



Please return the components to certified suppliers once their service life has expired!

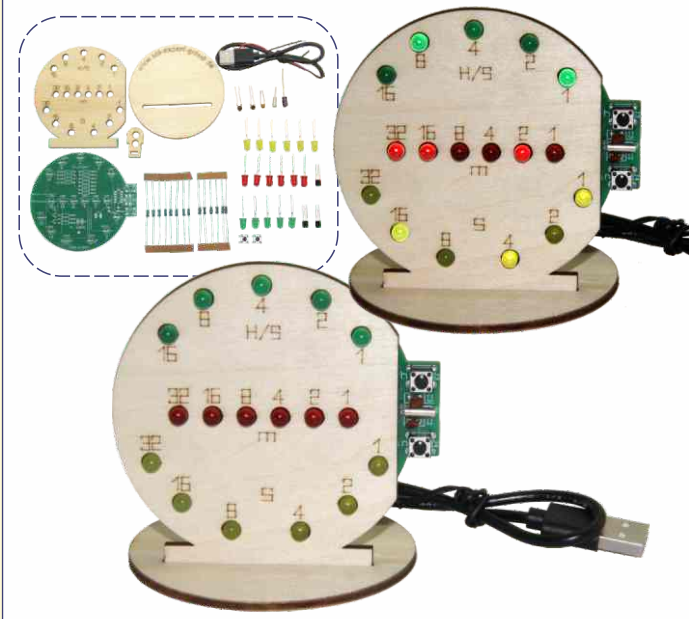
Nice to build!



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MADE IN PRC

Binary clock, soldering kit. Power supply via USB charger



TIP: Check now that all components are included as described in the parts list. If they are present, simply tick the box.

Parts list: Checking and sorting components

Qty	Component	Value / Description	☐
1	Circuit board	96697	☐
5	5 mm LEDs (LED7 – LED11)	Colour: green	☐
6	5 mm LEDs (LED1 – LED6)	Colour: red	☐
6	5 mm LEDs (LED12 – LED17)	Colour: yellow	☐
8	Resistors (R4 – R6), (R13–17)	4.K7 Ohm	☐
6	Resistors (R7 – R12)	330 Ohm	☐
1	Capacitor (C4)	100 nF/10V	☐
2	Capacitors (C2–C3)	22 pF/10V	☐
1	Capacitor (C1)	10 uF/10V	☐
3	Transistors (T1 – T3)	BC557B	☐
2	Push-button switches (J3 – J4)	3301	☐
1	Quartz crystal (Q1)	32 MHz	☐
1	Front cover, base plate	engraved	☐
1	Bending aid	laser-cut	☐
1	Connection cable	USB	☐

The 'binary clock' circuit board kit is ideal for beginners to soldering and for all aspiring electronics engineers and hobbyists. More than 40 components are soldered onto the circuit board for the clock. The programmed microprocessor is already soldered onto the board. This enables the time to be displayed 'in binary' on LEDs. One row of LEDs is responsible for the hours/minutes and another for the seconds. The actual time is set using push-buttons. The "Binary Clock" electronics kit is powered by a USB charger, such as a mobile phone charger. This eliminates the need for a costly separate battery. The included plywood front panel displays the binary values, allowing them to be converted to decimal values. Dimensions: 100 x 80 mm

IMPORTANT SAFETY INSTRUCTIONS! Please keep this user manual in a safe place for future reference! It contains important information • The kit is designed for a DC voltage of up to 5 V only.

Never connect the kit to a 230 V mains supply! This poses a serious risk to life! • When soldering, the soldering iron, the solder and the components being soldered become very hot. So please take extra care! • Always use a soldering mat when soldering! This prevents the components and the circuit board from slipping. • To store the soldering iron safely whilst you are working, we recommend using a soldering iron stand.

For children and young people, we recommend:
An adult must supervise the assembly and soldering process!



Soldering – the right way!

