

# Assembly Instructions IV-11 DCF, melody

with Date, Weekday and Temperature

This IV-11 clock is the next generation to the IV-11 Quartz, DCF, melody.

This is not a beginner kit. It requires soldering experience on the IV-18 and the IV-3A board

The switching power supply wall adapter is 100- 240V AC to 12V DC 1.2A.

The power consumption of the circuit, incl. IV-18 tube, IV-3A tubes + sound module is 12 V 450mA  
A DC-DC step-up is for the power supply VFD tubes

The voltage can be adjusted from 38 Volt - 45 Volt blue potentiometer. (Tube protection)

The AC voltage for filament is generated with an IR2155.

The frequency is adjustable with P1 for the IV-11 tubes and P2 for the IV-18 tubes.

A flicker of the VFD tubes can be eliminated.

The power supply on board is controlled with a "soft start circuit" with Power MosFet.

Between switching off and on please wait for 1 - 2 seconds.

When the LEDs flashing, the time was too short.

The connections for the displays PCB is realized with pin headers. So the motherboard can also used as a controller for your own projects.

A dimmer module adjust less 9 Volt in the dark.

The switching threshold can be adjusted with the potentiometer on the module

In the version without IV-18 Tube the date is displaying on the IV-11 tubes every 10 seconds.

If that is not desired, or IV-18 is installed J1 must be set.

Jumper J2 is for UK and Portugal, adjusting time - 1h.

Jumper J3 is currently not in use.

The weekday is realized with 2 x IV-3A 9 segment tubes.

In order to design these individually, a diode matrix is used here.

Soldering is required with a needle tip or 1mm soldering tip.

Displaying weekday with IV-25 or IV-26 as a point tube is provided.

The MP3 sound module is seriell controlled to the MC.

The MC sends a signal every full hour as well as every  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  hour.

On the microSD card are 24 hours files and 3 files for  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$

So it is possible to play the BigBen sound hourly.

Attention the sound output of the MP3 module only works with DCF reception

Below the IV-11 tubes are RGB Led's. These have a slow color change.

The kit can be ordered individually.

Basic module with CPU board, 6 x IV-11 + 2 x DP tube and DCF receiver

Extension sound module

Extension date display with IV-18 tube

Extension weekday display IV-3A

Extension weekday display IV-25 / 26

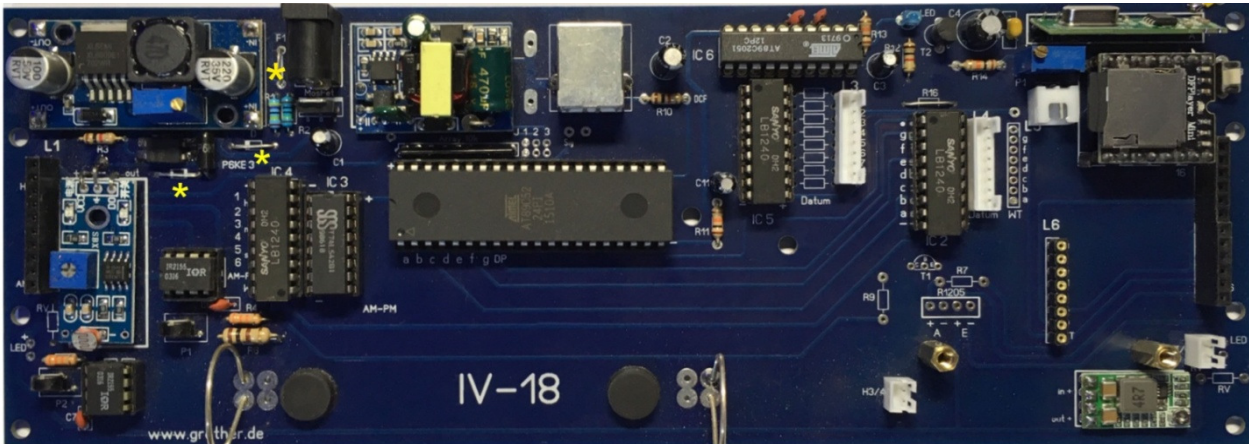
Extension wireless Temperature

The components for each step are packed separately.

