V. 1
29.08.2017

ASSEMBLY GUIDE

JUNIOR 1D

SHORTWAVE RECEIVER KIT
DOPPELSUPER, 10.7 MHZ-455 KHZ AM/SSB
1.5 - 30 MHZ

STAMPFL
HAM ELECTRONICS

TABLE OF CONTENTS

EDITORS NOTES

THERE IS NO WARRANTY TO THE KIT!
If short circuits and smoking heads occur please use "FIRST AID"

TOOLS

- Screwdriver
- Flatnose Pliers
- Electric Soldering Iron
- Multimeter
- Insulated Pliers
- Small Pliers 2mm
- Fine Tweezers
- Magnifying glass

Pictures are in high resolution and can be enlarged.

GUIDANCE FROM:

- HB9KOC Heinz Stampfl
- HB9QN Rolf Hasler
- Mario Graf (grafdesign.ch)
- Carmen Sommer

Many thanks for the support!

UUUPS! SHORT, MALFUNCTION, PROBLEMS? - FIRST AID (HELP INSTRUCTION GUIDE)

1. Write a detailed Report
2. Make Photos of your kit and attach it to the E-mail 2x (front and back of the print)
3. Initiate calming measures
4. Wait for Help

E-MAIL ADDRESS
info@heinzstampfl.ch

JUNIOR 1D

Again and again I had requests from Junior1 builders, whether digital frequency displays or reception areas can be extended. I advise against these interventions. The questions motivated me, however, to develop Junior1 further. J1D is the successor model of Junior1, specially developed for HAM RADIO enthusiasts without HF measuring station.

The only adjustment work is to adjust the LCD
Display contrast!

J1D shows the following changes: An Atmega AT644 microprocessor is used as a "brain". This provides the control commands for the DDS, the LCD display and the preselector. All buttons as well as the redary encoder are also queried at the AT644. The reception concept of Junior1 has proven itself, which is why it was largely adopted in J1D. However, the large reception area requires a completely new input circuit. The preselector realized with high-quality ring cores provides a good mirror frequency suppression. At the output of the preselector, the RF voltage is converted by the field effect transistor in a low-impedance manner and supplies this voltage to the first mixer. At the output of the mixer, the first IF is at 10.7 MHz. If you want to upgrade the receiver, the 10.7MHz ceramic filter can be replaced by an 8-pole quartz filter. The board is ready to handle it.

The first IF enters the A4100D. This converts the 10.7MHz to the 2nd IF of 455kHz. The automatic
Amplification control, demodulation and LF preamplification
Also takes the A4100D.

An SSB reception comes by direct radiation in the ZF amplifier. The superimposed oscillator is realized with a BC547 and a ceramic resonator.

By this direct method, however, the control range is lower and there is a continuous glow of the "Field LED". In addition, distortion of the SSB reception is possible with too strong signals.

An LM380 in conjunction with a 4Ohm loudspeaker guarantees a strong audio reproduction.
The operation of J1D is reduced to the essentials.
The tuning steps can be selected by pressing the redary encoder knob. The "MEMO button" allows you to store the last set frequency and type of demodulation before switching off the device. The pre-programmed reception frequencies are selected by pressing the "Amateur" and "Radio" buttons.
The "Field LED" shows the relative reception field strength and serves as a tuning aid for the preselector.
A new battery compartment is also available.

Conclusion: J1D is a powerful SW receiver with high sensitivity and frequency stability in a attractive design. Before we begin now with the construction, read these important points:

1. **The pushbuttons must be used in the correct position. The stage on the button is marked as a line on the board.**
2. **Check the correct resistance before soldering the resistors Value.**
3. **The electrolytic capacitors are absolutely polarized soldered. The positive pole is the longer wire and the Negative pole is marked on the housing.**
4. **Take your time and follow instructions.**
5. **Make sure you do not create any short circuits because of Soldering eyes.**

If you want to mount the IC's (except A4100D), which is not absolutely necessary. Frames can be used. If so take special caution to check all pins for alignment.

REMARKS

As with any other electronic circuit, the development of Junior 1D was the greatest challenge to find the best possible compromise. At a Product of this type should also have its advantages and disadvantages be addressed.

Local Oscillator:

The local oscillator is obtained directly from the DDS. Unfortunately, DDS oscillators in this price class have their disadvantages. In addition to the main signal, many weak secondary frequencies are included in the spectrum. This is shown by disturbed reception areas. On: 5.1-8-8.5-9.4-10.4-11.7MHz, this effect is strongest. When the antenna is connected, however, most “ghost signals” disappear under the noise. A plus is the good phase noise of the LO, because the DDS output signal is derived directly from 125MHz clock.

SSB reception:

In SSB reception, the upper and lower side bands is received at the same time (DSB). The bandwidth is 6kHz. Only one SSB filter with 2.7kHz bandwidth and with the appropriate overlay frequencies would allow real single-page reception here.

SSB Smaller dynamics:

By directly feeding the SSB superimposed frequency from 455kHz into the A4100D, the AGC (Automatic Gain Control) “pulls” by about 40db. Exactly this value goes in the Scope of control. This can happen with strong SSB Stations as distorted playback. Here, only a weakening of the input signal brings relief.

A great plus of J1D is its simple operation, a very good powerful sound in AM and its high assembly security packed in a pleasing appearance

Useful tips before we start!

Put away the Speaker and not to unpack it.
Reason: The magnet can attracts small parts.

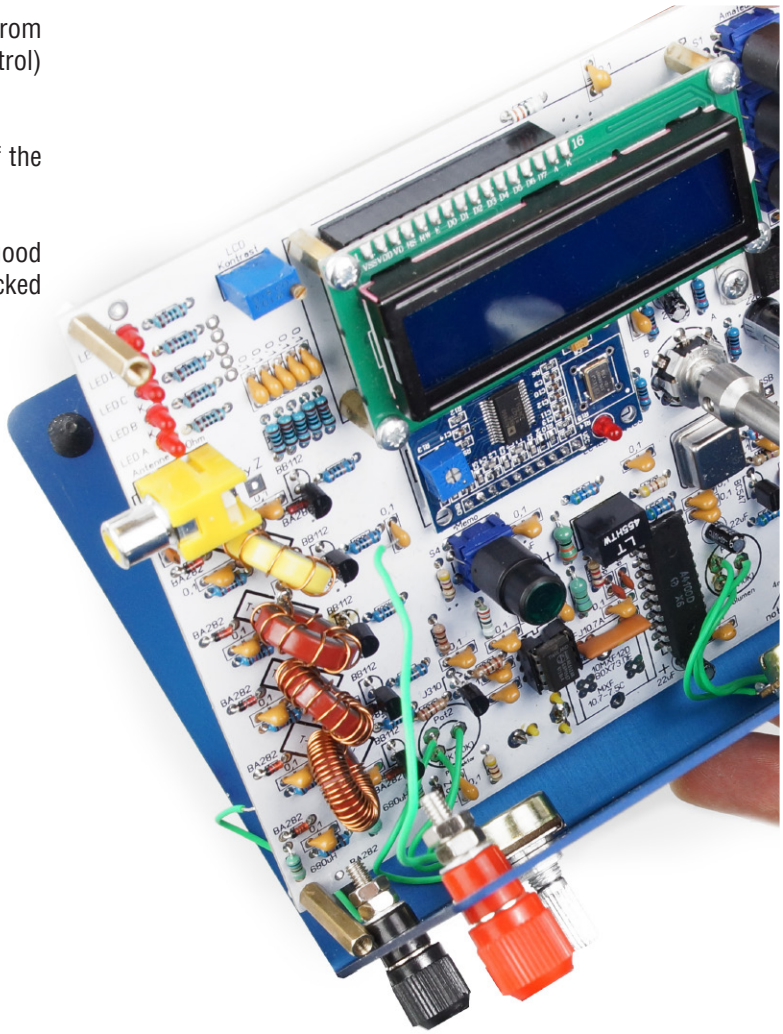
Empty all remaining plastic bags into a clean vessel.
There is no packaging system.