Soldering tips on video

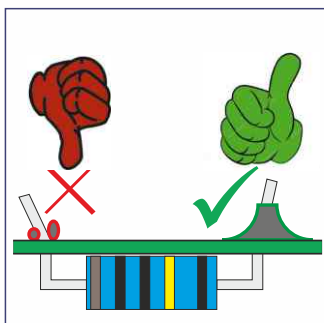
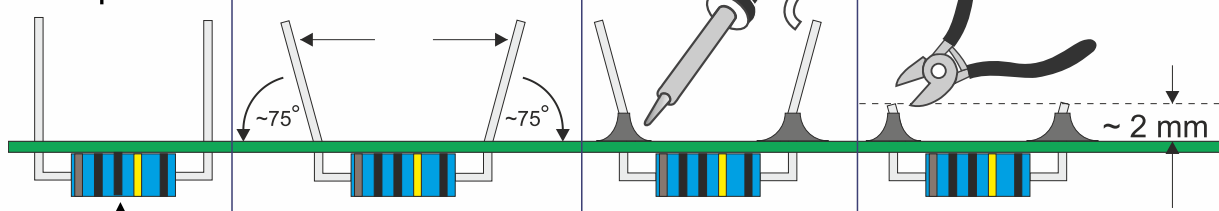


1 Assemble components

2 Bend the wires apart

3 Soldering

4 Trimming component wires



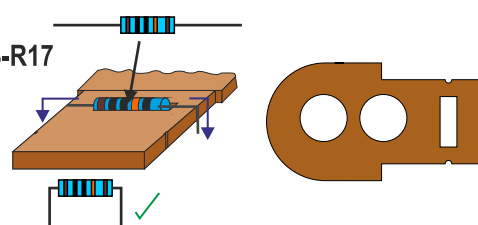
Assembly instructions as a video



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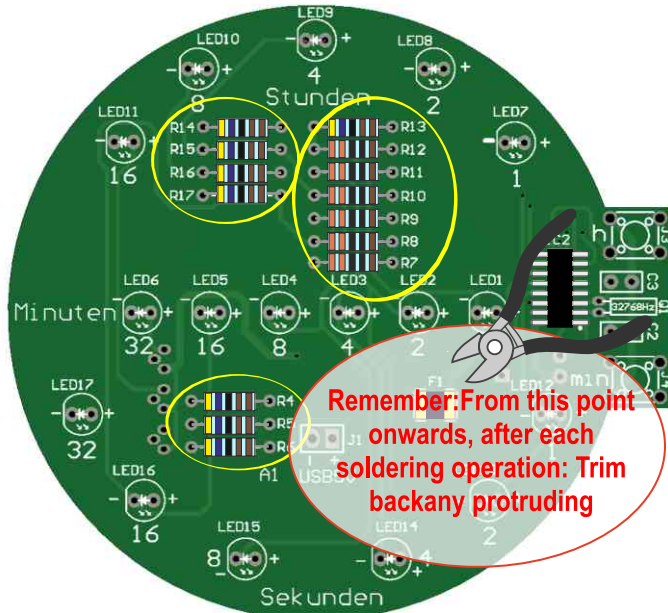
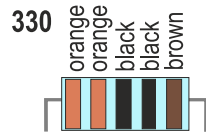
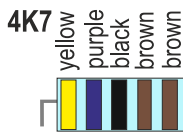
Bend all the resistors now