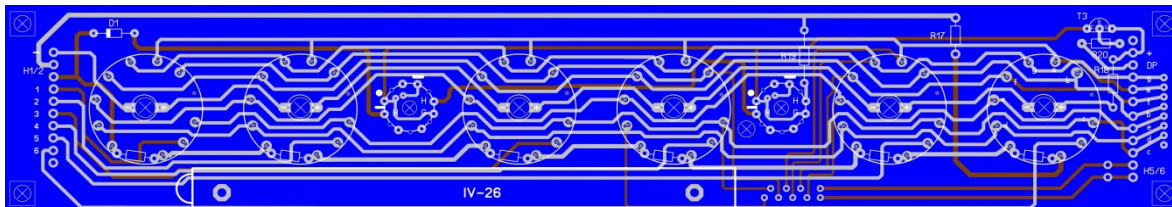
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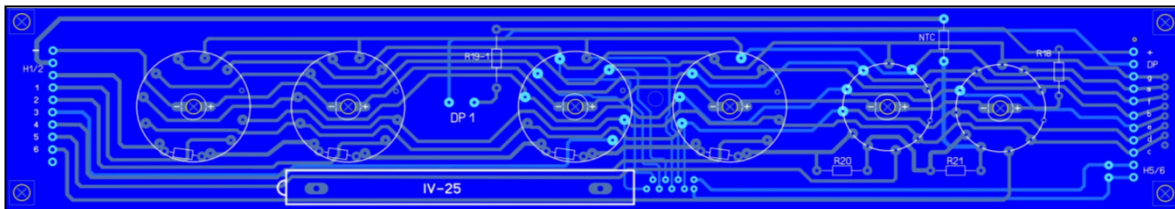
with Date, Weekday and Temperature



Master PCB 237mm x 78mm

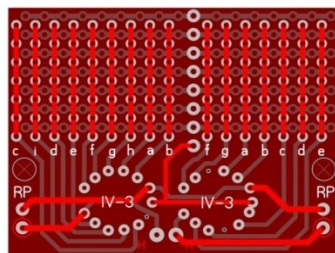


Display PCB 6 x IV-11 VFD Tubes + 2 x IV-1 Tubes 237mm x 42,5mm



Display PCB 4 x IV-11 VFD Tubes, 2 x IV-6 VFD Tubes + 1 x DP Tube 237mm x 42,5mm

Weekday PCB  
44mm x 34mm



IV-18 PCB 24,5mm  
Day, Month, Year



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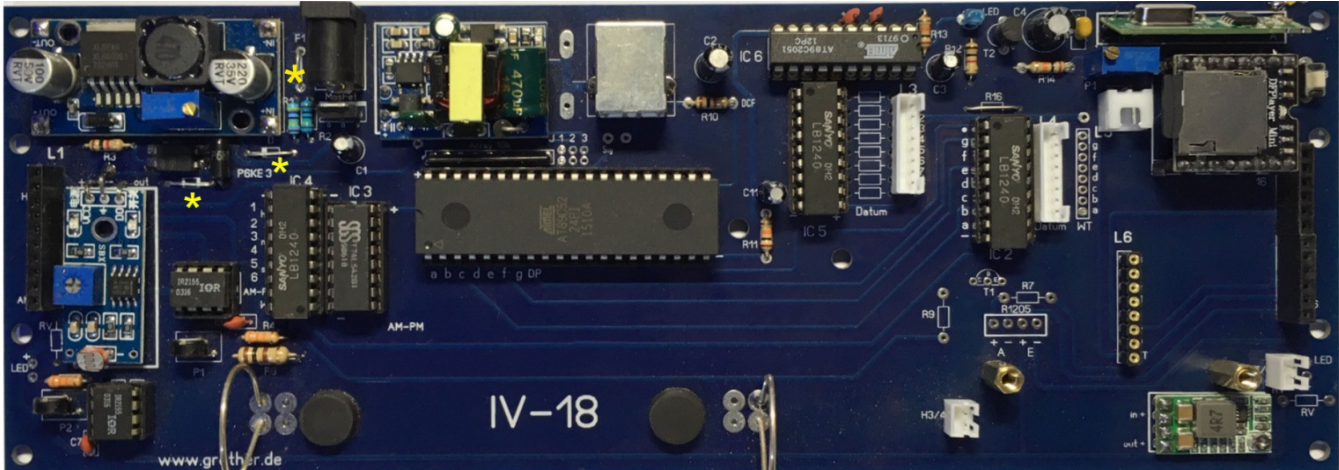
## Assemble Motherboard CPU

Parts bag 1

Zoom PDF and you will see details !!!

This is version 4. There are some changes to version 3. New DC DC 5 Volt and DC DC for IV-3 board

The 433 receiver for temperature is on board



- Solder 3 bridge wire, here marked yellow
  - Resistors  
The resistors have color code, look on the PCB pictures component list.
  - OK AQY212  
Keep mounting direction
  - P6KE Diodes  
No mounting direction
  - IC Socket 4, 16, 18, 40 pole  
Keep mounting direction
  - Quarz 12Mhz
  - Array 10k  
Keep mounting direction Mark on left site front
- Solder J1 for Date IV-18 and J2 for UK -1h
- MosFet K2399  
Keep mounting direction



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- Capacitors



104 = 100nF

33 = 33Pf



473= 47nF

- Electrolytic Capacitor

the white mark is - minus



- DC - DC Step Down 5 Volt

short distanz to PCB

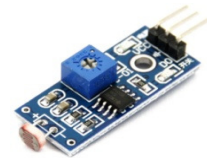


- Trimmoti, Trimmer



- Dimmermodule

Just bend the pins, remove the black plastic and bent the pins 180°



- 2.54 mm female header

left site 1 x 10 pin, right 2 x 6 pin



- DC Connector + USB Connector



- DC DC Step Up Modul

solder with 4 wire



The new DC DC modules has no trimmer, so there is no need for adjust.