Have fun and success in building this Kit.

Heinz Stampfl

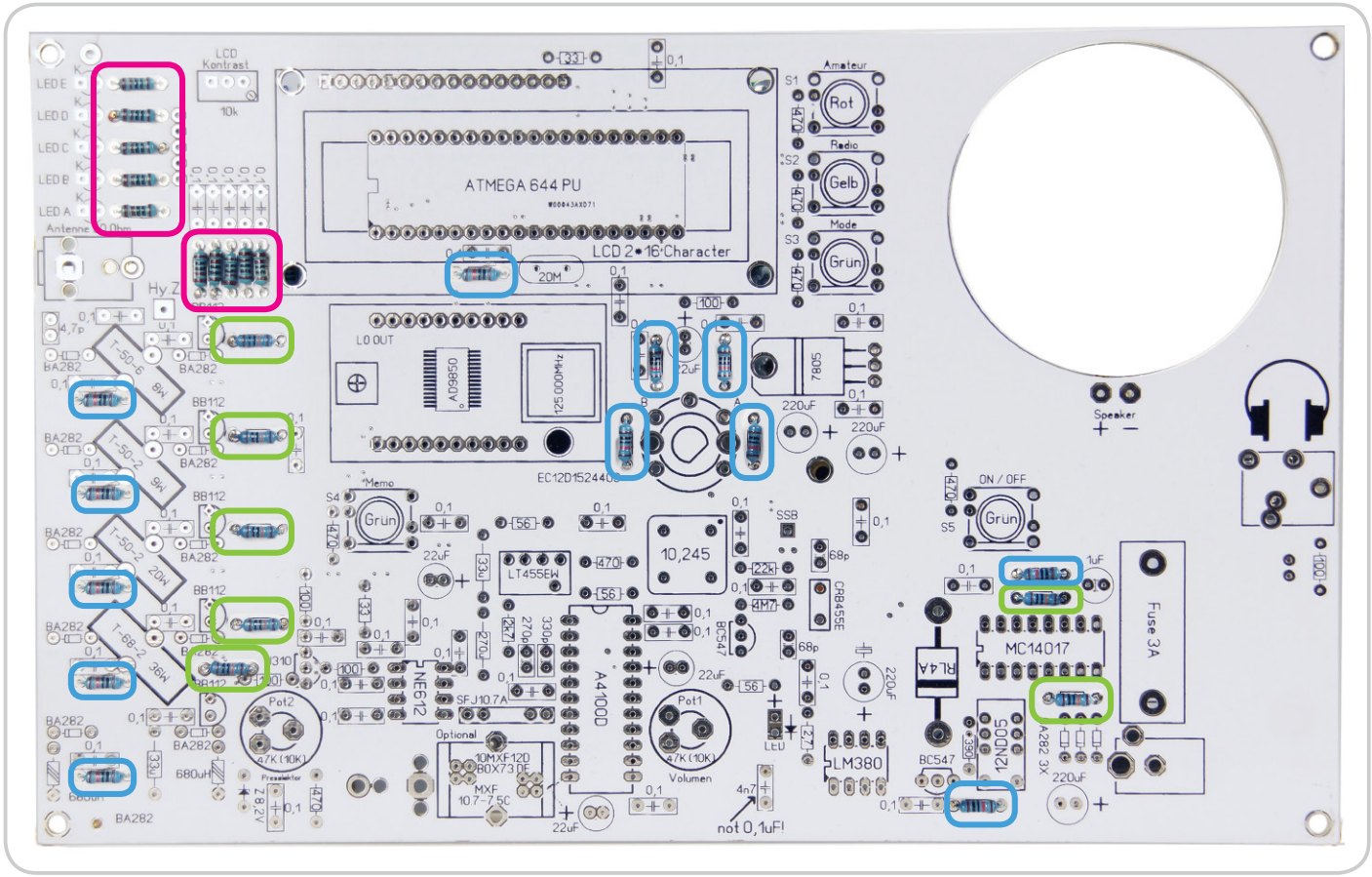
TECHNICAL SPECIFICATIONS

- reception area: 1,5-30MHz
- Modulation types: AM-DSB
- IF Filter: 10,7MHz ceramics
  (Optional quartz filter 8Pol) 455kHz 6kHz BW 6Pol
- Dynamic Range AM: 95db
- Dynamic Range SSB: 55db
- SSB Method: Direct irradiation into the IF amplifier
- Receiver principle: Doppelsuper 10,7MHz-455kHz
- Local oscillator: DDS(9850) 125MHz CLK
- Frequency steps: 10Hz, 100Hz, 1kHz, 5kHz, 9kHz
- Display: LCD 2x16 character
- Voltage range: 9-16V
- Power consumption: 300mA
- Battery Life: 8xAlkaline Typ AA ca.7h Akku 2100mAh ca.7h
- Height, width, depth: 150mm, 215mm, 150mm
- Weight: 0,85kg mit Batterien



RESISTORS: 1

We first fit the flat components:
We start with the Resistors which we check for its right value before soldering it to the Print



10x

Metal Film Resistors: 1k
Color Code: brown | black | black | brown | brown

7x

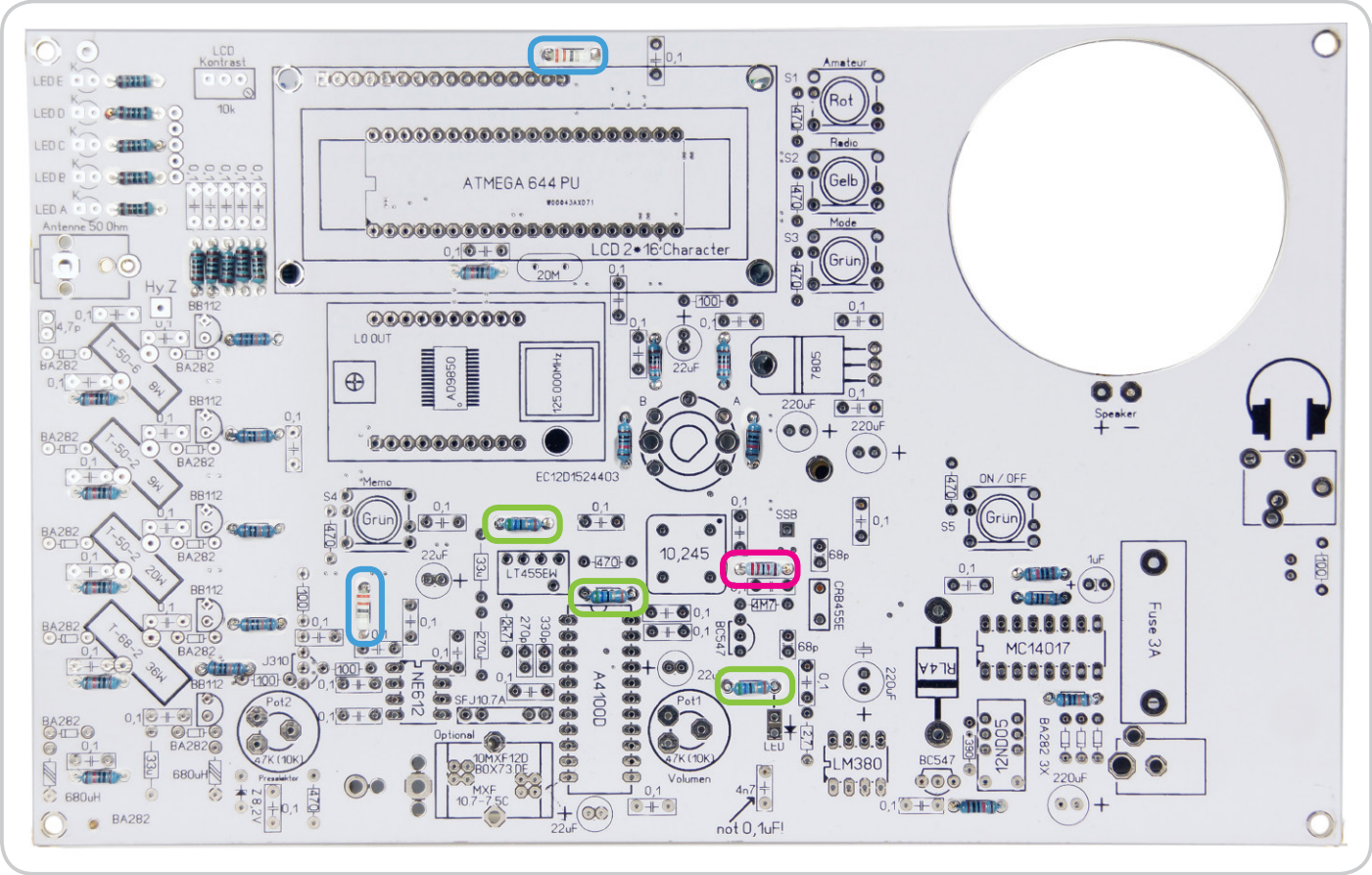
Metal Film Resistors: 100k
Color Code: brown | black | black | orange | brown