R4-R6, R13-R17



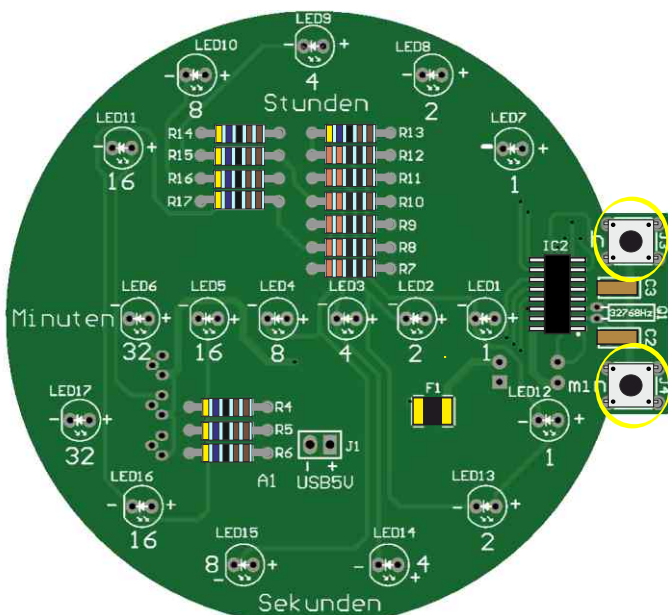
1 Fitting and soldering resistors

Components	Description	Circuit symbol	Appearance
R4 - R6, R13 - 17	4K7 Ohm		
R7 - R12	330 Ohm		



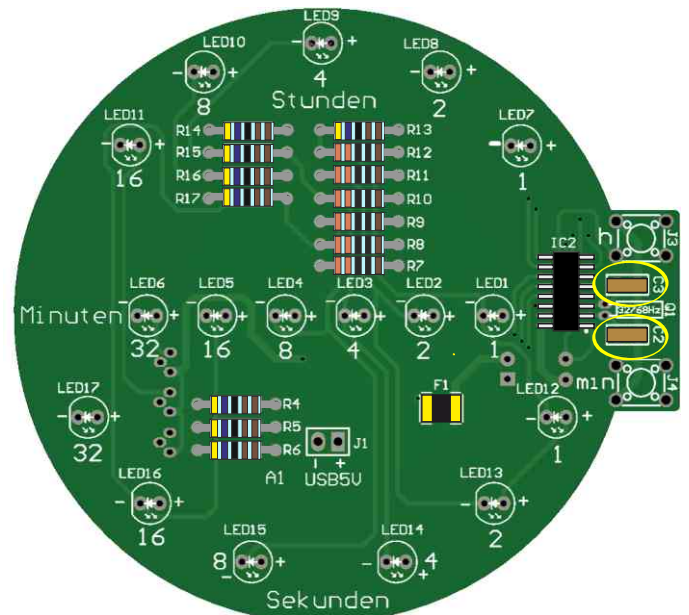
3 Fitting and soldering push-buttons

Components	Description	Circuit symbol	Appearance
J3 - J4	3301		



2 Fitting and soldering capacitors

Components	Description	Circuit symbol	Appearance
C2-C3	22 pF/10V		



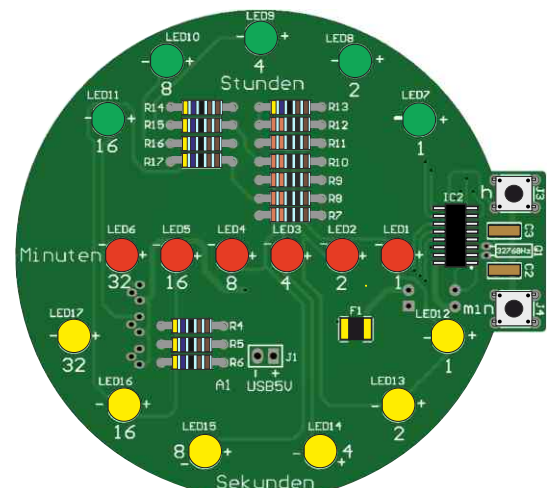
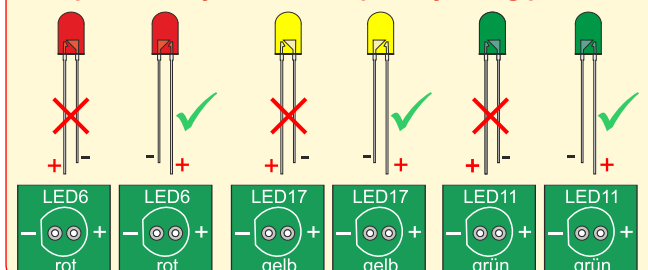
4 Fitting and soldering LEDs onto the circuit board

Components	Description	Circuit symbol	Appearance
LED 5 mm	LED1 - LED6 red		
LED 5 mm	LED12 - LED17 yellow		
LED 5 mm	LED7 - LED11 green		

ATTENTION: All LEDs must lie flat on the circuit board after soldering. Otherwise, the wooden front panel may not slide on properly!