The output voltage is 44 - 46 Volt

# Assembly Instructions IV-11 DCF, melody

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PCB Version 6 x IV-11 + 1 x DP

Parts bag 2



- 2 x wire bridge R19-1, 19-2

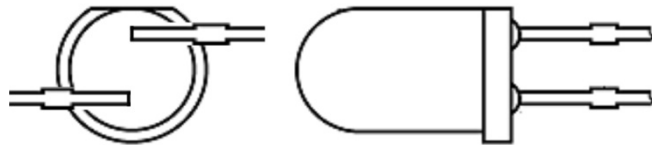
- Resistors R 17 ( NTC ) + R18



- LED 1 - 6

short pin is - ( minus ) to the left site

bend in angle cut the wire 3mm and solder



## Preparing the VFD tubes.

- Now the large IV-11 tubes, turn around and pull the wires straight using pliers. Keep the tube as in figure

- The distance between pin 1 and 11 is a greater distance than between other pins.

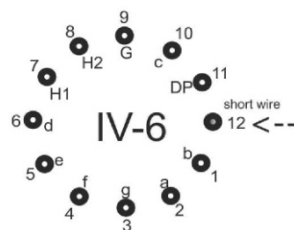
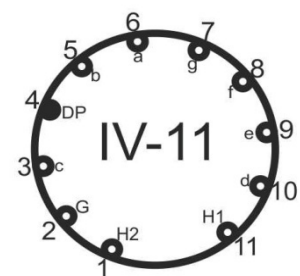
- Cut off lead 4 (DP) to 5mm in length. (Thepoint, is not required and not soldered)

- From wire 2 trim about 1 mm, then wire 3 to 2mm, and wire 4 to 3mm ... and so on, the last wire does not need trimming (wire 11). (This makes it easier to install the tube in the holes of the PCB)

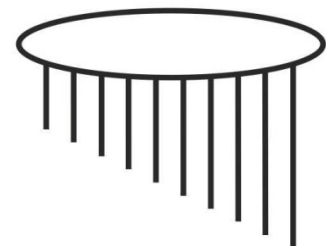
- Repeat above trimming to tubes 2,3 and 4.

- put the distance sleeves over the leds and soldering tubes in place.

Bottom view



Bottom view



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Only for 4 x IV-11 + 2 x IV-6 Display PCB

## Solder DP Led's

Solder resistor and Led's.

Minus, the short wire to the left site.

Remove the middle pin from the pin header

Angle the 2 pins 90° for soldering to PCB

Slider the black PVC direct to the PCB.



You can paint the top cap of the acrylic with black color.

Put the 10-pin header on the left and the 2 x 6-pin header on the right from below through the Display PCB.

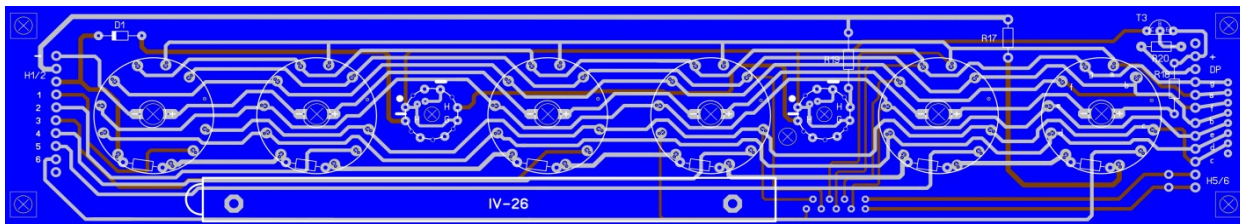
Screw both boards together, provisionally.

Push the pin headers left and right into the socket strips

Solder the pins on PCB

Now disconnect both PCB's

## IV-1 tubes only for 6 x IV-11 PCB



Diode D1 = 1N4148

Look for right direction

Transistor = PNP

Look for right direction

Resistor R19 = 75 Ohm

Resistor R20 = 4,7k

## Solder IV-1 tubes IV-1 Röhren.

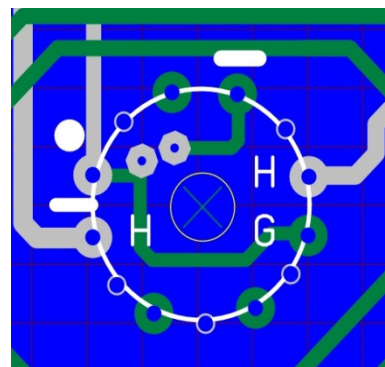
On the left site the tube has a short wire

This is the position on PCB with the mark ( line )

