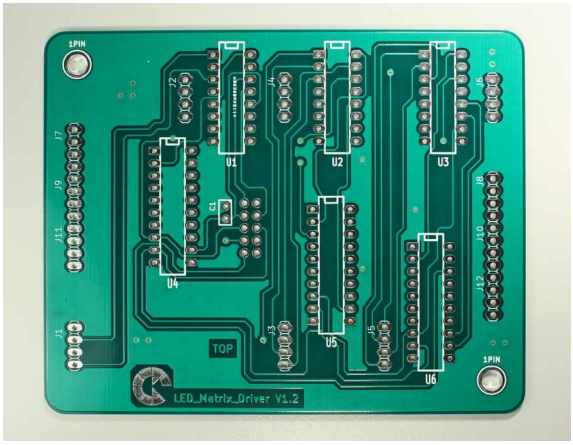
Monster Clock Material Checklist

Pos.	Typ	REF	VALUE	Quantity	I.O
1	Module	U	Module LSM303D	1	
2	THT	C	22pF	2	
3	THT	C	1000pF (1nF)	1	
4	THT	C	100nF	2	
5	THT	C	100uF (Elko)	1	
6	THT	C	0.33uF	1	
7	THT	C	10uF (Elko)	2	
8	THT	D	1N4001	2	
9	THT	F	Fuse	1	
10	THT	U (IC)	MEGA328-P	1	
11	THT	U (IC)	EEPROM DIL8	1	
12	THT	U (IC)	74HC595	3	
13	THT	U (IC)	TPIC6B595	3	
14	SMD	U (IC)	Regulator LM2936MP-3.3	1	
15	THT	U (IC)	Regulator L7805CV	1	
16	THT	J	IC Socket Dil 8	1	
17	THT	J	IC Socket Dil 16	3	
18	THT	J	IC Socket Dil 20	3	
19	THT	J	IC Socket Dil 28	1	
20	THT	J	Pinstrip Male POL 1X8	9	
21	THT	J	Pin Head Female POL 1X2	1	
22	THT	J	Pin Head Female POL 1X4	9	
23	THT	J	Pin Head Female POL 1X5	1	
24	THT	J	Pin Head Female POL 1X8	4	
25	THT	CON	Connector Female Header POL 2X5	2	
26	THT	CON	Socket Header Connector POL 2X5	2	
27	THT	CON	Barrel Jack	1	
28	THT	LD	LED3MM green	1	
29	THT	LD	LED3MM yellow	1	
30	THT	Q	MOSFET N 2N700	2	
31	THT	R	1K OHM	2	
32	THT	R	2.2K OHM	2	
33	THT	R	4.7K OHM	2	
34	SMD	R	4.7K OHM	24	
35	THT	R	10K OHM	2	
36	THT	S	Switch TS-604	3	
37	THT	S	Switch D6	1	
38	THT	SPK	Buzzer	1	
39	THT	X	Crystal 16MHZ	1	
40	THT	U	LED Matrix	9	
41	CON	J	Bus Cable 10 POL	1	
42	Power	J	Power Supply	1	
43	PCP		3 Pieces Printet Circuit Board	1	
44	Case		Clock Case 4 Pieces	1	
45	Bolts		Bolts M4	4	
46	Bolts		Bolts M3	6	
47	Washer		Washer M3	6	
48	Shim		Shim M4	12	
49	Nut		Drive-in Nut M3	6	
50	Threaded Inserts		Threaded Inserts M4	4	

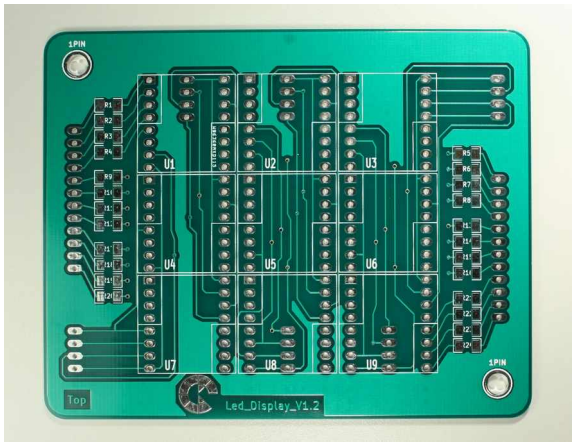
PCB (Printed Circuit Board) Name:



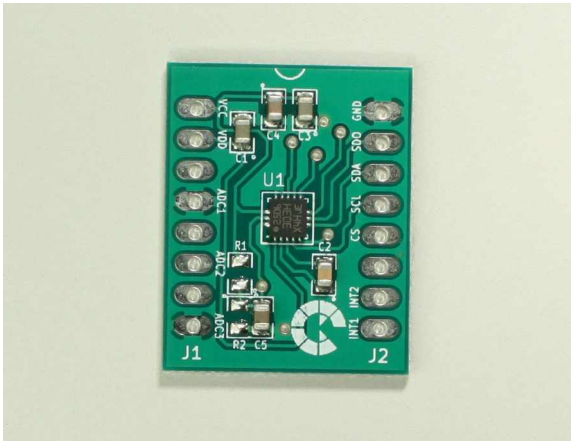
PCB: Clock_Board



PCB: LED_Matrix_Driver



PCB: LED_Display



PCB:Position_Module

Introduction:

It's the half battle when you have basic knowledge of electronic, don't be afraid when you are a novice, hold tight on the solder instruction and you will success at the end.

When you get stuck, don't continue! Make a break and ask a friend who has experience.

We don't take any responsibility of any injury or damage as a result of assembling this kit.

Follow tools are required to assemble this kit, you need a soldering iron, solder, diagonal cutting pliers, multimeter and optional a solder sucker. This tools are not included in the delivery content.

When you have finished the soldering work then it is time and necessary to clean up the printed circuit boards with a solution of dish detergent and methylated spirit to avoid leakage current. For a better cleaning you can use a toothbrush.

After the cleaning you have to dry the printed circuit boards. A hairdryer will help you to do to the job. It is important that the boards are absolutely dry that means bone-dry.

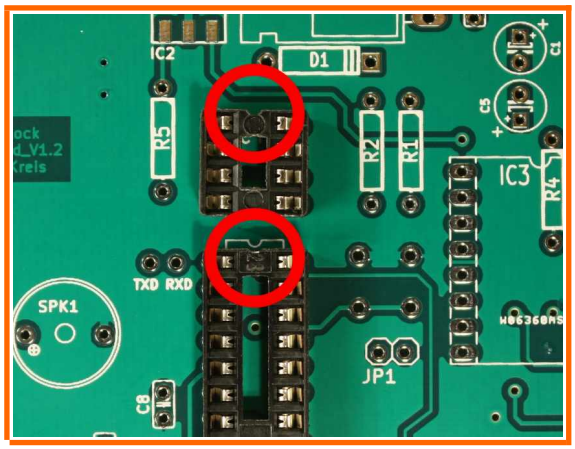
A wet board can cause short circuit or leakage current and can damage your clock, or your clock won't work right. Remember we don't take any responsibility for this fault.

Use a suitable power supply unit. (input voltage 9-12 volt and max. 1 ampere). Inappropriate voltage or polarity can cause permanent damage.

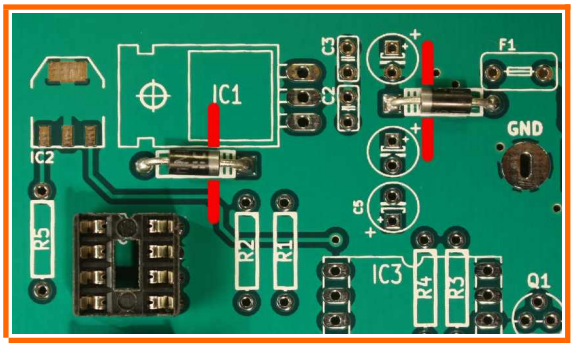
Don't put any items into the clock. Protect your clock against water and any liquids. Avoid damp rooms when you operate this device.

We are delighted that you have chosen this kit.

Mounting PCB 1 (Clock_Board)



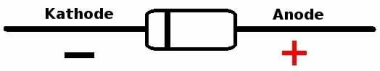
1. Solder the IC Sockets IC4 = 8 Pin, IC5 = 28. When you look at the sockets, you will recognize a notch at the end. Make sure that this notch match onto the notch in the silkscreen.



2. Diodes are semiconductor components that allows the current to flow only in one direction. The diodes protect the circuit against negative power supply.

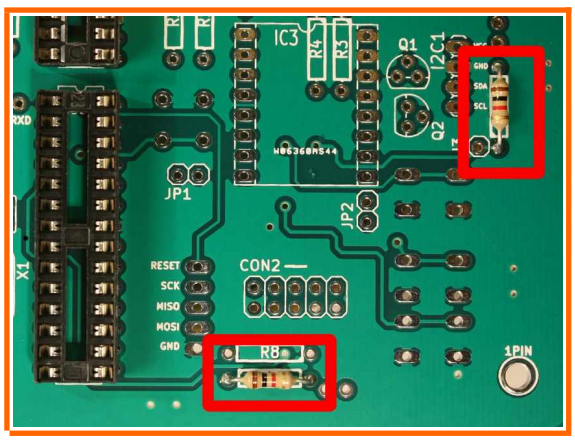
It is important that you place the diodes in the right direction, when not your board will smoke like burning grass.

DIODE



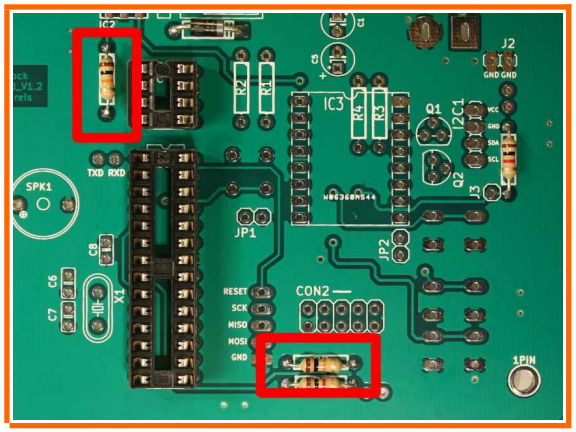
The diodes have at the end a silver strip make sure that the strip match to the strip in the silkscreen image.

Bent the lead and place and solder the diodes D1, D2, look for the right location.



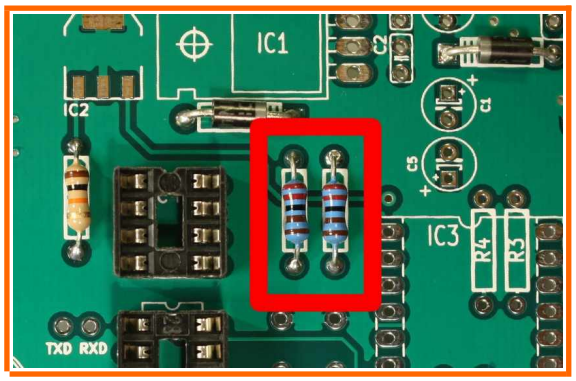
3. A resistor is a passive two terminal component they reduce the current flow or helps to adjust the signal level. Now you can solder the carbon resistors R6, R7 onto your board.