Important: Pay attention to polarity! Long pin = '+'



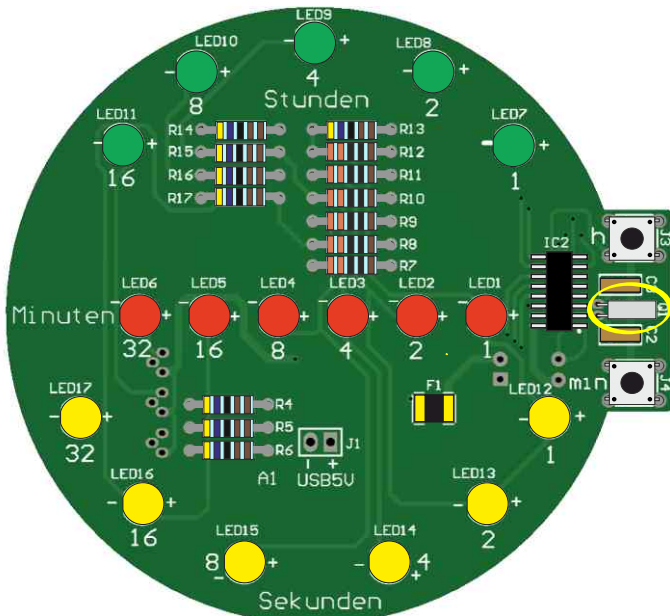
5 Fitting and soldering a quartz crystal

Components	Description	Circuit symbol	Appearance
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Q1	32MHz		
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Please note: Horizontal installation!

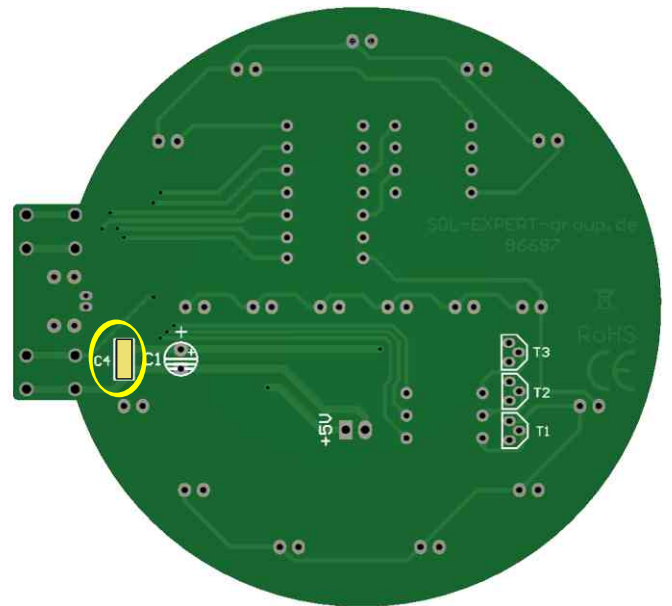


6 Fitting and soldering a capacitor

Components	Description	Circuit symbol	Appearance
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C4	100 nF/10V		
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Let's move on to the back of the circuit board:



7 Fitting and soldering transistors

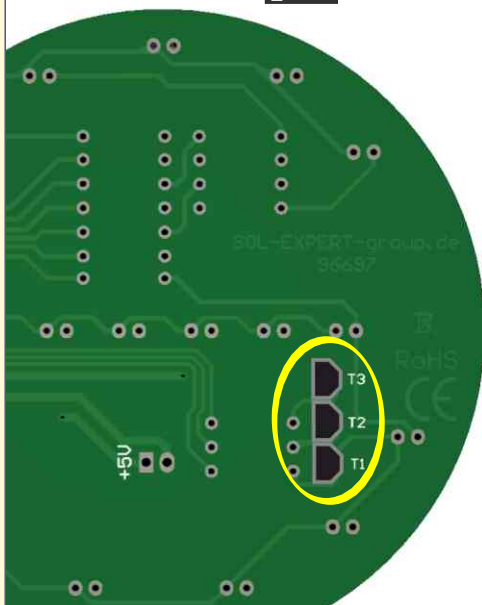
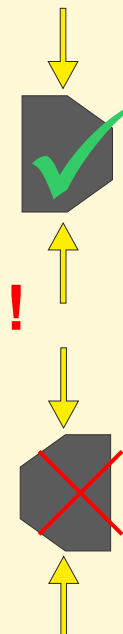
Components	Description	Circuit symbol	Appearance
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T1 - T3	BC557B		
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Trimming component wires:



Note the orientation!



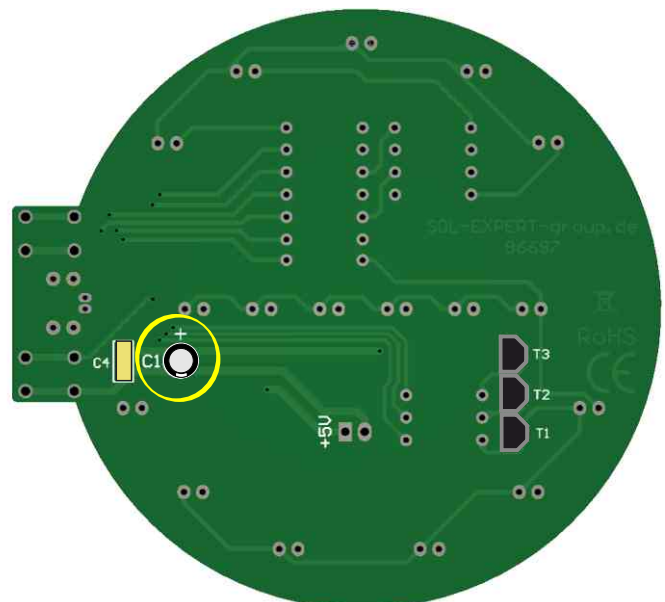
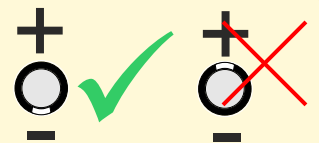
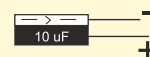
Attention: The legs of the transistors are very close together. You should therefore solder with particular care to ensure you do not cause a short circuit between the legs.

8 Fitting and soldering a capacitor

Components	Description	Circuit symbol	Appearance
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C1	10 uF/10V		
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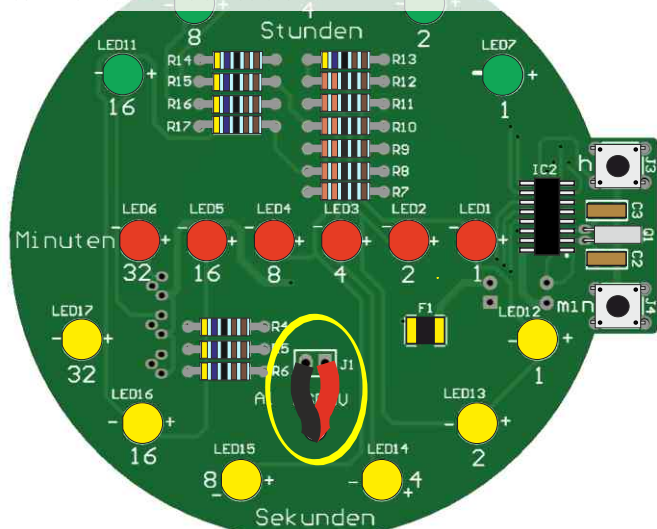
Note the orientation!
Long leg = '+'