Default is flashing dot. If you want also flashing

line, solder a bridge between the two small

solder pads on PCB



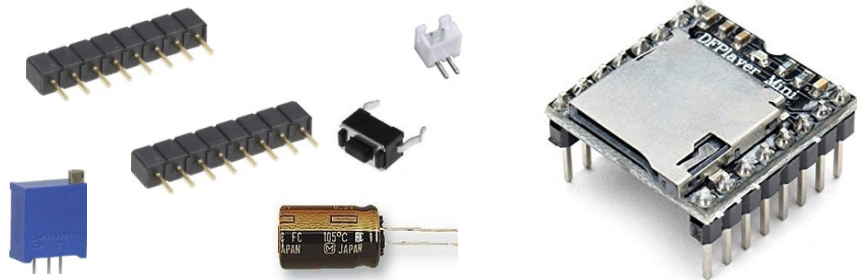
Please make sure that the wires have no contact with each other.

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## MP3 - WAV Soundmodul

Parts bag 3

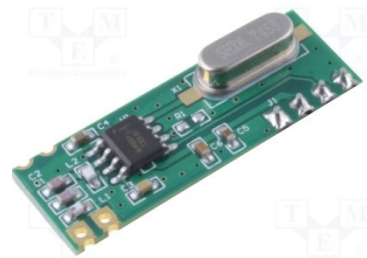
- Solder all parts



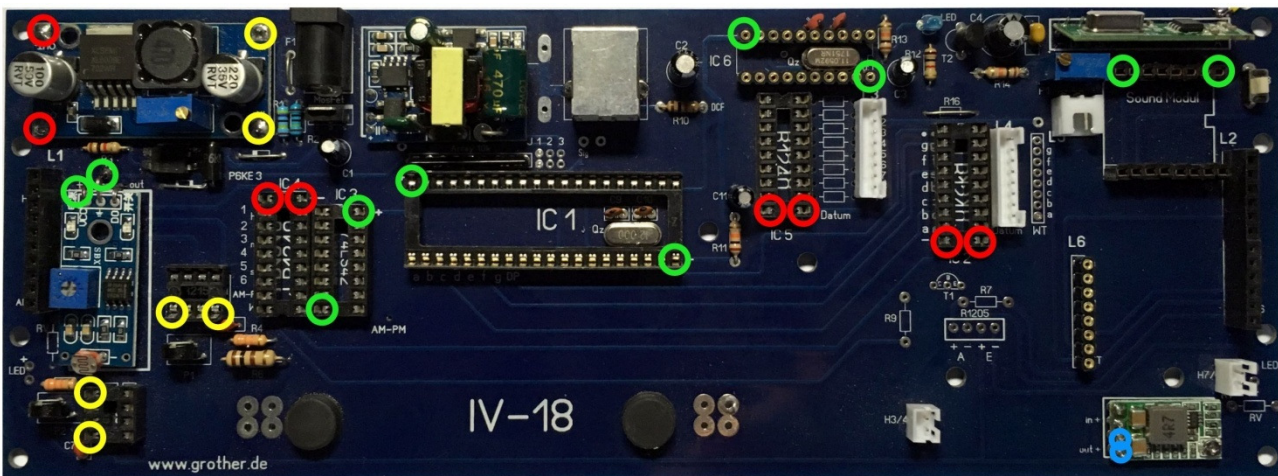
## Wireless temperature

Parts bag 8

- Solder all parts D16. R12, R13, R14, 2 x 33pF, Qz 2, C2, C3, T2, Led and 2 x 10 pin female header for At89C2051  
The 433 module will be soldered direct to mainboard.  
Slightly bend the pins before soldering



## Check voltage main PCB



Plug in the power adapter. After a short delay, one or both LEDs on Dimmer Module should go on

- 12 Volt DC IN DC-DC Step up, IR2155-1, IR2155-2
- 44 - 48 Volt DC Out DC DC Step up
- 5 Volt Dimmer, IC1, IC3, IC6, Pin 1 + 7 Soundmodul
- 44 - 46 Volt day, 35 - 39 Volt night IC2, IC4, IC5
- 1,8V DC DC für IV-3 weekday if available.

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# Assembly Instructions IV-11 DCF, melody

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## DCF 600 Receiver

Parts DCF

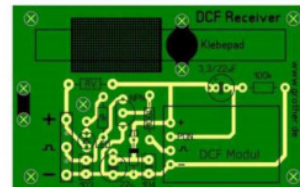
Short information.

The DCF Modules are new and came with wires prefabricated  
I desoldered these to use it for this projects

### Assembling order

- Resistors
- Diode
- Transistor
- Capacitors
- Pin Headers
- 5 pin Header. Please Pin 2 und 4 take out before soldering
- DCF Modul
- Ferrite
- with Glue pad and Strip

- + red
- ┌ green
- black



DCF Case 65mm x 46mm x 26mm

After power connection and 2 - 10 seconds the LED in DCF Module flashes.

After synchronisation with DCF Signal flaching will be each second .

If not please turn the Module in direction to Frankfurt, Germany.