Value: 1 K Ohm
Colour code: brown, black, red, gold



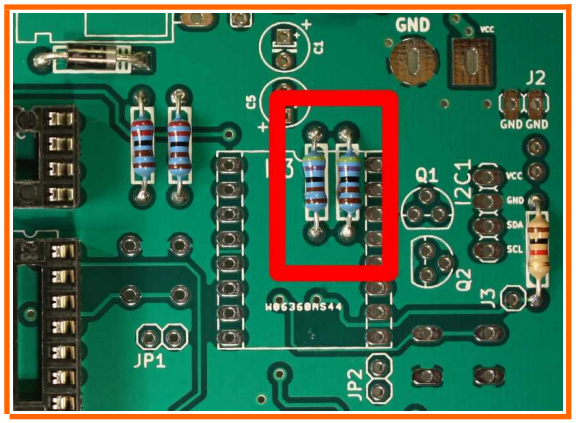
4. Solder the carbon resistor R5, R8 onto your board, these resistors reduce the current flow.

Value: 10 K Ohm
Colour code: brown, black, orange, gold



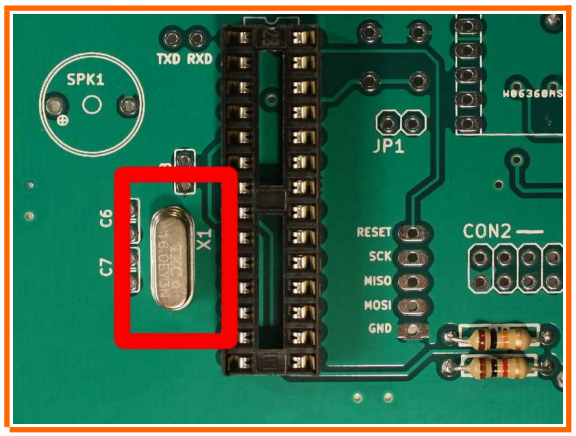
5. The pull up resistors pulls the voltage on a defined valid logic level in this case 5 V. We use metal resistors for a better tolerance value. Now solder the resistors onto your board.

Value: 2,2 K Ohm
Colour code: red, red, black, brown, brown

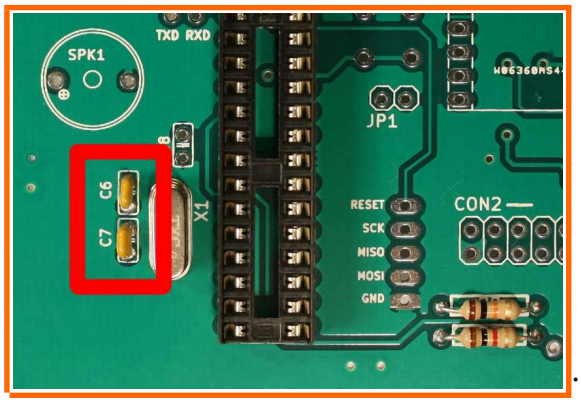


6. The logic level value is 3,3 volt in according to the positive power supply voltage.

Value: 4,7 K Ohm
Colour code: yellow, violet, black, brown, brown



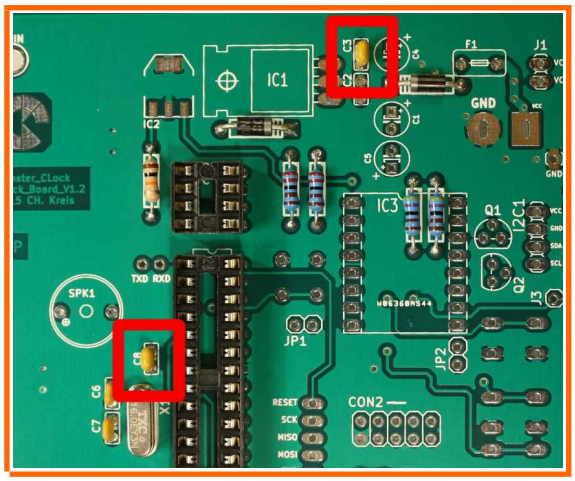
7. Next step place and solder the crystal X1.



8. A capacitor is a passive two terminal electrical component that stores electrical energy in an electric field. In this circuit we use the capacitors to smooth the power supply output.

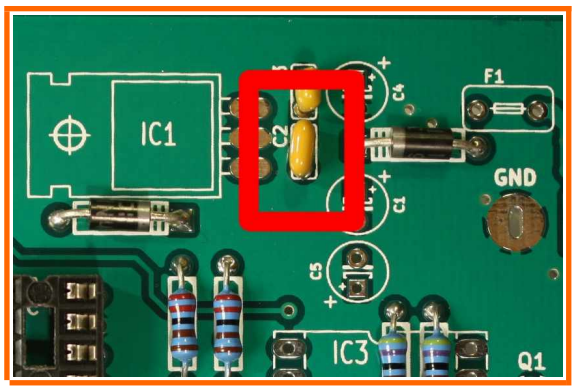
Now look for the right location and solder the ceramic capacitor C6 and C7

Value : 22 pF
Printed Value: 220 (22)



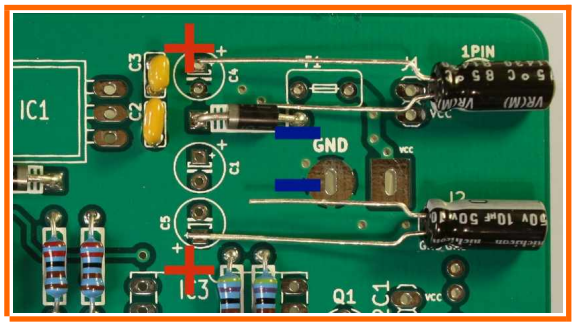
9. Place the ceramic capacitor C3 and C8

Value: 100 nF
Printed Value: 104



10. It's time to solder the last ceramic capacitor C2 onto the board.

Value : 33 pF
Printed Value: 330 (33)

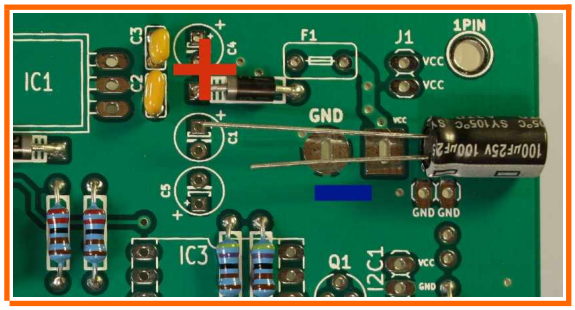


11: Electrolytic capacitor have two pols, positive and negative. Look at the longer wire that is the positive pol. Make sure that the positive pol match to the “+” onto the silkscreen. Maybe you have noticed on the capacitor a broad strip mark this side is the negative pol the other side shows the value.

It's important that you place the component correctly otherwise the component don't work at all. In the worst case the capacitor could explode !

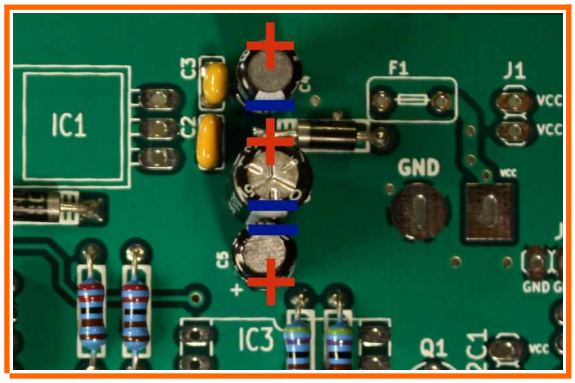
Now place and solder the electrolytic capacitor C4 and C5

Value : 10uF

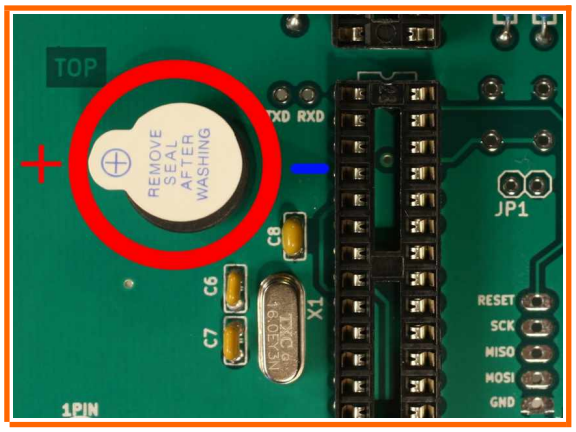


12. Solder the electrolytic capacitor C1.

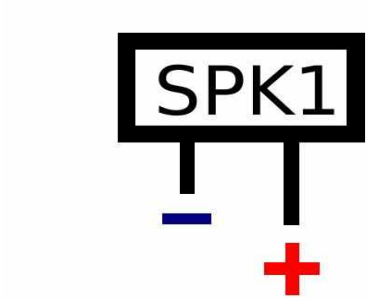
Value : 100 uF



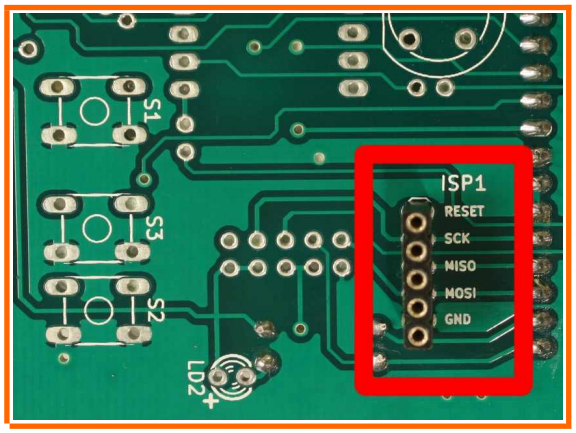
Look at the picture and double check the polarity of the capacitors.



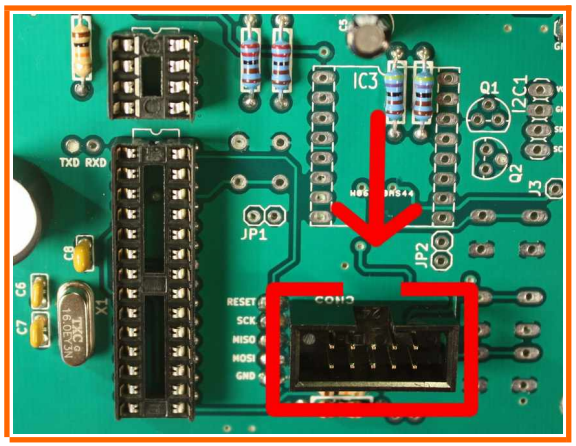
13. Your alarm clock needs a speaker to wake you up in the morning!
Make sure the positive pol match with the silkscreen. Have you placed the speaker the wrong sides, then no sound come out. Now solder them.