12x

Metal Film Resistors: 10k
Color Code: brown | black | black | red | brown

RESISTORS: 2

We first fit the flat components:
We start with the Resistors which we check for its right value before soldering it to the PCB



1x

Metal Film Resistors: 22k
Color Code: red | red | black | red | brown

3x

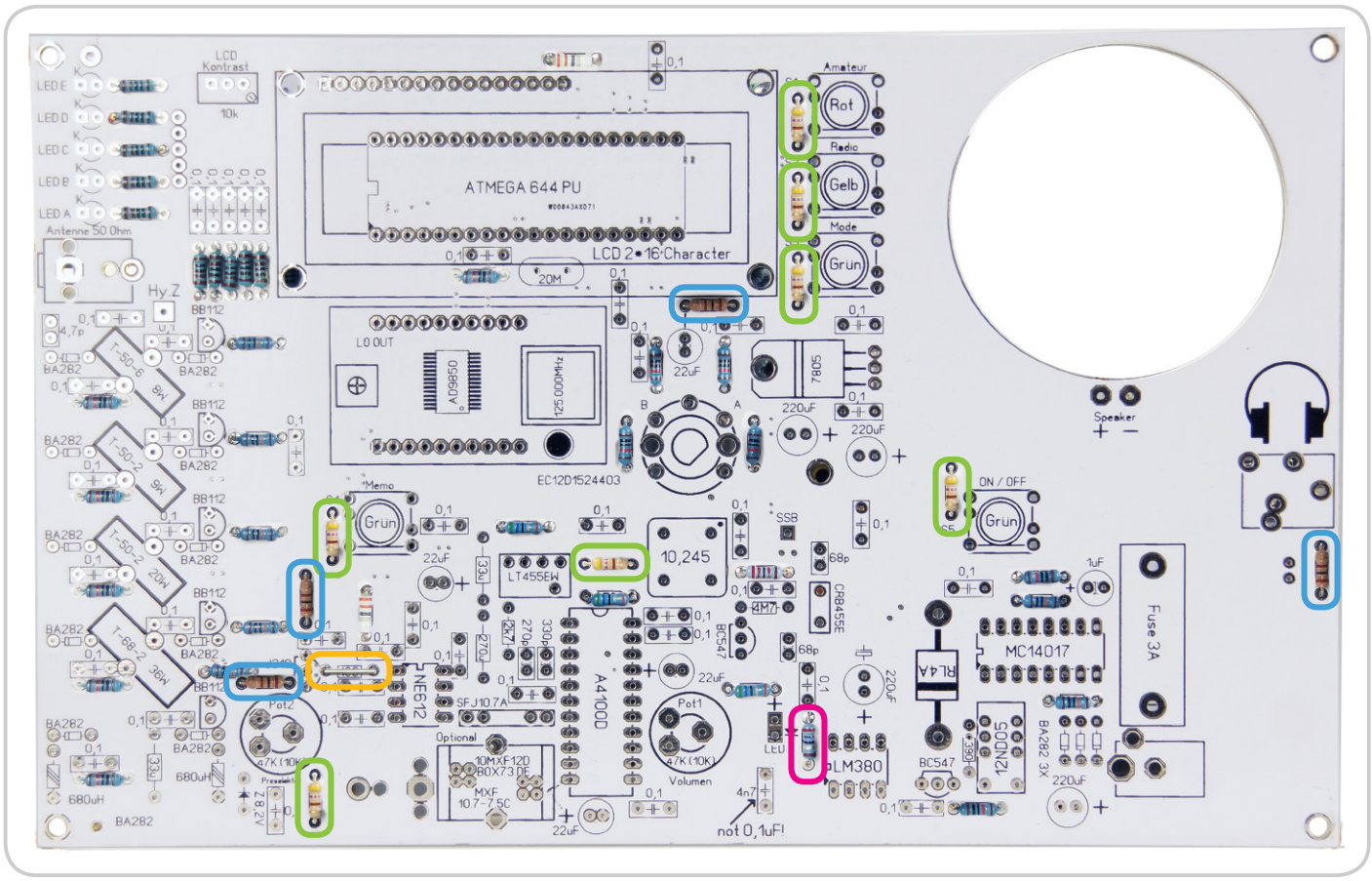
Metal Film Resistors: 56R
Color Code: green | blue | black | gold | brown

2x

Metal Film Resistors: 33R
Color Code: orange | orange | black | gold

RESISTORS: 3

We first fit the flat components:
We start with the Resistors which we check for its right value before soldering it to the PCB



1x

Metal Film Resistors: 2,7R
Color Code: red | violet | black | silver | brown
Alignment does not matter.

7x

Carbon Film Resistors: 470R
Color Code: yellow | violet | brown | gold
Alignment does not matter.