Time, Date and Weekday appears after 2 - 6 Minutes.



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## Date IV-18 Tube

Parts bag 4

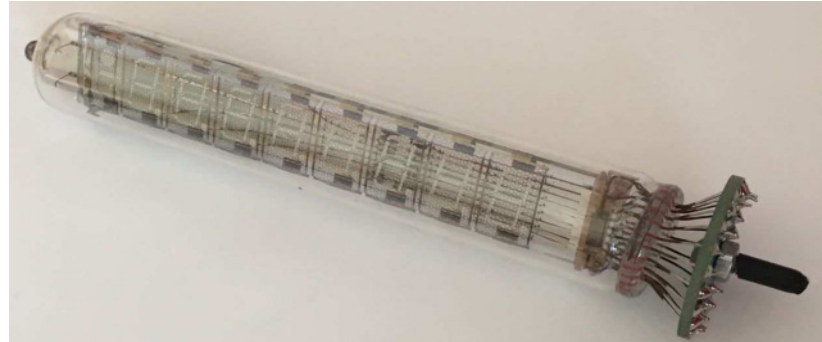
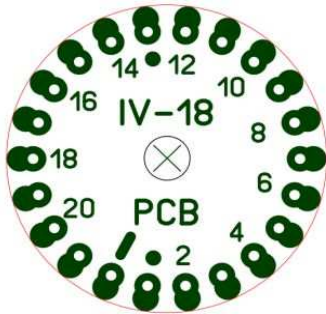
Order of assembly as described for Motherboard

Resistors, capacitors, etc.

## Solder wires IV-18 Tube


Insert screw M3 from the component side to the solder side

Put the shrink tubing over the screw and heat it.



Bend the wires of IV-18

The pin 22 is shorter, this first through PCB

( see mark  )

Now the other wires

Adjust PCB and wires 7mm. Distanz to PCB and tube

Solder wires and cut it.

Please check with Ohmmeter Pin H1, H2 filament

Pin 9 and 21. Here about 14 Ohm.

Check the length of the 8 pin cable L3, L4 and H3/4 by plug in on the motherboard

The wires should be 75 mm to 85mm

Now solder the wires shown right table

Put the IV-18 in a drinking glass so it's easy to solder the wires

First solder the 8 pin cables

Then the 2 pin cable.

Bend the wires and fix it with cable ties.

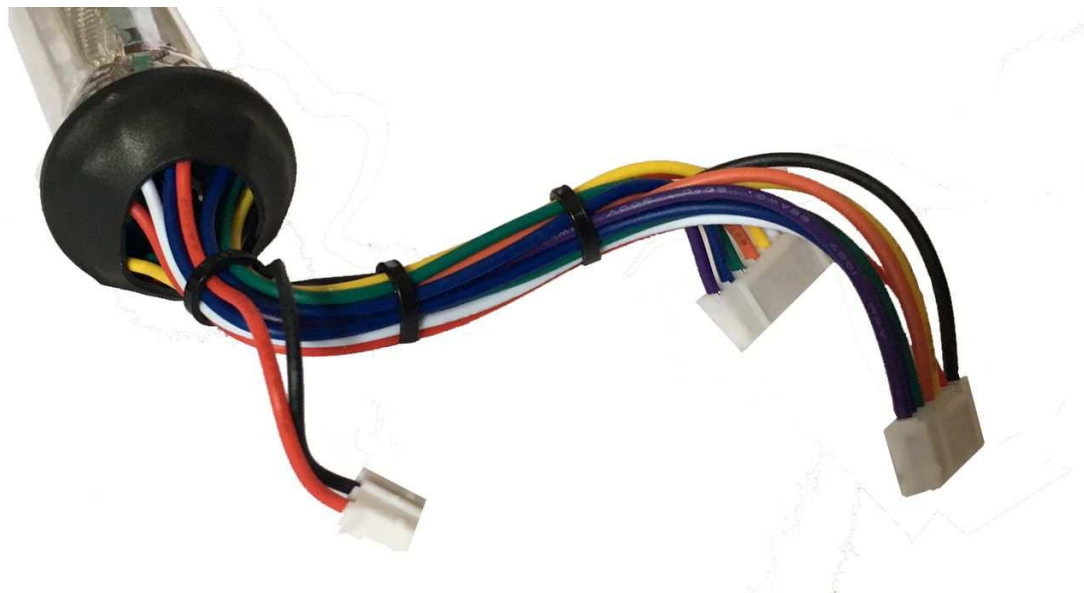
For better contrast you can use a black adhesive tape.

Pin		L3	L4	H3/4
1	Digit 5	orange		
2	Digit 3	white		
3	Digit 2	red		
4	Digit 1	black		
5	Digit 4	yellow		
6	Digit 6	green		
7	Digit 8	violet		
8	Digit . -			
9	H1			red
10	a		violet	
11	f		white	
12	b		blue	
13	g		red	
14				
15				
16				
17	e		yellow	
18	c		green	
19	d		orange	
20	Punkt		black	
21	H2			black
22	Digit 7	blue		

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Please only use this table. It is made for the round PCB



Now pull the shrink tubing over the wires and shrink over the round board.  
( use a lighter )



Stick the 2 adhesive pads to the motherboard  
The holes left and right from the pads are for fixing the tube with the 1.0mm silver wire.