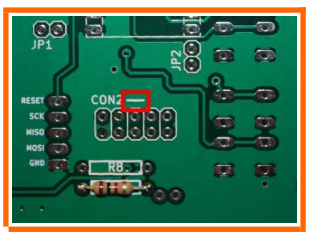
The longer wire is the positive pol.

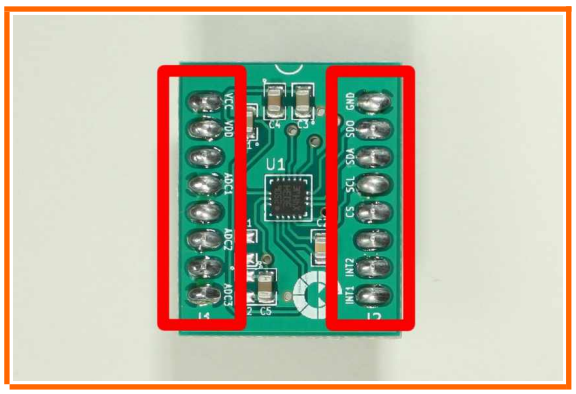


14. Place and solder the female pinhead **ISP1 onto the back** of your board. You have to **solder on the topside**.

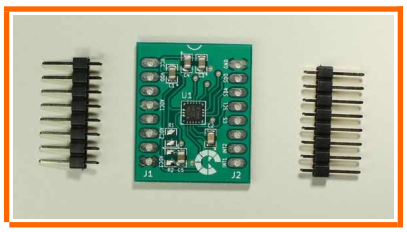


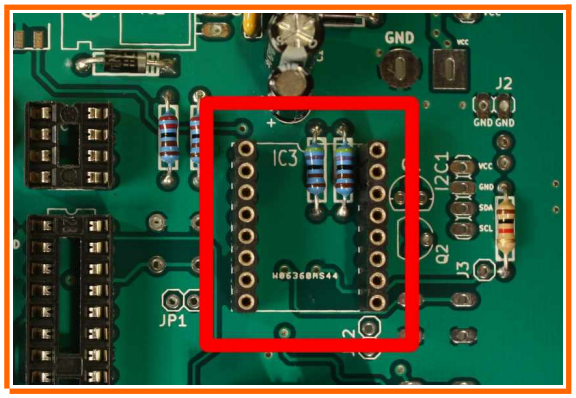
15. The interface CON2 connect the Display to the Clock Board. Examine the male pinhead you will notice a notch. Make sure that the notch match with the strip onto the silkscreen.





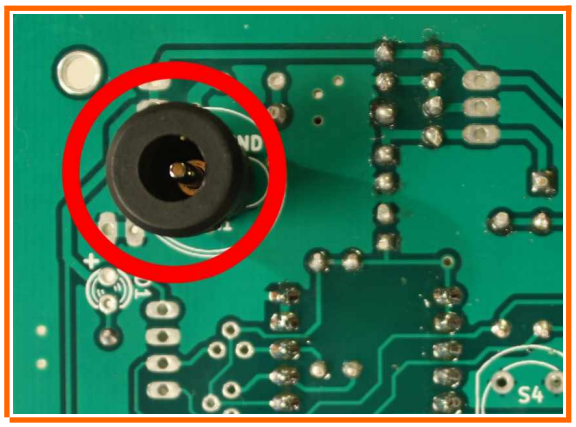
16. To chance the alarm clock time we need the position module. Just solder the pin strip onto the position module and now the module is ready to mount.





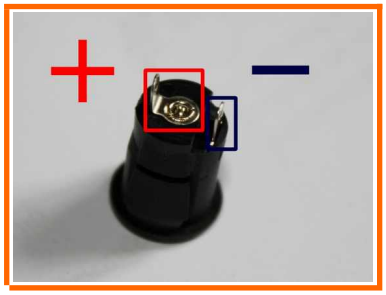
17. Plug the 8 pol female pinhead into the pin strip at your position module. Now place the whole module at the place IC3 and solder the 8 pol female pin strip.

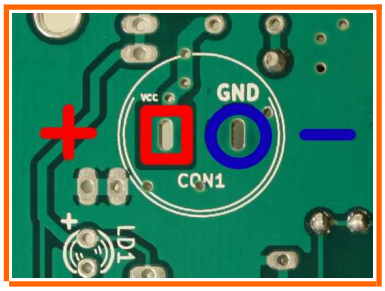
Don't forget to unplug the module.

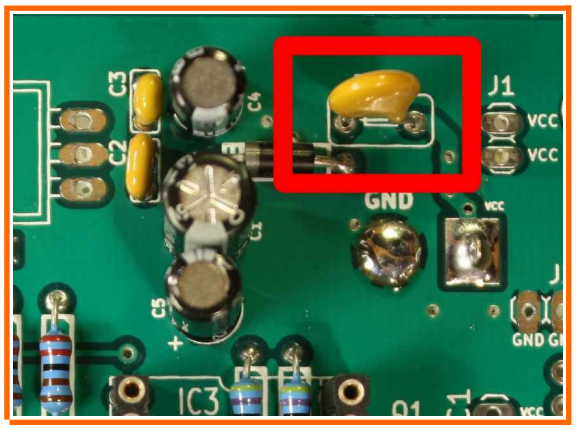


18. Place the power jack CON1 **on the backside** at your Clock Board. It is very important that you **place the power jack with the right polarity** onto your board. Double check and then **solder the component onto the topside.**

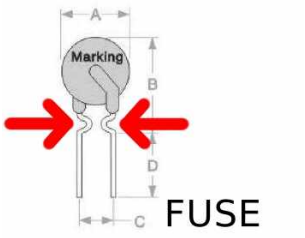
It takes some time to heat up the metal and make sure there is plenty of solder on the pads.

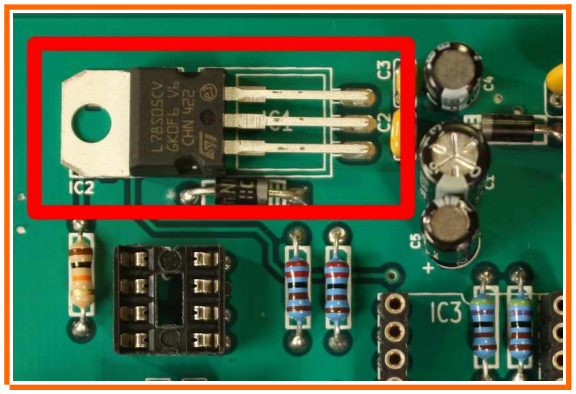




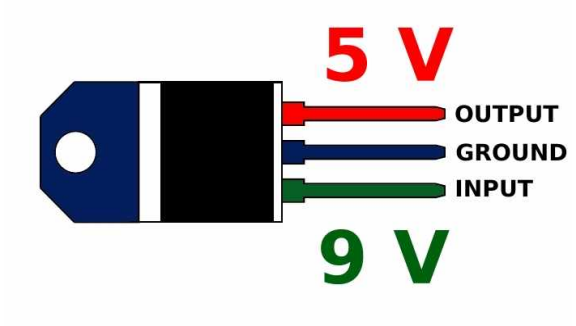


19. We use a fuse to protect the circuit against excessive current. To identify the right component you have to **look at the lead you will observe a kink** in them. Look closely at the picture the **knick goes inwards** and not to be confused with the 1000 pF ceramic capacitor that kink goes outward and the whole component is smaller. Now solder the fuse F1 onto your board.

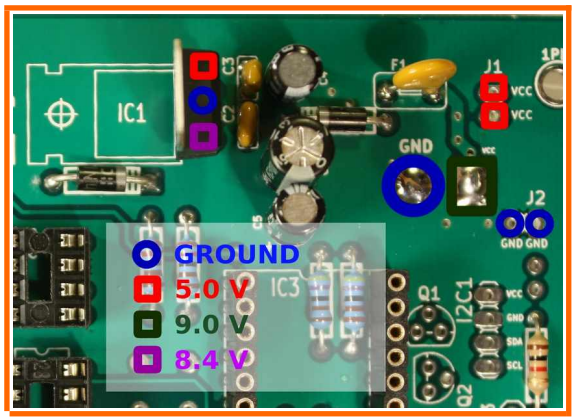




20. The regulator reduces the input current from 9 V to constant output current of 5 V.



Lay the regulator metal tab onto the printed circuit board and you get the right connection position. Now tack the leads through the holes and solder them.

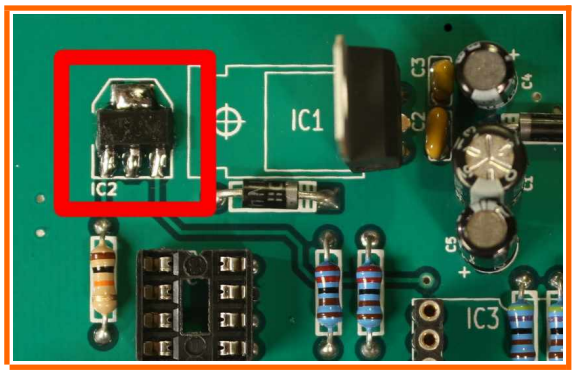


21. First power check. Make sure that the Printed Circuit Board is clean of metal bits or clipped leads. Plug the power supply in to the Jack. Examine with your Multimeter the voltage at the regulator. Compare the measure value with the measure points on the picture.

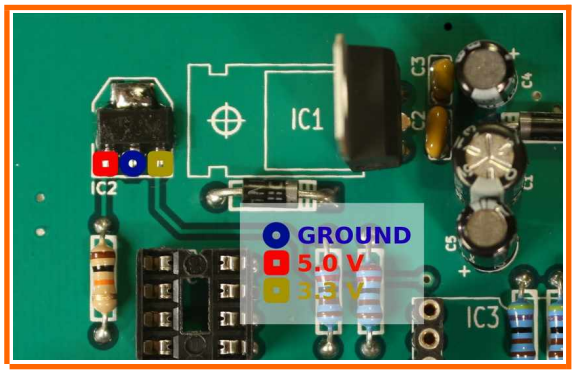
Maybe you take attention at the voltage drop between the green (power input) and violet measure (regulator) point. The voltage drop is caused by the protector diode D2.

Trouble shooting: Have you placed the power jack, diodes or the regulator the wrong way around, please check the components.
If you can't find the error don't continue, ask a fiend who can help you.