4x

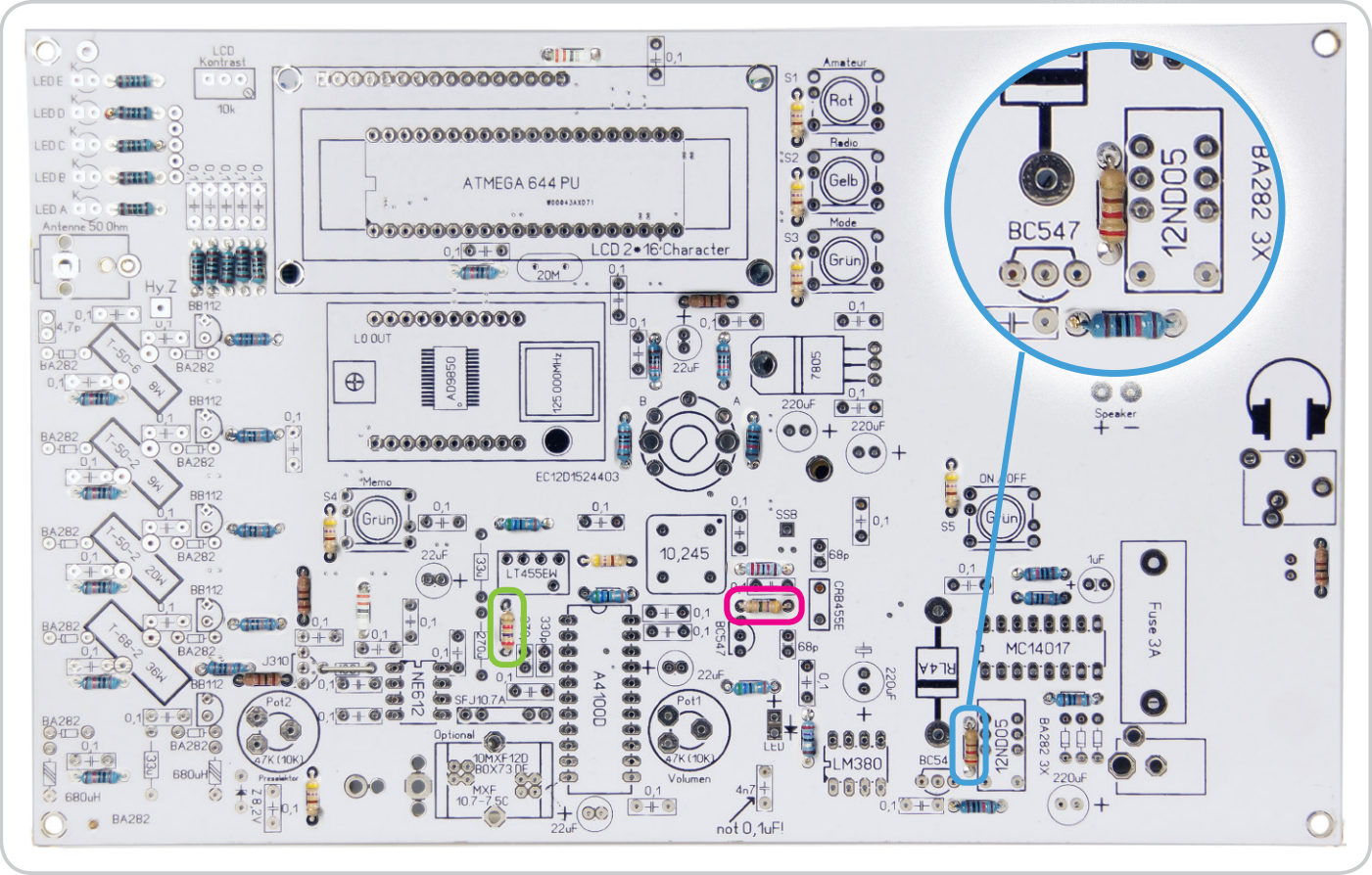
Carbon Film Resistors: 100R
Color Code: brown | black | brown | gold
Alignment does not matter.

1x

ERSATZ: Drahtbrücke
Anstelle des 100R Widerstandes!

RESISTORS: 4

CORRECTION!:
Instead of the 390R a 220R Resistors is soldered in.



1x

Carbon Film Resistors: 4M7
Color Code: yellow | violet | green | gold
Alignment does not matter.

1x

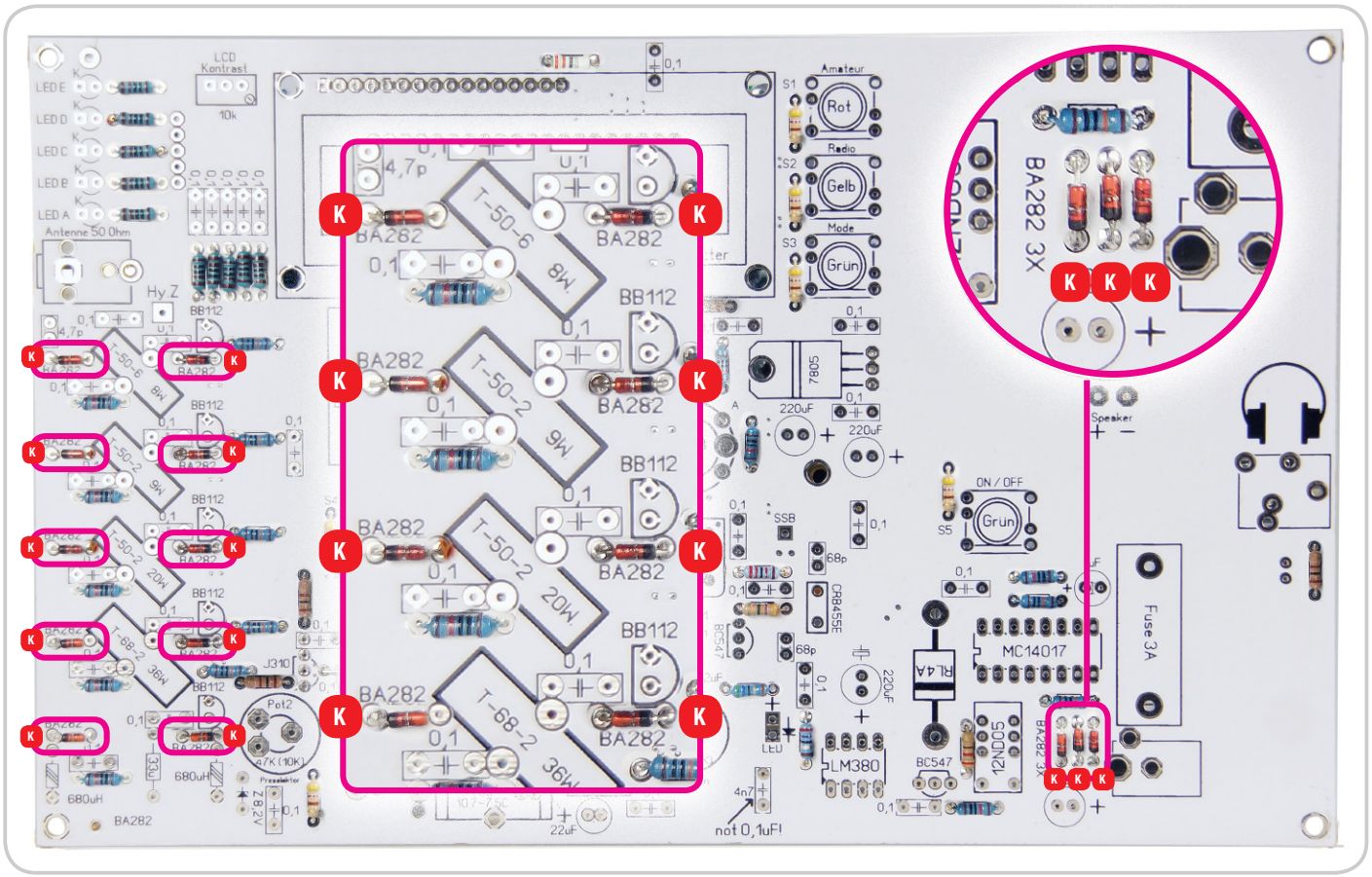
Carbon Film Resistors: 2k7
Color Code: red | violet | red | gold
Alignment does not matter.

1x

Carbon Film Resistors: 220R
Color Code: red | red | brown | gold
Alignment does not matter.

DIODES: 5

ATTENTION!:
Keep mounting direction in mind!