Bend the wires on the IV-18 tube, then solder first one wire.  
Then pull tight and solder the other.

After power on the display shows 00.00.2000 When the DCF is synchron the date appears.

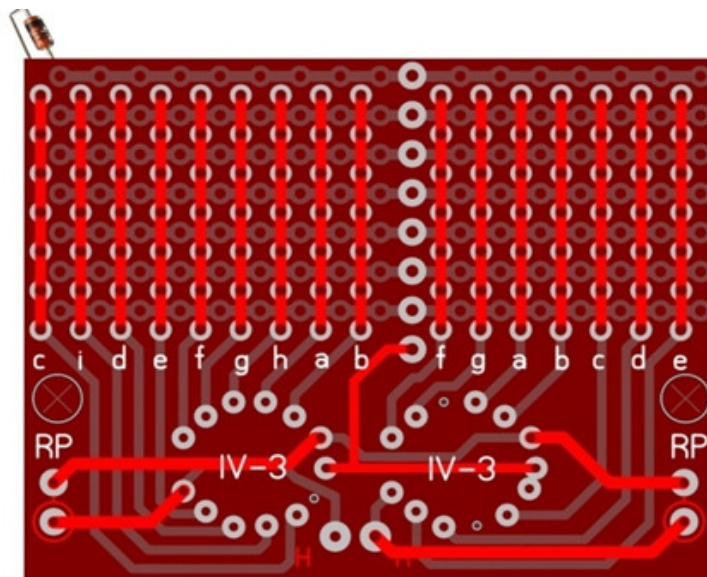
# Assembly Instructions IV-11 DCF, melody

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Weekday with 2 x IV-3 9 Segment

Parts bag 5

	IV_3 left										IV-3 right						
	c	i	d	e	f	g	h	a	b		f	g	a	b	c	d	e
g	So	x		x		x	x		x			x			x	x	x
f	Sa	x		x		x	x		x		x	x	x	x	x		x
e	Fr				x	x	x		x			x					x
d	Th		x					x	x		x	x			x		x
c	WE	x	x	x	x	x			x		x	x	x			x	x
b	Tu		x					x	x						x	x	x
a	Mo	x			x	x		x	x			x			x	x	x



The new PCB is in red color incl. holes for 2 Resistors.

If a tube is brighter than the other, solder the 100R resistor to the brighter one.

You need a soldering iron with a small tip.

Solder the diodes shown in the table.

The first vertical row is for segment " c " and needs 4 diodes

Solder the diodes in direction shown on the picture.

After soldering the first row please check the

solder joints with a magnifying glass.

## The IV-3 9 Segment solder to the left site !

Looking from the front the IV-3 tubes have on the left site a short wire. This wire will not be soldered

This is the position on the PCB where is no hole.

# Assembly Instructions IV-11 DCF, melody

with Date, Weekday and Temperature

**Solder the IV-3 tubes direct to PCB with low distance.**

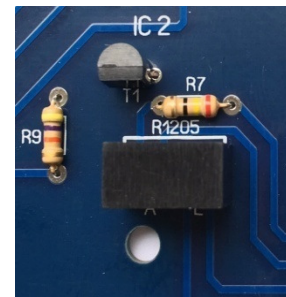
- Solder 8 pin female header to the motherboard.
- Solder 8 pin male header to IV-3 PCB.  
The longer pins point down  
Solder 2 pin cable for filament

Screw 2 x 10mm spacers on the motherboard.



## Weekday with IV-25 / IV-26 dot display

- Solder parts shown on the picture  
**The label of the R1205 voltage regulator is behind**



IV-25 and IV-26 picture you see the tubes from the wire site

For 6 x IV-11 Display PCB is the IV-26 provided.

The smaller IV-25 is for 4 x IV-11 2 x IV-6 PCB

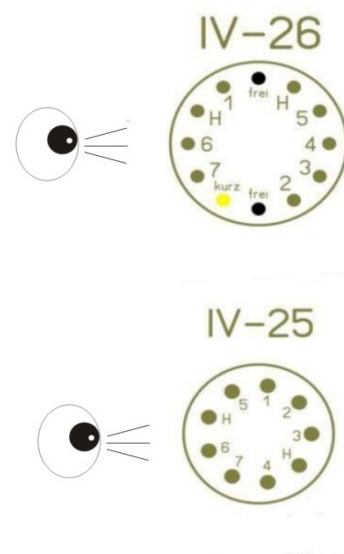
- just pull the wires of the tube  
For indication there is a short wire. Yellow marked on the picture.

You get a red and a black wire. From this you need only the insulation.