Disconnect the power supply from the clock board.



22. Place and solder the SMD regulator on the location IC2.

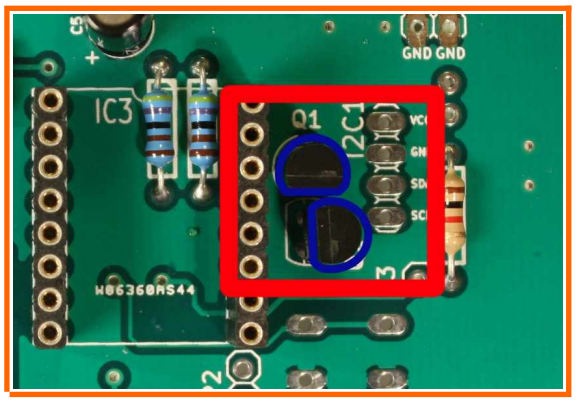


23. Second power check. Energize your Board. The output voltage at the yellow measure point amounts 3,3 V

Trouble shooting: The solder joins the pins.

Disconnect the power supply from the clock board.

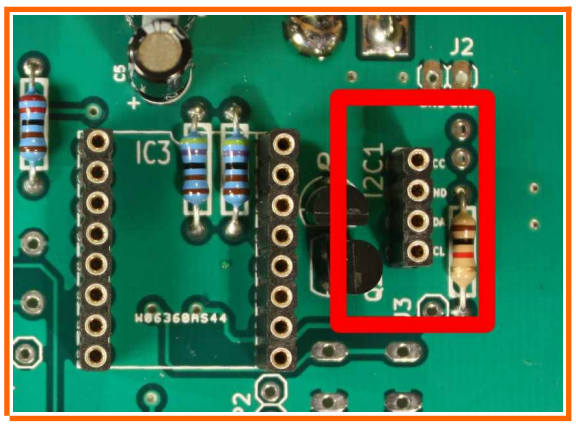
Was the test successful then you can continue with the next step.



24. We use MOSFET's in this circuit. Before you touching the component ensure that you are **free of electrostatic charge,** touch a radiator to discharged yourself and use an anti-static surface to handle the component.

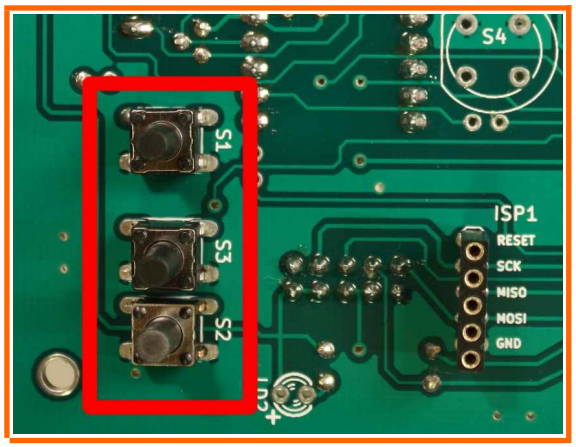
The static charge could destroy them and the I2C bus dosen't work.

The half round transistor case must match the half round silkscreen, check twice. Now solder them on the location Q1 and Q2.



25. Place the pin head female 4 pol on the location I2C1.

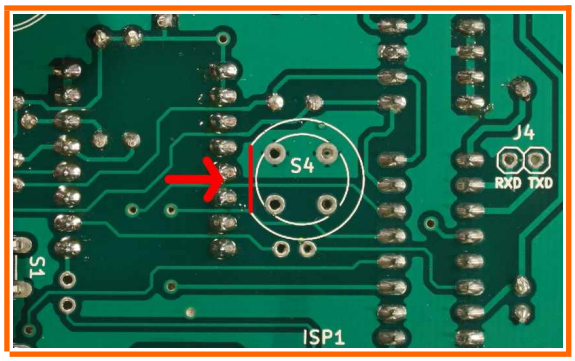
You can put on optional the RTC Module onto the interface.



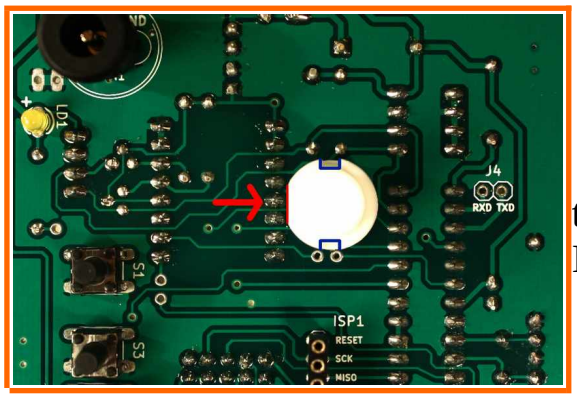
26. Before you solder the buttons you should clean thoroughly the board with a solution of dish detergent and methylated spirit.

Important: Make sure that the board is after the cleaning absolute bone dry.

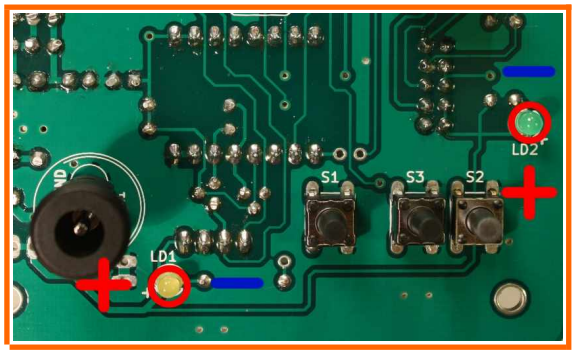
It's time to tack the switches S1,S2 and S3 **on the bottom side** of the board. **Ensure that you solder at the top side.**



27. **The half round switch shape must match with the silkscreen**, look twice. Have you mounted the switch the wrong way the alarm button won't work.

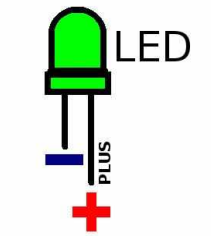


When you are unsure how to mount the switch S4, then do not solder the component yet. Wait until you have made the final check and you have mounted the IC's. Now you could test the switch. If you press the switch the yellow LED1 will turn off. Was the test successful, then solder the component.



28. The LED (Light Emitted Diode) has two pols, as usually the longer lead is the positive pol. Place them **on the bottom side** and double check the polarity, have a look at the silkscreen for the right position.

LED1 = yellow
LED2 = green

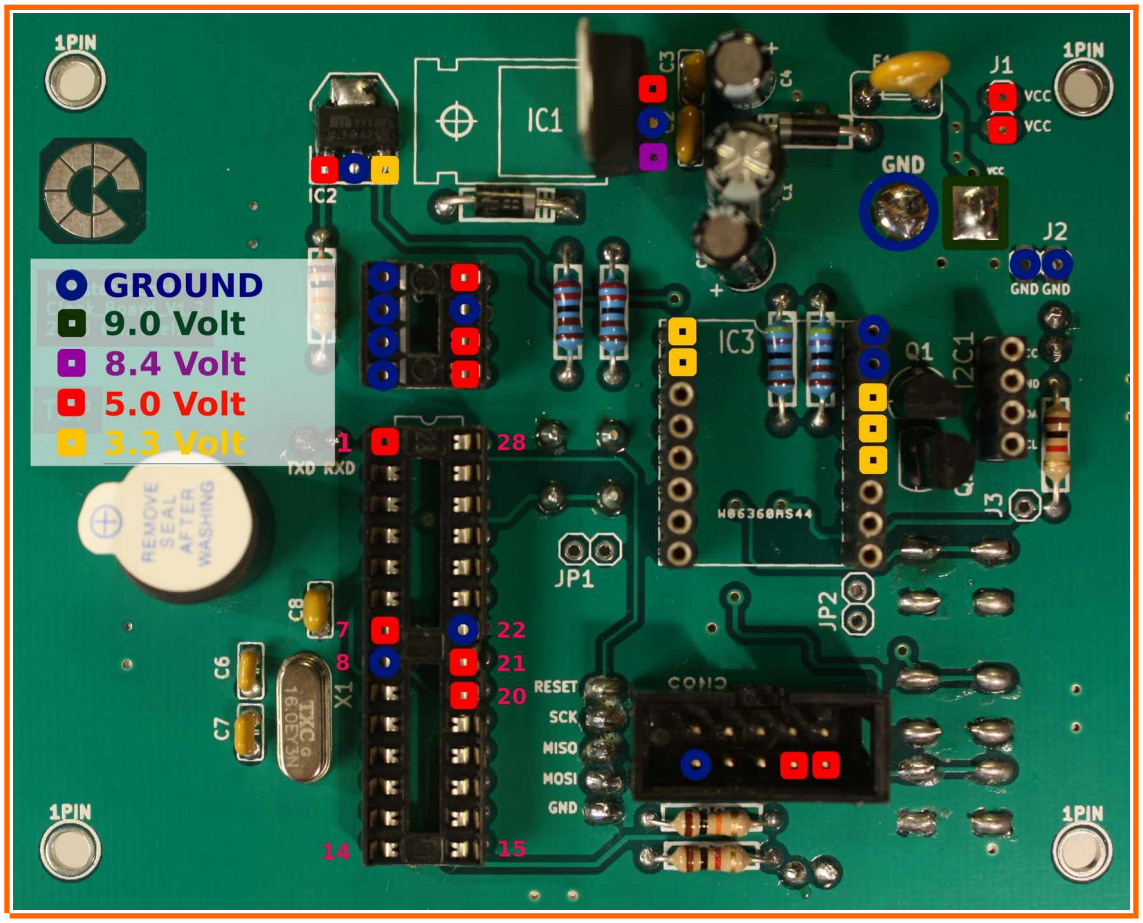


Remind: The longer lead is the positive pol and no light will appear when the LED is mounted incorrectly.

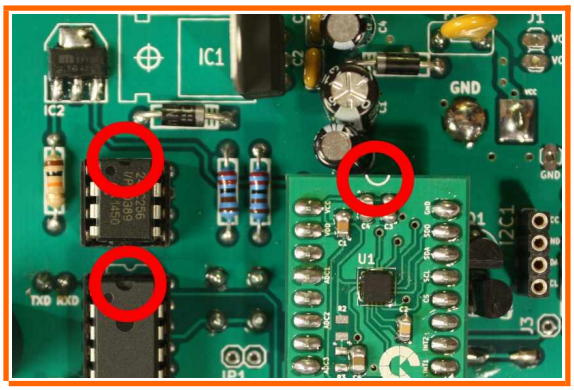
29. The final check.

Now is time for the truth, look again for metal bits, energize your board and make the final measurement.

Compare the values with the measure points on the picture. Take time for your measurements and check twice. The voltage can differ at a minimal range depending on your multimeter tolerance value.