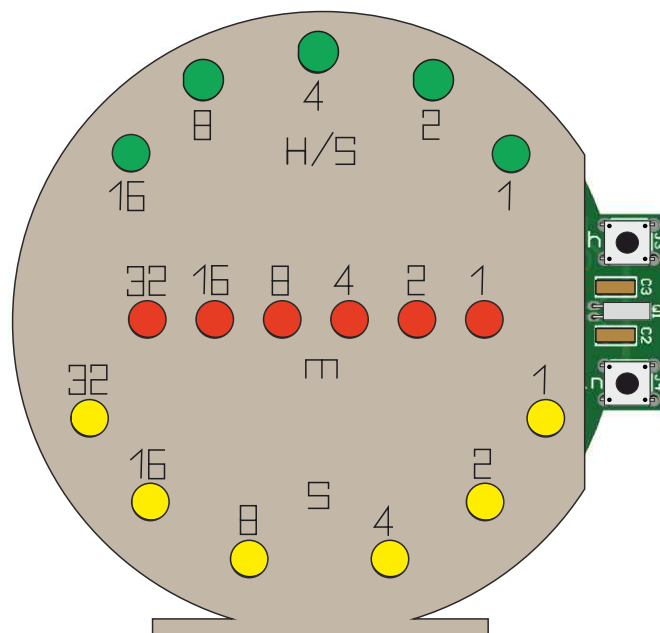
9 Soldering a USB cable

Components	Description	Appearance
USB	Connection cable	

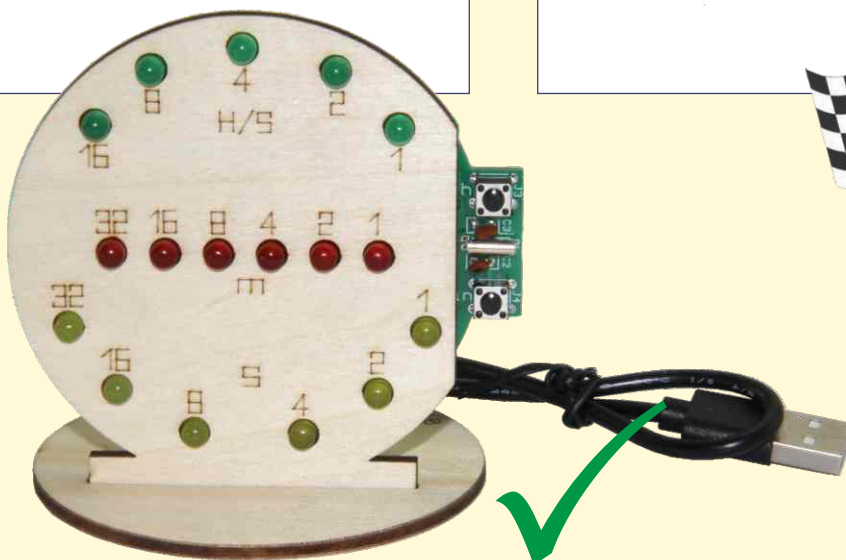
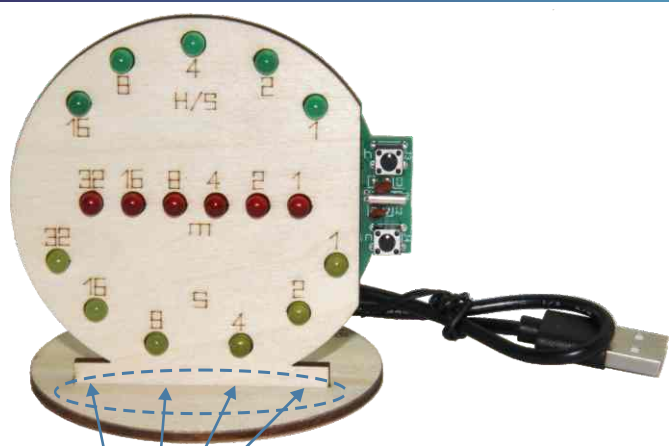
First, thread both individual cables (red and black) together through the two holes, about 1.5 cm of each. To solder them, push the stranded wire of each cable through the solder lug and then solder it on from the back. **Connect the red cable to '+' and the black cable to '-'.**