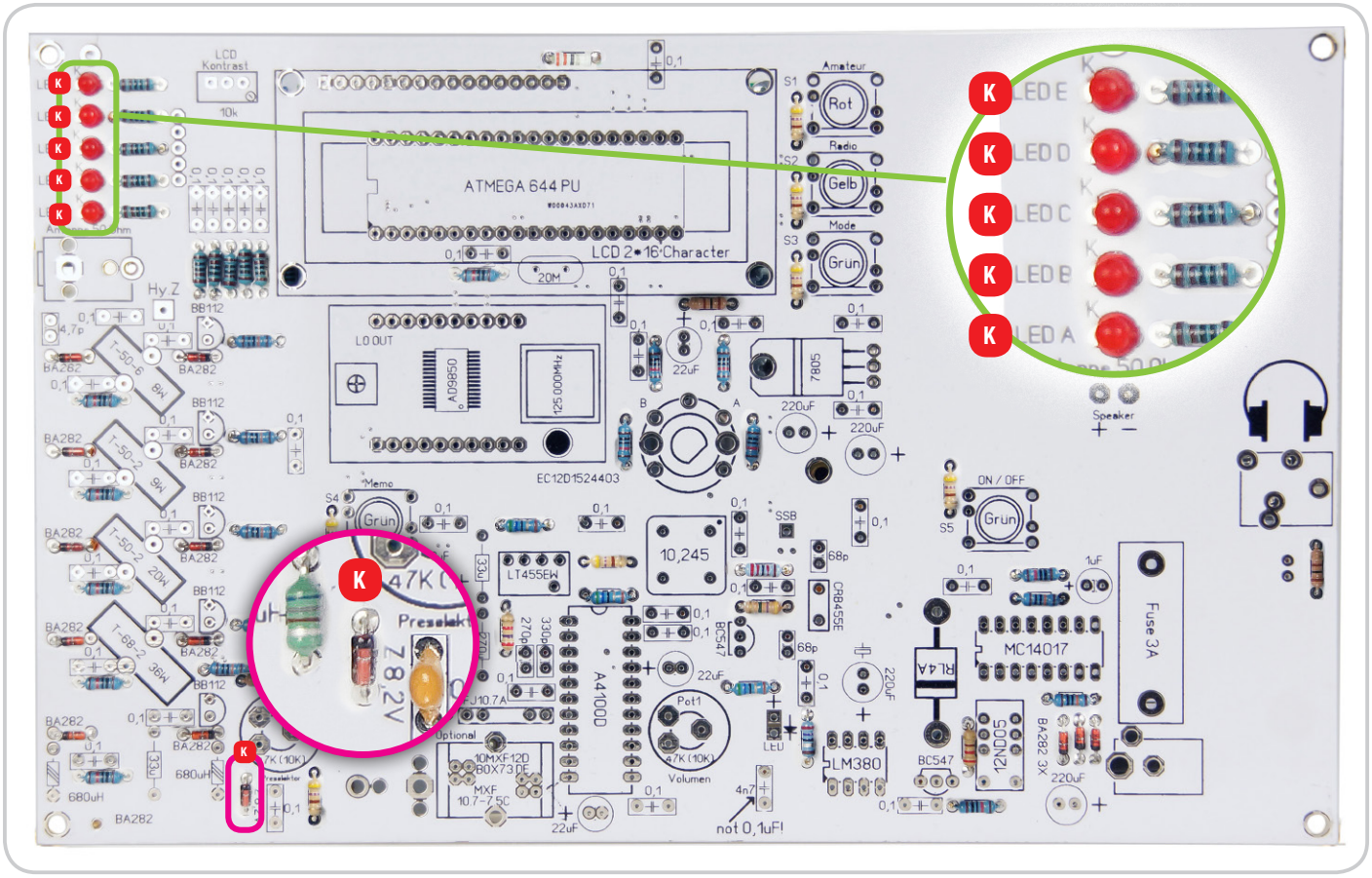


13x

Switch diode Typ: **BA282**

DIODES: 6

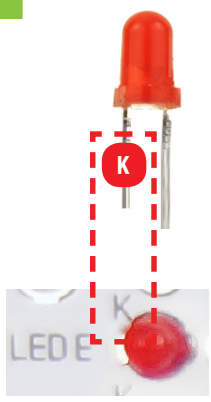
ATTENTION!:
Keep mounting direction in mind!



1x

Z-Diode Type: V8V2

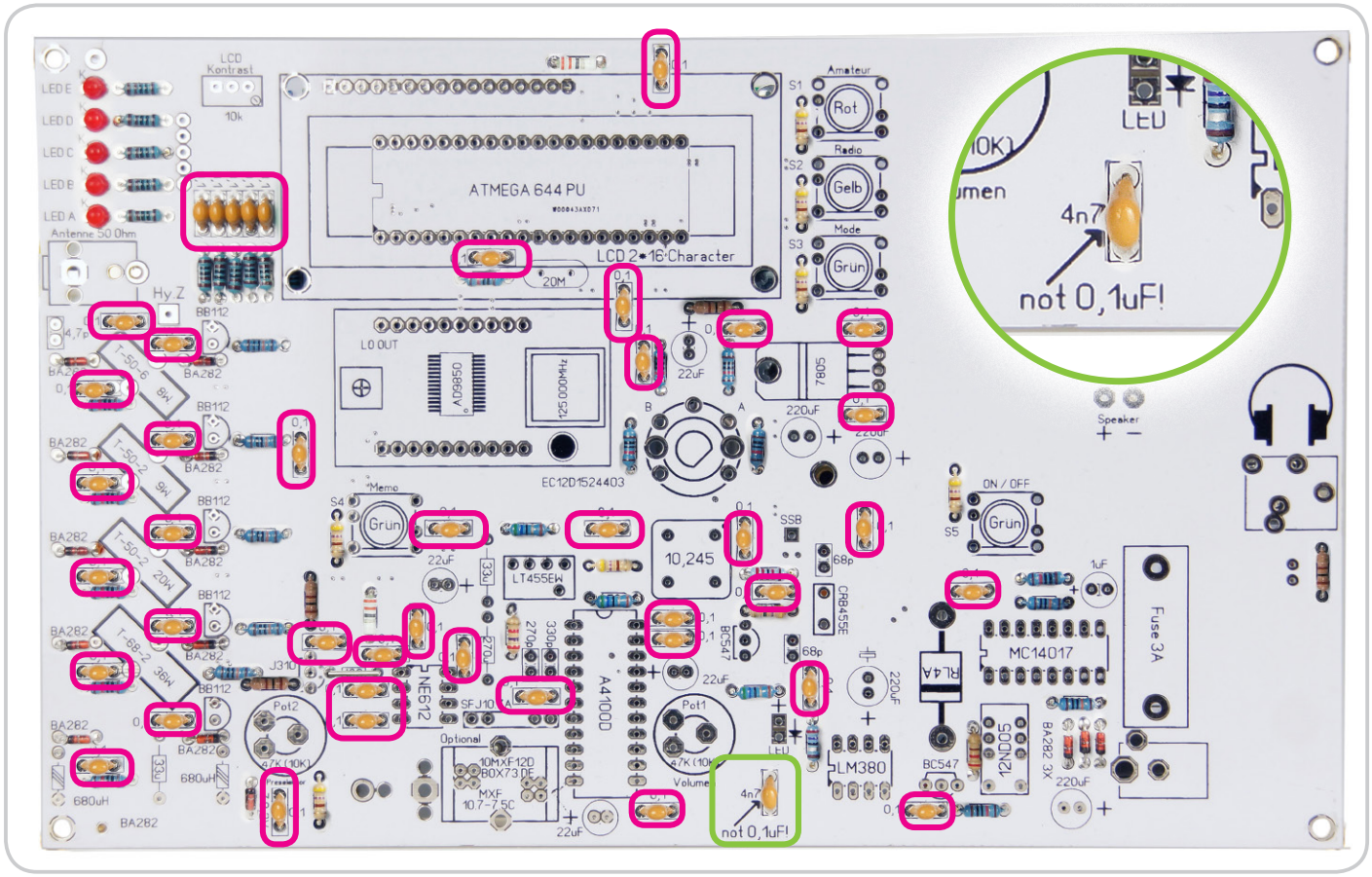
5x



LED: 3mm
The shorter leg is the minus pole (C).