Important: has the final check failed don't continue and remind we don't take any responsibility of any injury or damage as a result of assembling this kit. The wrong voltage and polarity could destroy and overheat the IC's.



30. Insert the IC's on the right location and make sure you ground yourself before you handle with the components.

IC3 = Position_Modul
IC4 = Eeprom
IC5 = ATMEGA328P

The component (IC's) U-shaped notches must match with the notches on the silkscreen, double check. The red circles on the picture marked the U-shaped notches. Incorrectly installed IC's will destroy them self.

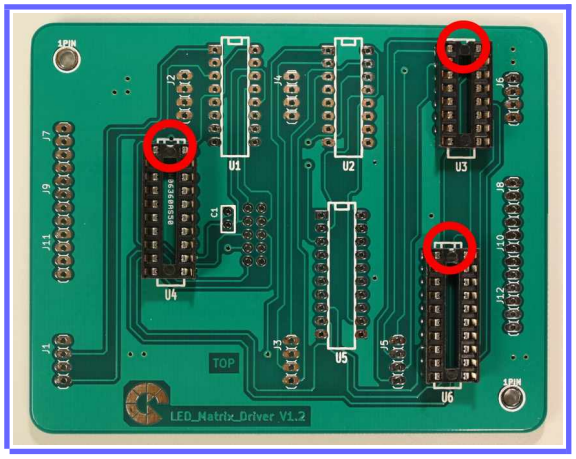
Occasionally it is necessary to bend the pins of the chip, they slide and fit better in the socket. Take a look at the picture, lay the pins parallel onto a flat surface and push them carefully in the right position (pins 90° to the case).

Function Test: Test your board, plug the power supply into the power jack. The LED1 (yellow) and theLED2 (green) are glowing.

Press the switch S4, the speaker make a beep and the yellow LED1 will turn off.

The LED2(green) indicate that the Atmega 328p and the clock board do the job.

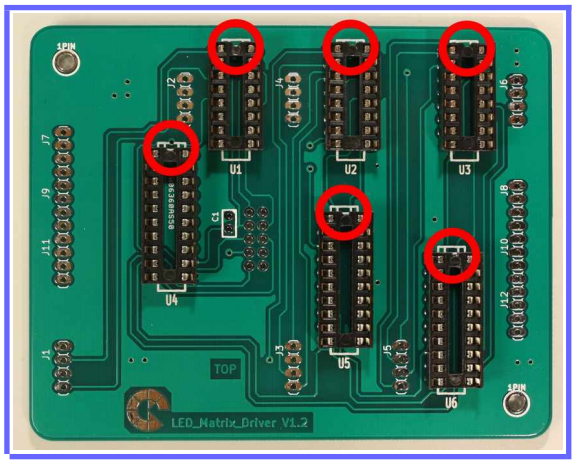
Mounting PCB 2 (LED_Matrix_Driver)



1. Place and tack the sockets:

U3 = 16 PIN
U4 = 20 PIN
U6 = 20 PIN

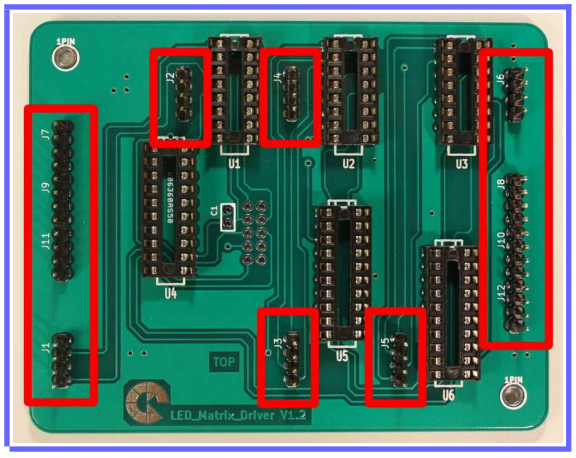
Take attention to the U-shaped notches they must compare with the silkscreen. Roll over the printed circuit board, the board should laying stable onto the flat plate. Now you can easily solder the pins.



2. Place the last sockets:

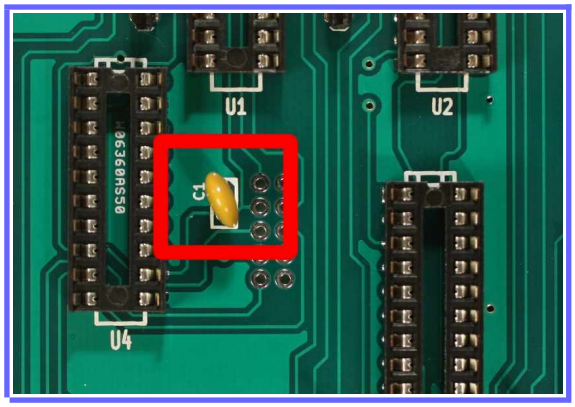
U1 = 16 PIN
U2 = 16 PIN
U5 = 20 PIN.

Roll it over again and solder the components.



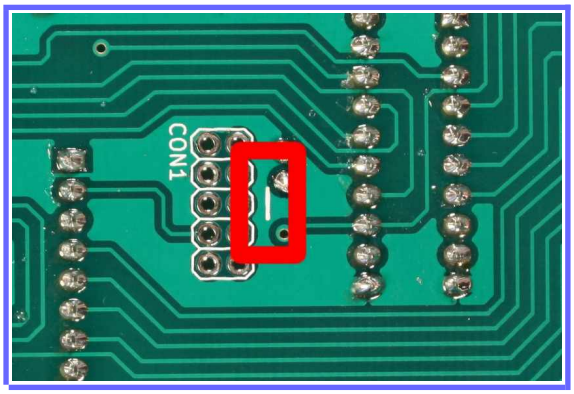
3. You have to cut 4 pieces 8 pol pin strip in to the half.

Align the first pin strip at 90° to the board, solder one pin and check the position, if necessary correct them. Is the pin strip correctly placed soldering the remaining pins.

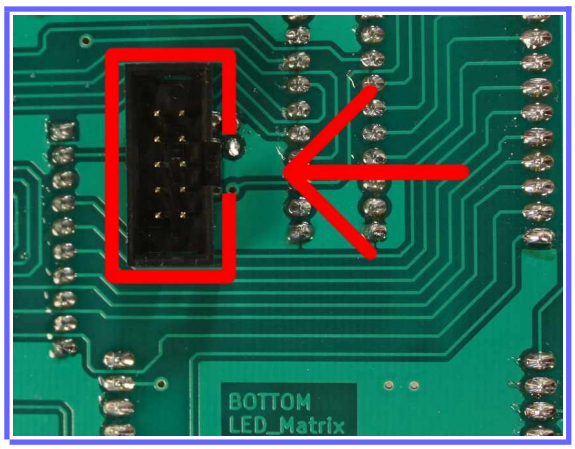


4. Place and solder the capacitor C1.

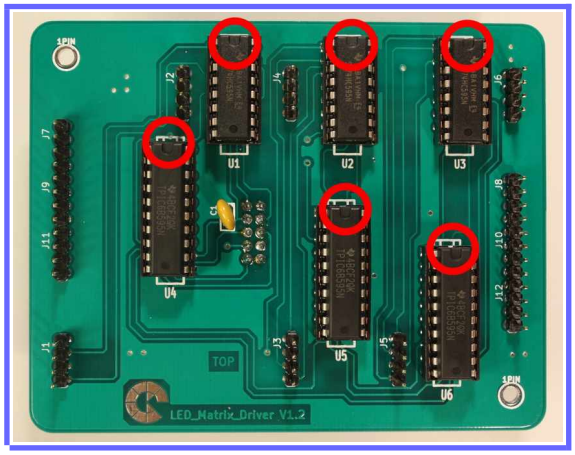
Value: 1000pF
Printed value: 102



5. Look at the location CON1 at the backside of the printed circuit board you recognize a small strip mark. Locate the notch in the pinhead and make sure that the notch match with the small strip mark on the silkscreen.



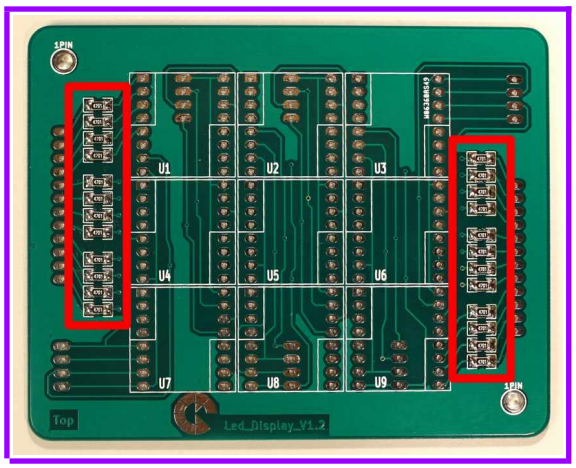
Tack the pinhead onto the backside and solder the pins on the topside.



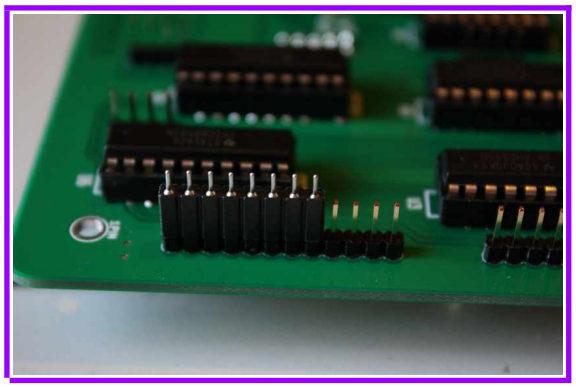
6. Clean up your Board and dry it.
Insert the IC's in to the sockets, **don't forget to check the notches they must match to the silkscreen.**

Be aware static discharge can damage the IC's, ground your self and use an anti static surface.

Mounting PCB 3 (LED_Display)



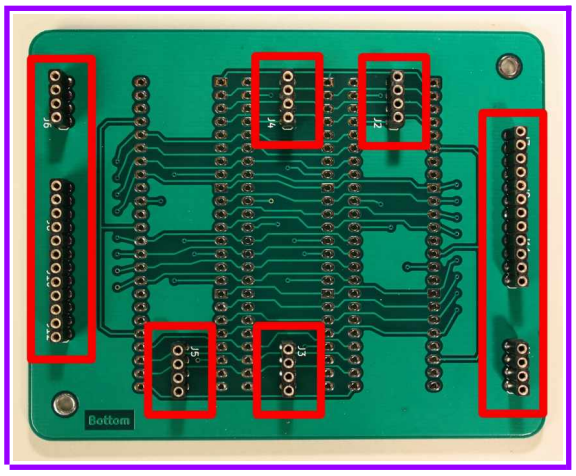
1. Applying flux past onto the pads, place the SMD resistors on the right location at the silkscreen and solder them. Are you unsure, then take a look at the soldering instruction manual, capital SMD soldering.