10 Slide the wooden cover into place



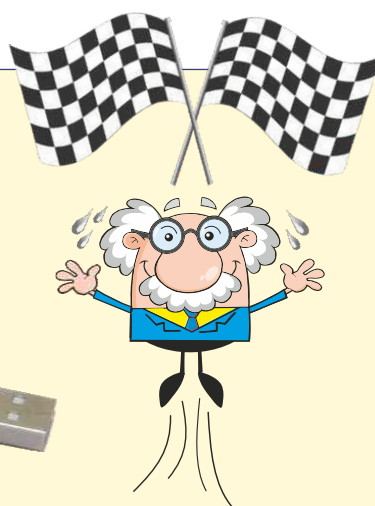
11 Place the unit on the base plate; secure it with adhesive if necessary



VISUAL INSPECTION

First of all, sit back and relax, and let your mind wander for a bit. Once you're completely relaxed, go through the assembly instructions again from the start and check that you've done everything exactly as described.

Pay particular attention to ensuring there are no short circuits and that the values of the resistors, etc., are correct. Take your time to examine everything carefully and, once you've checked everything, plug the USB connector into a USB charger, such as a mobile phone charger.



SETTING THE CURRENT TIME

The two buttons are used to set the actual time. The top button (1) is used to set the hours. You can use the bottom button (2) to set the minutes. Once the time has been set and no further buttons are pressed, the processor automatically starts the seconds.

If you disconnect the circuit board from the power supply and then reconnect it, the time will need to be reset.

READING THE TIME

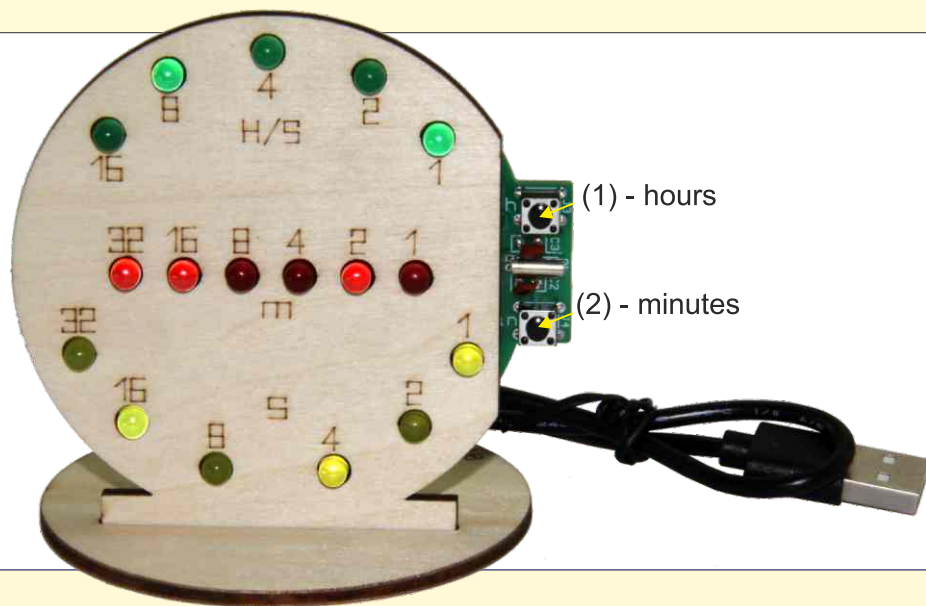
Here's how you can convert the binary value to a decimal number: simply add up all the values where the LED is lit. Here's an example for you to check:

Hour display				
○	●	○	○	●
16	8	4	2	1
8+1= 9 hours				

Minute display				
●	●	○	○	●
32	16	8	4	2
32+16+2 = 50 minutes				

Seconds hand				
○	●	○	●	○
32	16	8	4	2
16+4+1 = 21 seconds				

9:50
21
seconds



TROUBLESHOOTING

No LEDs are lit:

- Check all solder joints on the processor for short circuits
- Was the power bank switched on by pressing the button?
- Check the solder joints on the crystal and the USB plug
- Check the transistors for short circuits
- Is the power bank fully charged?

A single LED is not lighting up:

- Check the solder joints on the LED
- Is the LED fitted the right way round?



WIRING DIAGRAM