Check the wires H1 - H2 with a Ohmmeter. For these wires take the red isolation.

The other wires with black.

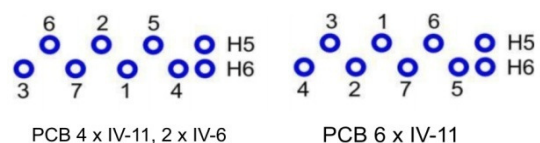
The short pin of IV-25 is pin No. 6



First stick the two adhesive pads to PCB

IV-25 or IV-26 tubes fix with to wires.

Tighten and solder the wires on PCB bottom.

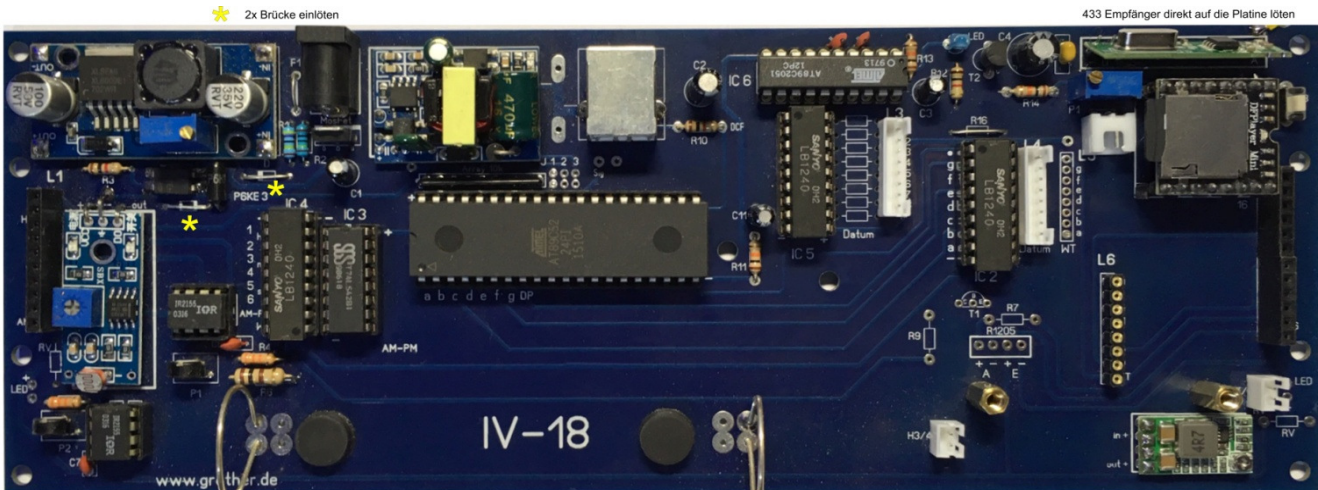


Now from left to the right solder each wire.

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## Commissioning



After checking all voltages page 6 you can stick the IC's .

Pay attention about the right direction

You need for main PCB: IC1, IC2, IC3, IC4 und IR2155-1

- Extension IV-18 Date: IC5 und IR2155-2
- Extension Soundmodul 16 pin DF-Player mini oder MP3-TF-16p

Screw 5 x 25mm spacer on main PCB. ( for display PCB )

Plug Display PCB into IV-11 board. Make sure that the pins are exactly in the socket strip on the left and right.

Connect the DCF Modul and then the power adapter.

Now the RGB leds should lit below the IV-11 tubes. The the tubes should count up from 00:00:00.

If the DCF box is in the right direction the time will displayed after 2 - 6 minutes.

If not turn the DCF box to direction Frankfurt. Look at the Led in the box. It should flash in minutes pulse.

The IV-18 tube displays 00.00.2000 and after synchronisation with DCF Signal the date.

Jumper J1 open. Date will be displayed on the IV-11 tubes. J1 closed, date on IV-18

Jumper J2 open EU time. J2 closed UK time. It is - 1h from EU time

If everything is all right no you can follow with the extension, Sound modul, Weekday and or Wireless Temperature.

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## MP3 Soundmodul

All Mp3 files are on the microSD card. Files for hour and also  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  hour

Each full hour the time will spoken in German.

All  $\frac{1}{4}$  hour 1 x Gong, all  $\frac{1}{2}$  Stunde 2 x Gong, all  $\frac{3}{4}$  Stunde 3 x Gong

To play your own files, the following should be noted.

- the files must be in "MP3" folder
- File 0001.mp3 is for 01:00 hour, 0002.mp3 for 02:00 hour . and so on
- 0025.mp3 is for  $\frac{1}{4}$  hour 0026.mp3 for  $\frac{1}{2}$  hour 0027.mp3 for  $\frac{3}{4}$  hour

If you don't want the  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  hour signal, delete the files.

It is possible for example in the night from 22:00 until morning 07:00 no voice.

These are the files 0022.mp3 - 0007.mp3.