BLOCKING CAPACITORS: 7

ATTENTION!:
The design of the 4,7nF ist the same as the 0,1uF!



43x

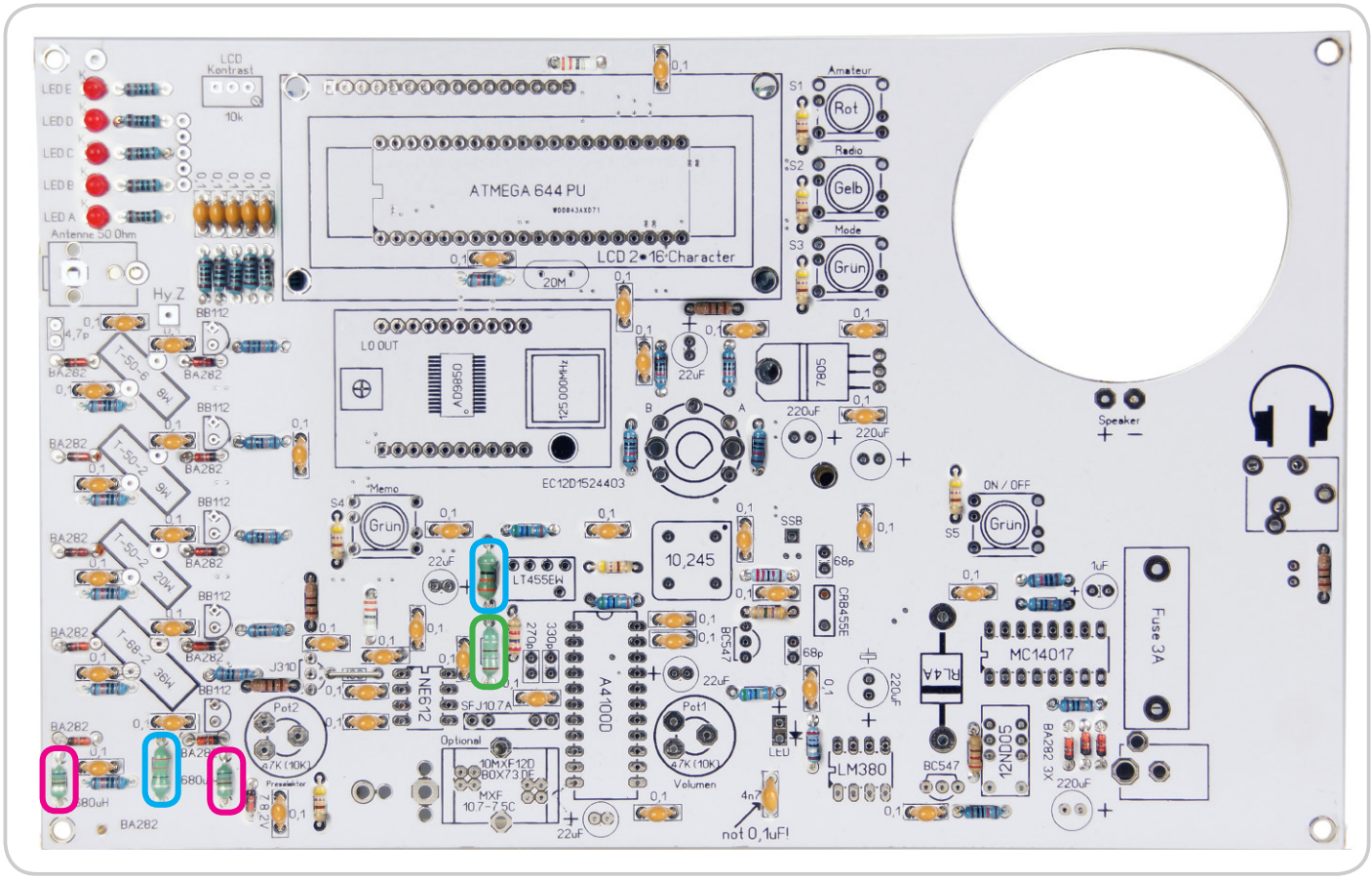
Blocking Capacitors: 0,1uF
Alignment does not matter.
In excess available!

1x

Ceramic capacitor: 4,7nF
Alignment does not matter.

INDUCTORS: 8

ATTENTION!:
Spool body could break!
Bend wires with care.



2x

Inductors: 680uH
Color Code: blue | grau | brown | silver
Alignment does not matter.

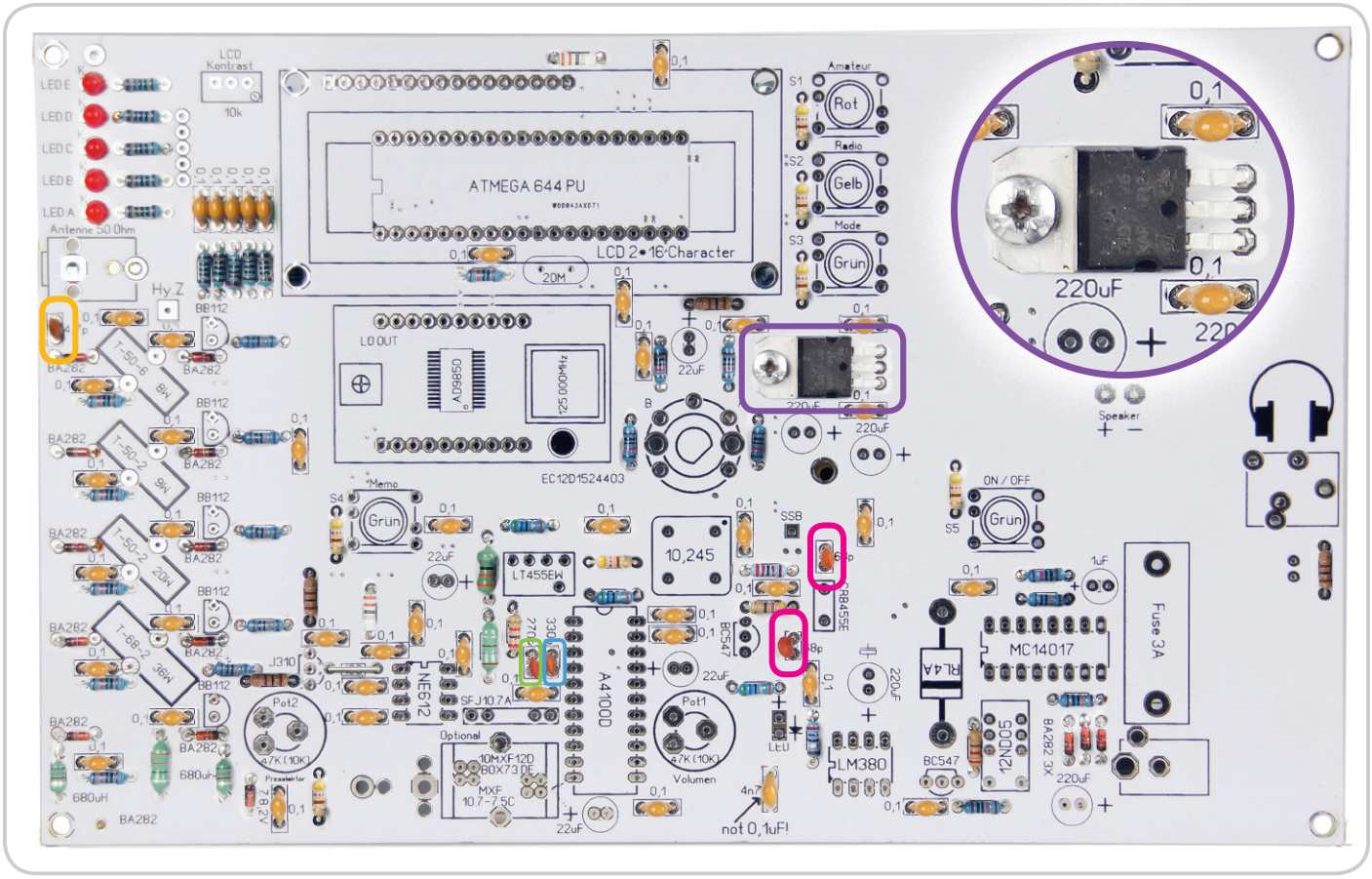
1x

Inductors: 270uH
Color Code: red | violet | brown | silver
Alignment does not matter.