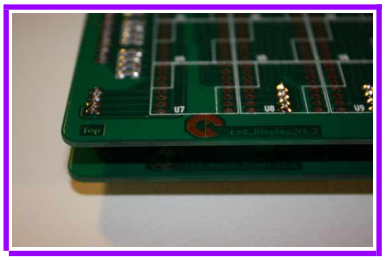


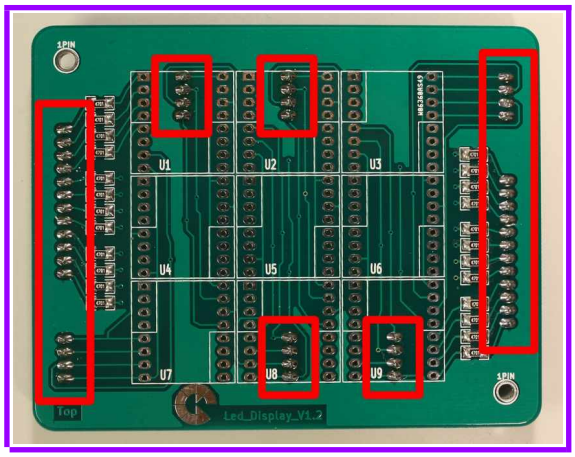
2. Take the PCB 2 (LED_Matrix_Driver), then plug all female pin heads on the pin strips.

Place the Board 3, **bottomside downwards** onto the pin strips, it should look like a sandwich.

Important: Double check that you solder on the topside, the components must be mounted on the bottom.

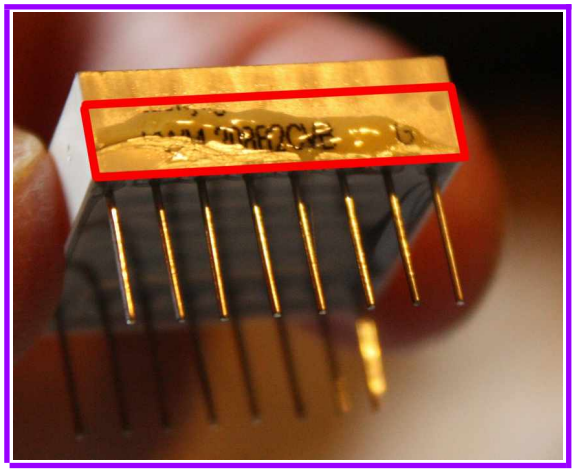






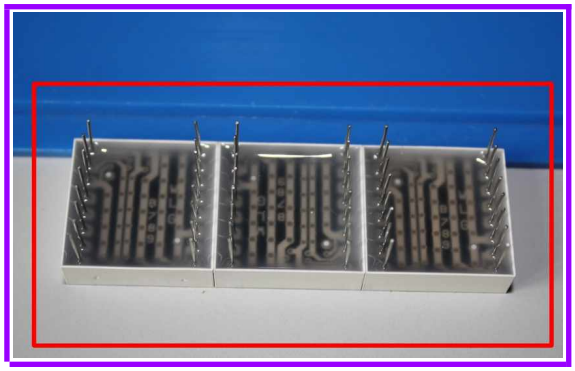
Don't forget to solder any solder joint, check twice, it's impossible to fix a bad or a forgotten solder joint, after you have mounted the LED device.

Make sure that the solder joints are clean and free of debris.



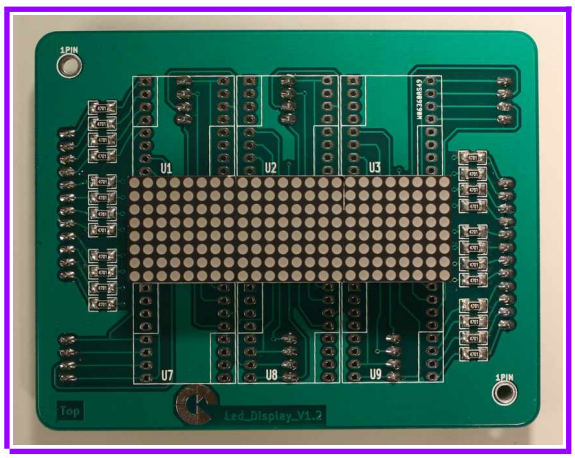
3. We align three LED segments together. It doesn't matter which way you install the LED segments, it's not wrong to install them with the printing in the same direction!

Take one LED segment and apply some plastic glue on both sides. Now stick the two segments on the left and right sides.

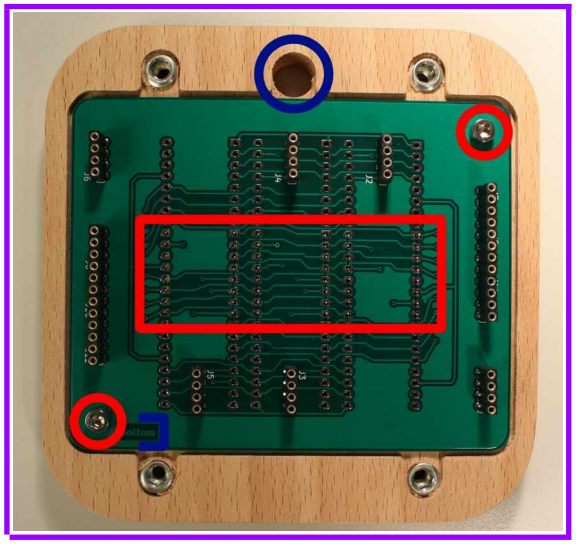


For assistance take a ruler and align the glued segments on the edge of the ruler and use a **flat surface** to line up the segments.

Let the glue dry thoroughly.

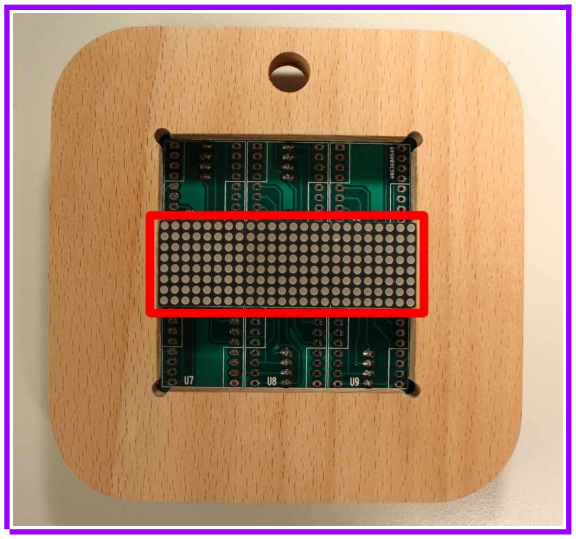


4. Now tack the wires through the pinholes of the PCB, it's a little bit tricky.



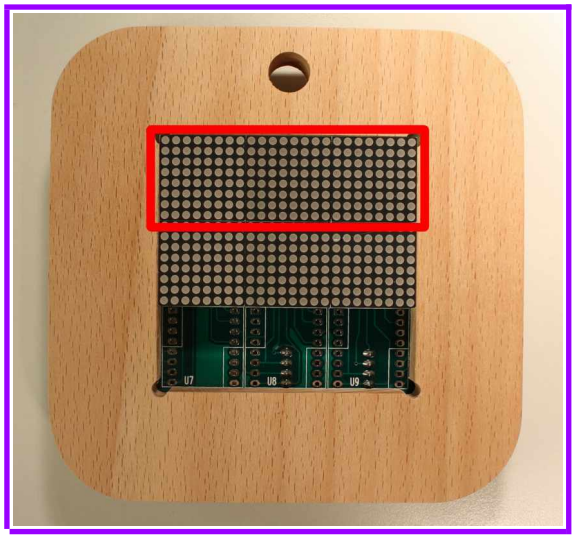
5. Pull the Front Case over the prepared printed circuit board and screw on them. Use as underlay a flat table.

Solder one solder point and check the position of the LED segment, look that you get a flat surface over the Front Case. Have you placed the LED Segment on the right position and you are satisfied with the result then solder the rest of the solder points.

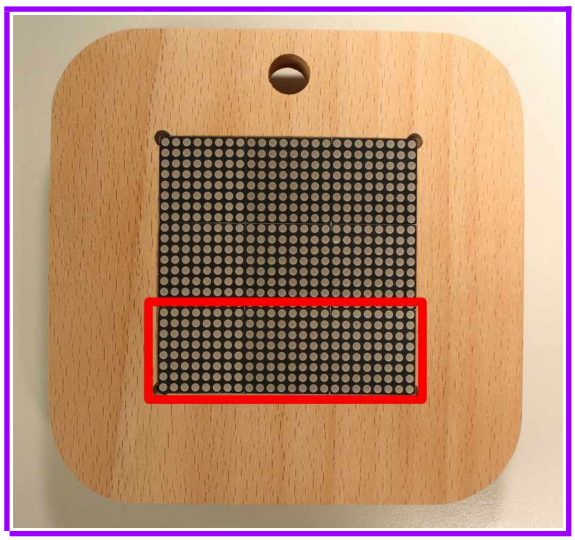


Now unscrew the board, take and place the next LED segment and repeat the instruction point five, do the same thing twice and the work is done.

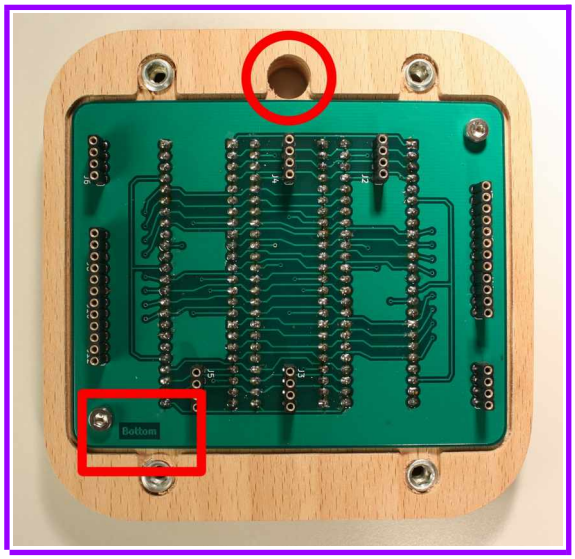
Unscrew the board. It's necessary to clean the board on the solder side thoroughly to prevent against leakage current, that could cause malfunction at the display.



The best result can be obtained when you glue and align all LED segments onto a flat surface, you get one LED block, look at the picture below. But it is very tricky to push the wires through the pinholes.