Please do not delete these files. The file name must be exist

For this reason, there is the Leer.mp3. You should use this file and copy it to a new file name 0022.mp3

When the filesystem is done on your HD copy it to the micro SD card.

It is important to copy the files, first 0001.mp3, then 0002.mp3 and so on.

If something is wrong with the filesystem it didn't work.

You can use the Freeware "audacity" for editing MP3 files

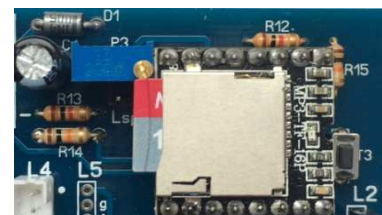
The Soundfiles can tested via Mikro SW T3

The output power can adjusted with P3 , 20 turns.

The speaker can be mounted with screws on OpenSky case.

Name	Datum	Typ
MP3	29.07.2017 08:23	Dateiordner

Name	Typ	Größe
0001.mp3	MP3-Audioformat	18 KB
0002.mp3	MP3-Audioformat	20 KB
0003.mp3	MP3-Audioformat	19 KB
0004.mp3	MP3-Audioformat	19 KB
0005.mp3	MP3-Audioformat	23 KB
0006.mp3	MP3-Audioformat	21 KB
0007.mp3	MP3-Audioformat	20 KB
0008.mp3	MP3-Audioformat	23 KB
0009.mp3	MP3-Audioformat	21 KB
0010.mp3	MP3-Audioformat	21 KB
0011.mp3	MP3-Audioformat	24 KB
0012.mp3	MP3-Audioformat	24 KB
0013.mp3	MP3-Audioformat	23 KB
0014.mp3	MP3-Audioformat	23 KB
0015.mp3	MP3-Audioformat	24 KB
0016.mp3	MP3-Audioformat	23 KB
0017.mp3	MP3-Audioformat	25 KB
0018.mp3	MP3-Audioformat	24 KB
0019.mp3	MP3-Audioformat	23 KB
0020.mp3	MP3-Audioformat	24 KB
0021.mp3	MP3-Audioformat	32 KB
0022.mp3	MP3-Audioformat	33 KB
0023.mp3	MP3-Audioformat	32 KB
0024.mp3	MP3-Audioformat	21 KB
0025.mp3	MP3-Audioformat	68 KB
0026.mp3	MP3-Audioformat	133 KB
0027.mp3	MP3-Audioformat	198 KB
Leer.mp3	MP3-Audioformat	52 KB

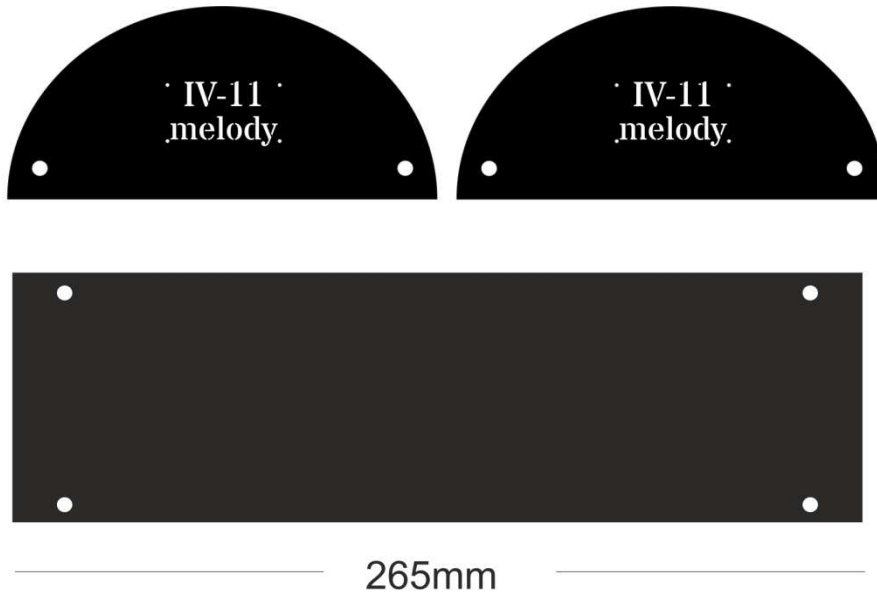


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Case OpenSky for IV-11



Mounting case:

- Insert screws through the aluminum profile, then through the PVC base plate ( remove protective film first )
- washer + M3 nut
- PCB
- Cap nut

For IV-11 melody mount the speaker  
( remove protective film first )

- mount left and right acrylic plate with Head Thumb Screws

For the extension weekday 2 x IV-3A cut a rectangle into the acrylic foil.

The template for this on the next page.

Also, cut the diagonals it is easier to unstitch.

All holes in the side panels and at the bottom are drilled a bit larger. You can adjust a little bit.

Unscrew the side plates before fitting the acrylic cap. So it is easier to install.

Slide the acrylic cap over the IV-11 tubes and insert under the aluminum profiles.

Now everything can be aligned and then tighten the screws again and the side panels.