2x

Inductors: 33uH
Color Code: orange | orange | black | silver
Alignment does not matter.

CERAMIC CAPACITOR: 9



2x

Ceramic Capacitor: 68pf
Alignment does not matter.

1x

Ceramic Capacitor: 270pf
Alignment does not matter.

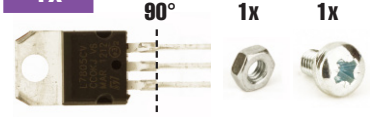
1x

Ceramic Capacitor: 330pf
Alignment does not matter.

1x

Ceramic Capacitor: 4,7pf
Alignment does not matter.

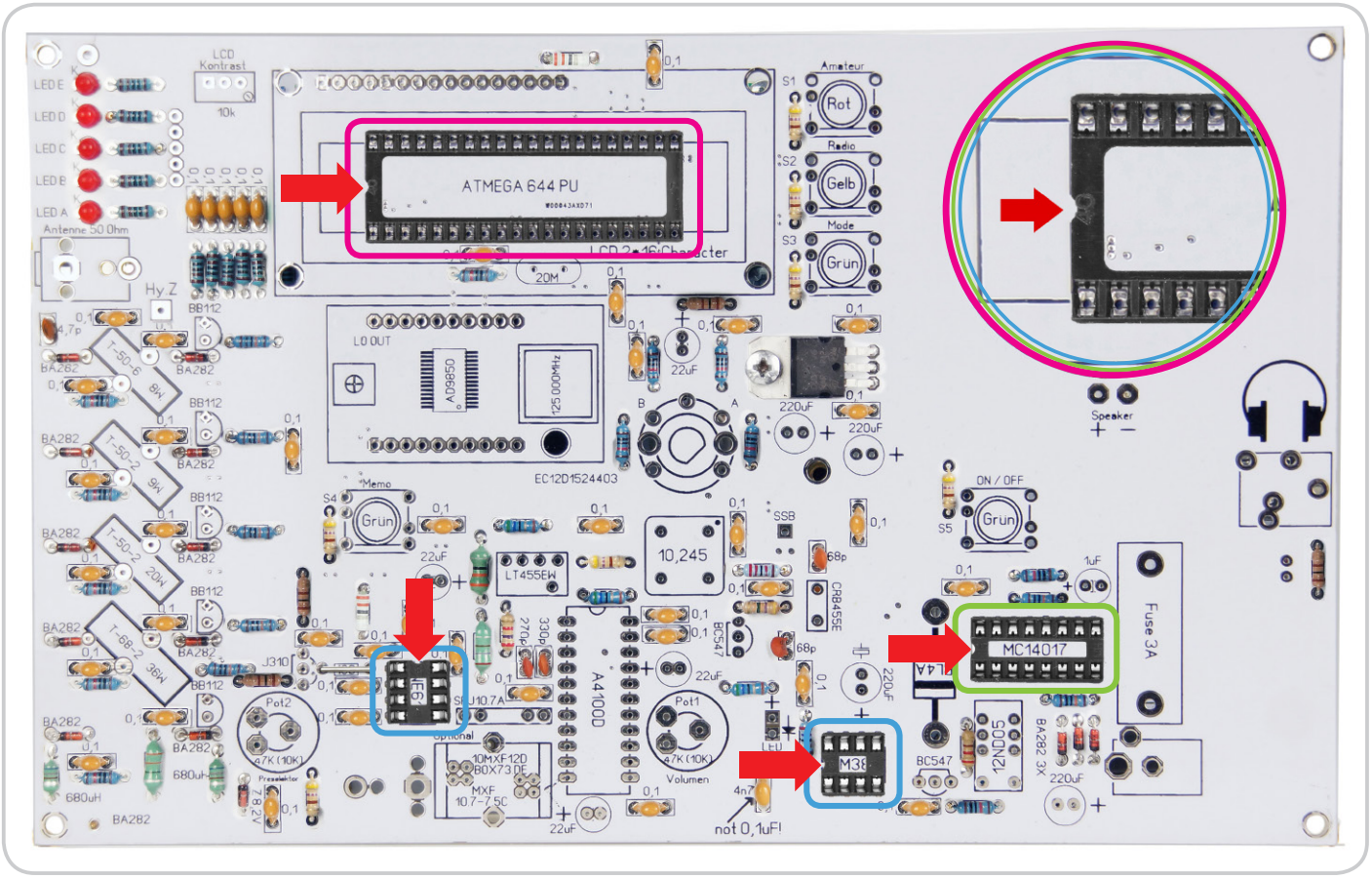
1x



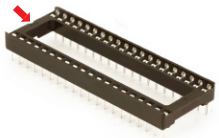
At the voltage regulator 7805 we bend the 3 feet at a 90 degree angle so that it is covered with the mounting hole on the circuit board. Fix and solder using M3x5mm screw and matching nut.

IC SOCKET: 10

CHECK MARKINGS ON PRINT!
Socket and markings on Print have to match.
Make sure no short circuits are made.

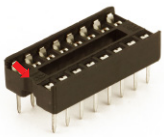


1x



Sockel: 40Pol
Keep mounting direction in mind!