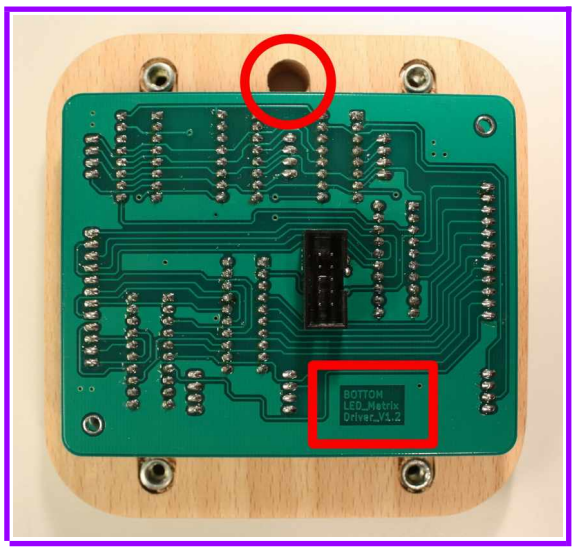
On the picture you see a fully fitted front case.



6. Take the PCB 2 (LED_Matrix_Driver) and plug them on the PCB 3 (LED_Matrix_Display).

The lettering of both PCB's must be below and the enclosure eye is on the top.

Don't forget the plastic washer M3 to put under the screw head.

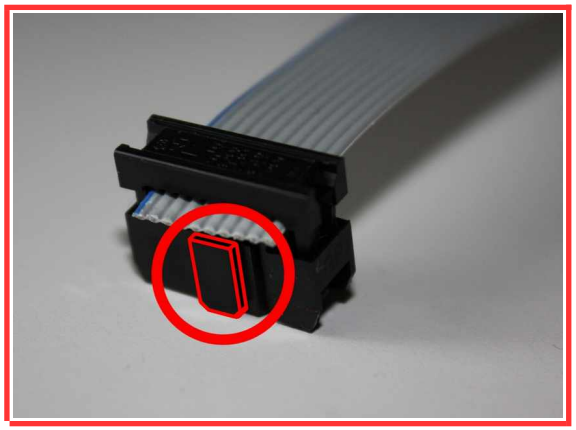


The picture shows a fully montaged front case.

BUS Cable

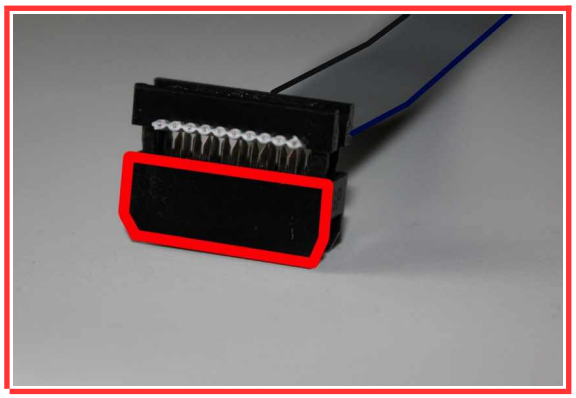
1. The picture shows the single components

- 1 p. BUS cable
- 2 p. pin head connector
- 2 p. strain relief



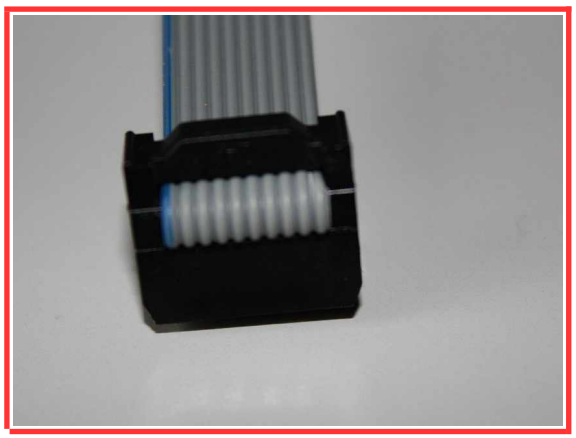
2. Push the bus cable through the **first** pin head connector. It is important that the strip is placed **outwards**.

Push hard until the latch fits in place, in this case a hammer is a useful tool.

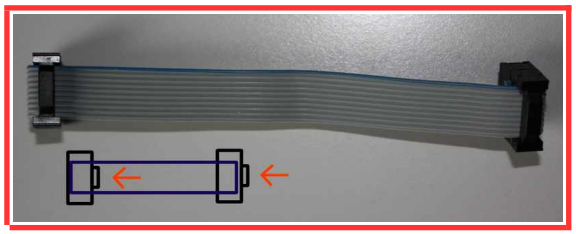


3. Push the bus cable through the **second** pin head connector. It is important that the strip is placed **inwards**.

Do it again and push the latch.



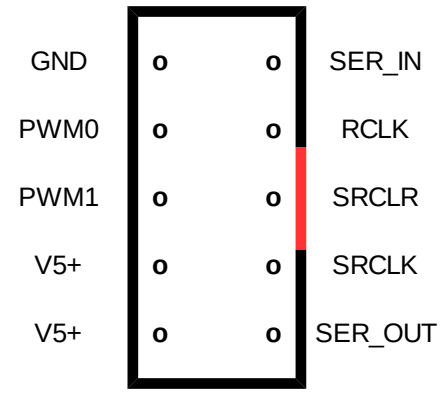
4. Lead the bus cable inwards and across the pin head connector. Press the strain relief in to the pin head connector until it snap in.



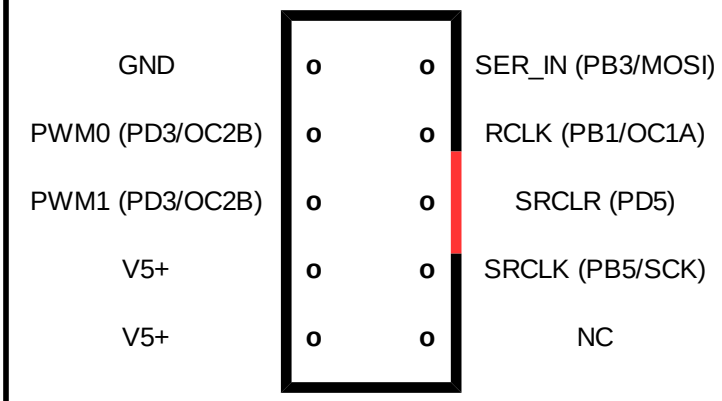
5. It's important that the strips of the pin head connectors are placed correctly (same direction), otherwise the LED Display will not be addressed. Look at the picture to ensure.

Pinout listing:

PCB:LED_Matrix_Driver
View:Bottom



PCB:Clock_Board
View:Top



Display Test

Connect the clock board and the LED matrix driver board together with the bus cable.

Power on your clock board.

It appears a monster (alien) on the display, now press quick the switch S2 and the device change in the display test mod, all 576 LED's will shine, otherwise you have missed a solder point or the bus cable is mounted wrong.

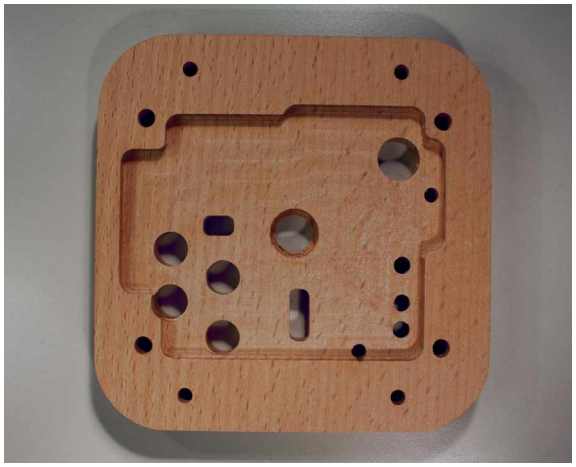
To leave the test mod, press switch S1.

Assembling Tutorial

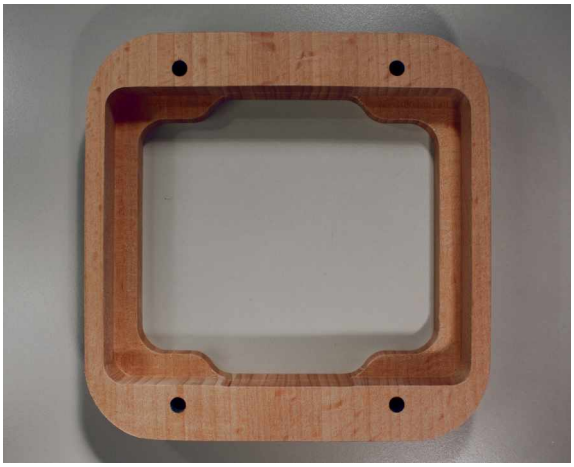
Part list:

Enclosure Front (Display)

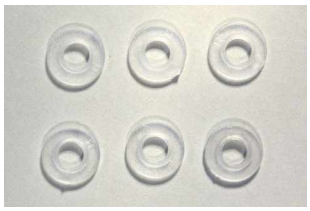
Enclosure Middle Section I



Enclosure Back



Enclosure Middle Section II



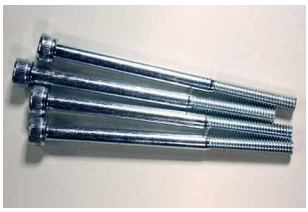
6 p. Washer M3

6 p. Drive in nuts M3

4 p.Threaded Inserts M4

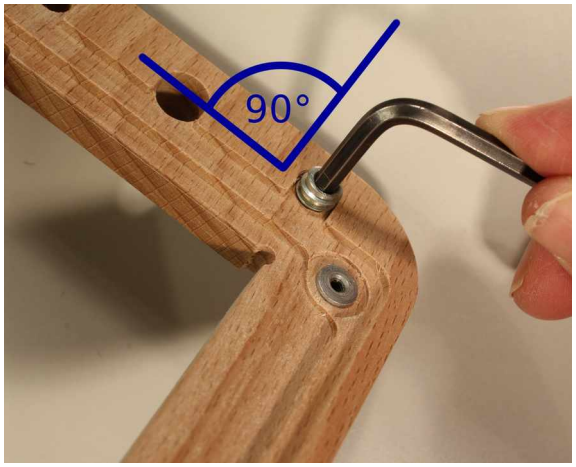
12 p. Shims M4

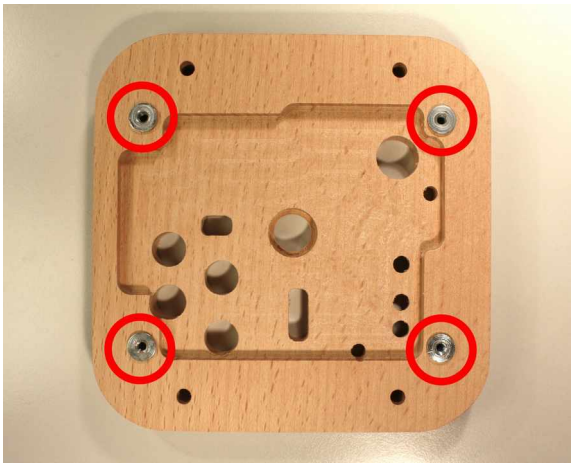
6 p. Bolts M3

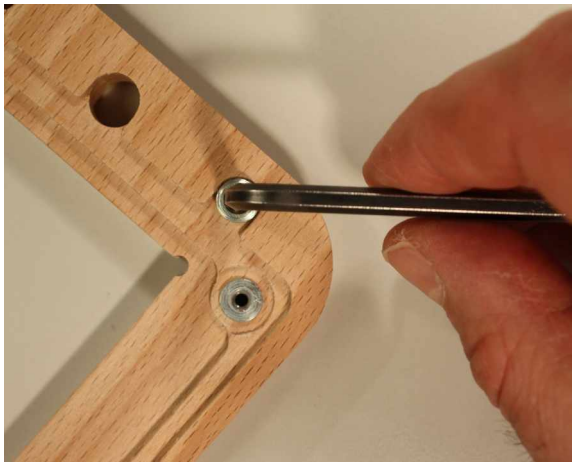


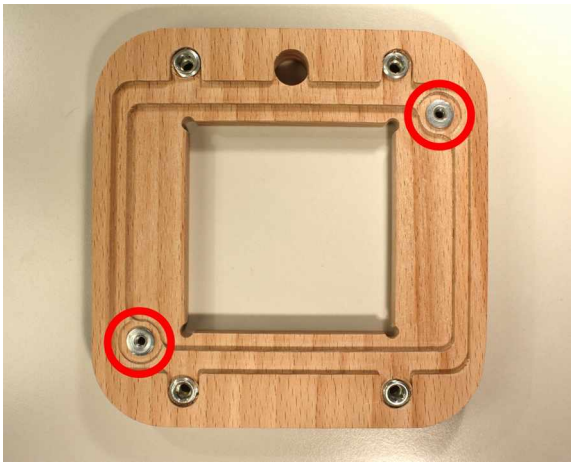
4 p. Bolts M4

Prepare the enclosure:









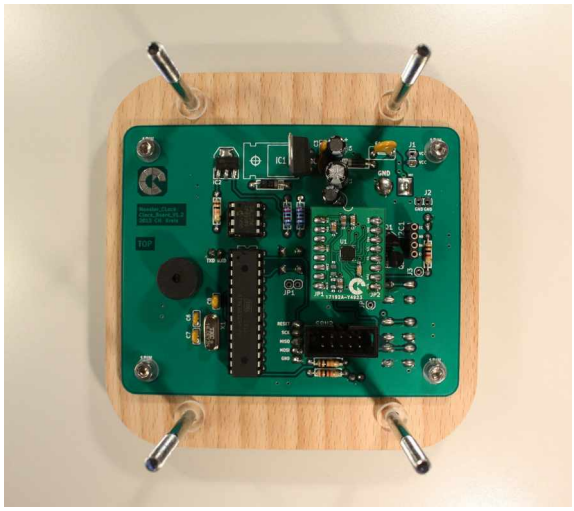
Use the sand paper to break all sharp edges.

Place the 6 pieces drive in nuts M3 to the right location, look at the picture above. Lay a piece of wood onto the nuts and then slam with the hammer on them, it is the best way to protect the enclosure.

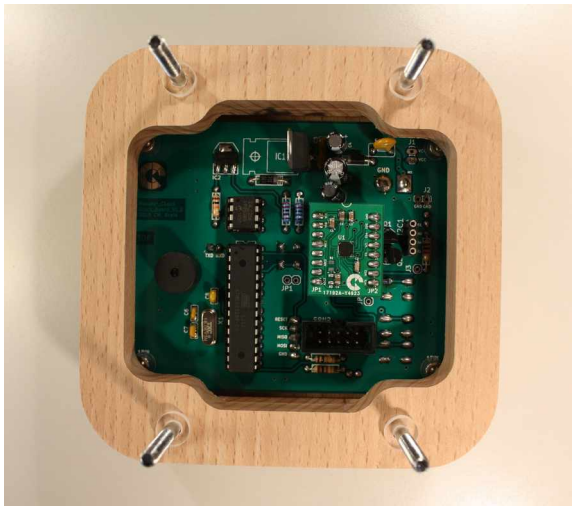
Take and use a hex wrench to drive in the 4 pieces threaded inserts M4.

Assemble the first time the enclosure without any electronic components and abrade the four sides of the enclosure smooth.

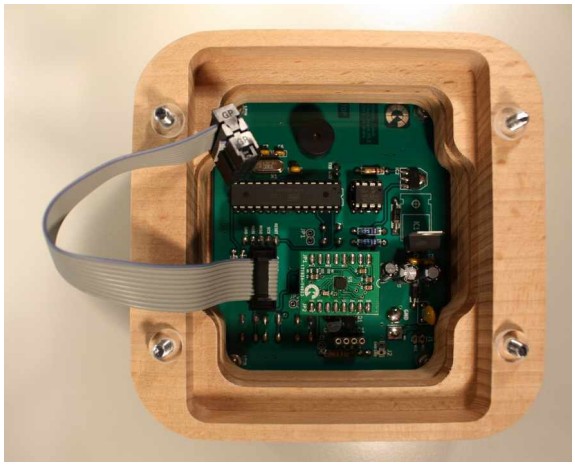
The final assembly:



1. Put the plastic washers M3 under the screw head and screw the clock board onto Enclosure Back. Push the bolts M4 through to the enclosure holes and place the shims.

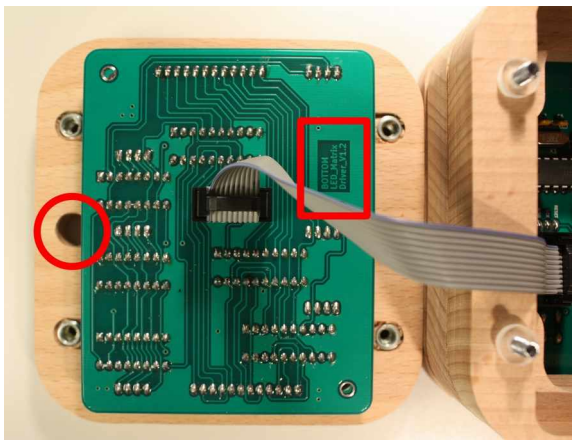


2. Put on the middle section I. The bulge of the middle section I looks downwards and one more time place the shims.

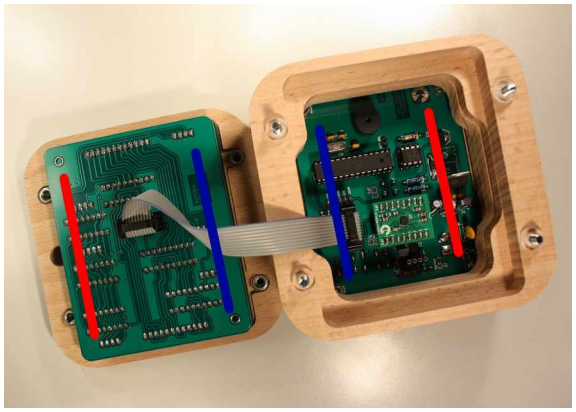


3. The bulge of the middle section II is deeper as the middle section I. Place the component (bulge upwards) and put on the remaining shims.

Now connect the bus cable with the clock board.



4. Double check the lettering on the PCB and the enclosure eye, are they correctly placed ? Now plug the bus cable in to the male socket.

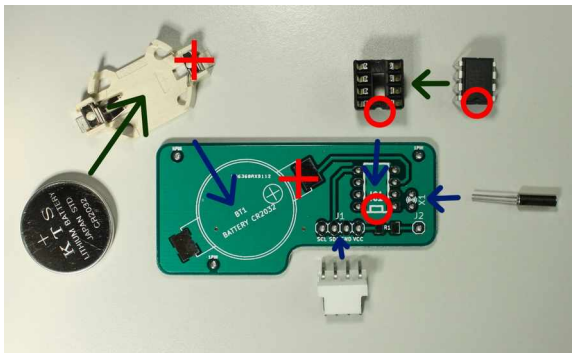


5. Put on the enclosure front, look at the picture the blue and the red strips of the enclosure front must match with the strips on the clock board, otherwise the digits are displayed on the screen upside down. Use hex wrench and screw on the bolts M4.

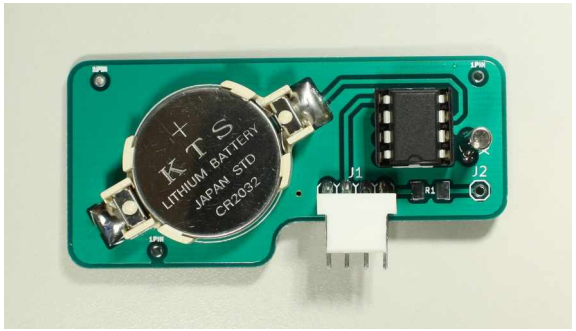
Montage RTC Module (Optional available)

Components:

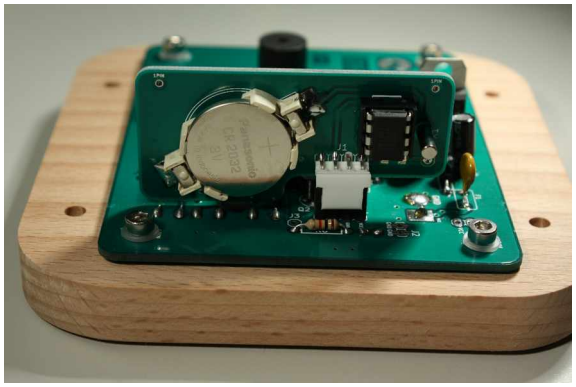
1. PCB
2. IC Socket
3. IC DS1307 (Real Time Clock)
4. Crystal
5. Pinstrip male 4Pol (angle 90 Grad)
6. Battery holder SMD
7. Battery CR2032



1. Look at the picture and place the components onto the right place at the silkscreen, now solder them. **The IC notch must match with the silkscreen**.



2. Check your work.



3. Plug the RTC module on the I2C interface.

GENERAL DESCRIPTION OF THE RTC Module

The DS1307 serial real-time clock (RTC) is a low-power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM.
Address and data are transferred serially through an I2C, bidirectional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24- hour or 12-hour format with AM/PM indicator.

The DS1307 has a built-in power-sense circuit that detects power failures and automatically switches to the backup supply. Timekeeping operation continues while the part operates from the backup supply.

The monster alarm clock saves all menu setting data in to the DS1307 SRAM, after a blackout the time, date and menu setting information will be restored back onto the monster alarm clock .

Fully assembled alarm monster clock