1x

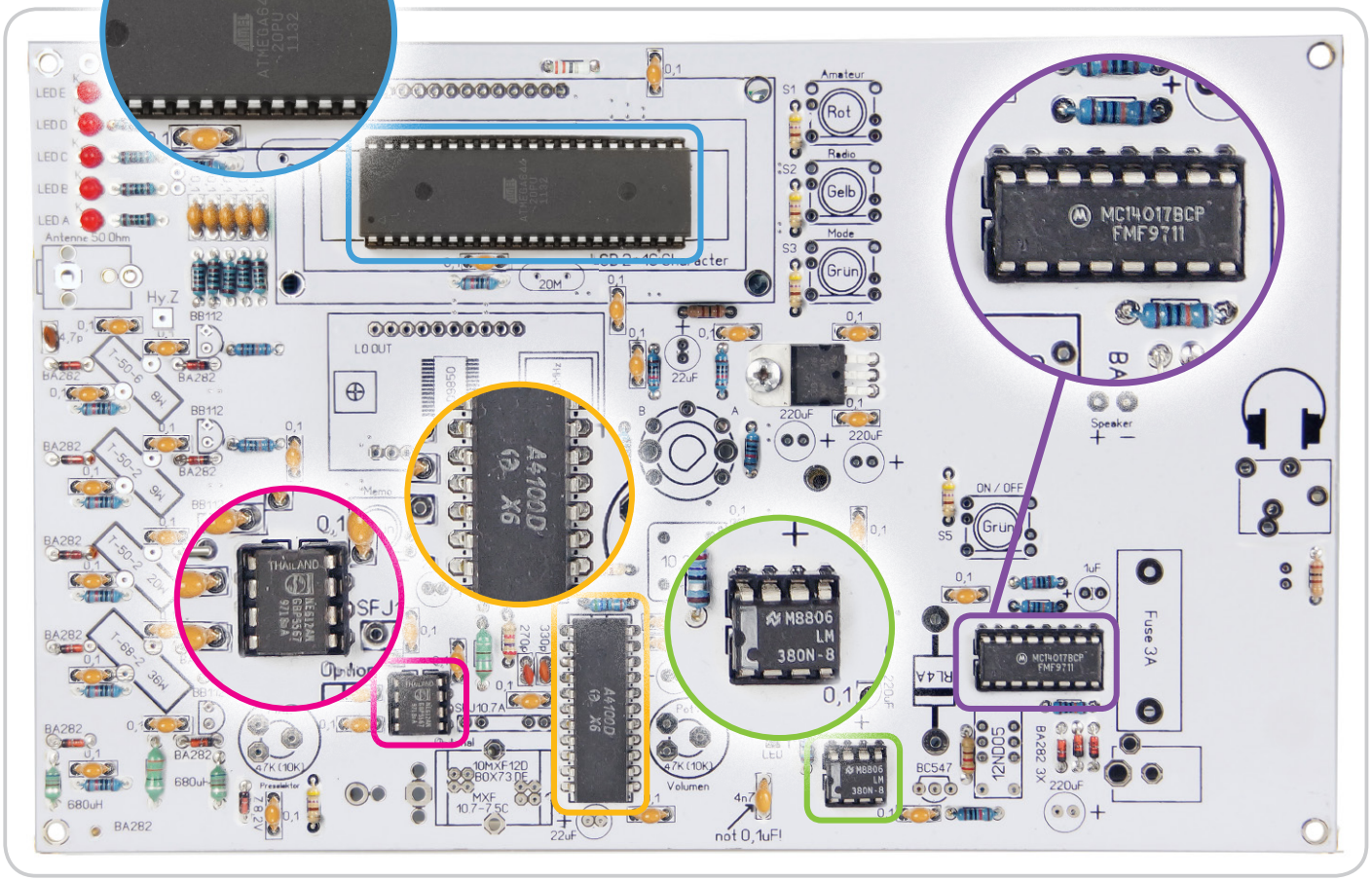


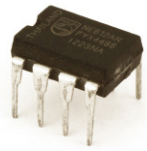
Sockel: 16Pol
Keep mounting direction in mind!

2x

Sockel: 8Pol
Keep mounting direction in mind!

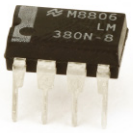
IC: 11





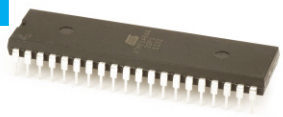
1x

IC: NE612
ATTENTION!: Verify IC Typ and direction!



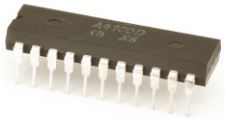
1x

IC: LM380
ATTENTION!: Verify IC Typ and direction!



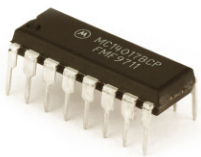
1x

IC: ATMEGA644
ATTENTION!: Verify IC Typ and direction!
Bend IC legs slightly towards the inside.



1x

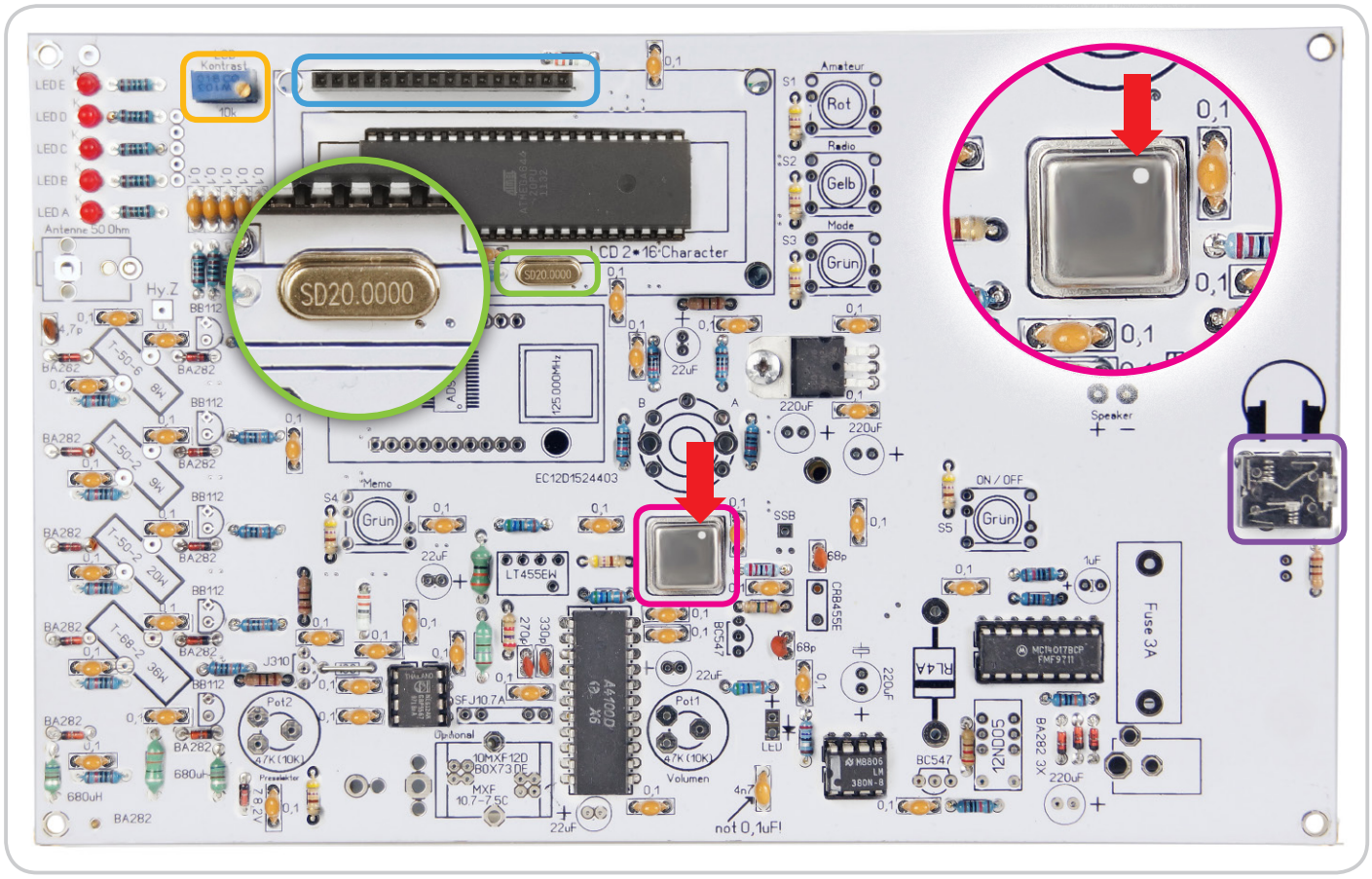
IC: A4100D wird direkt in die Platine gelötet.
ATTENTION!: Verify IC Typ and direction!
Bend IC legs slightly towards the inside.



1x

IC: MC14017
ATTENTION!: Verify IC Typ and direction!
Bend IC legs slightly towards the inside.

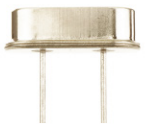
MISCELLANEOUS: 12



1x

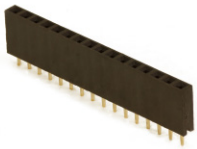
IC: XO 10,245MHz Is soldered directly to the board.
ATTENTION!: Verify IC Typ and direction!

1x



20 MHz Quarz
Alignment does not matter.

1x



16-pin connector strip (LCD)

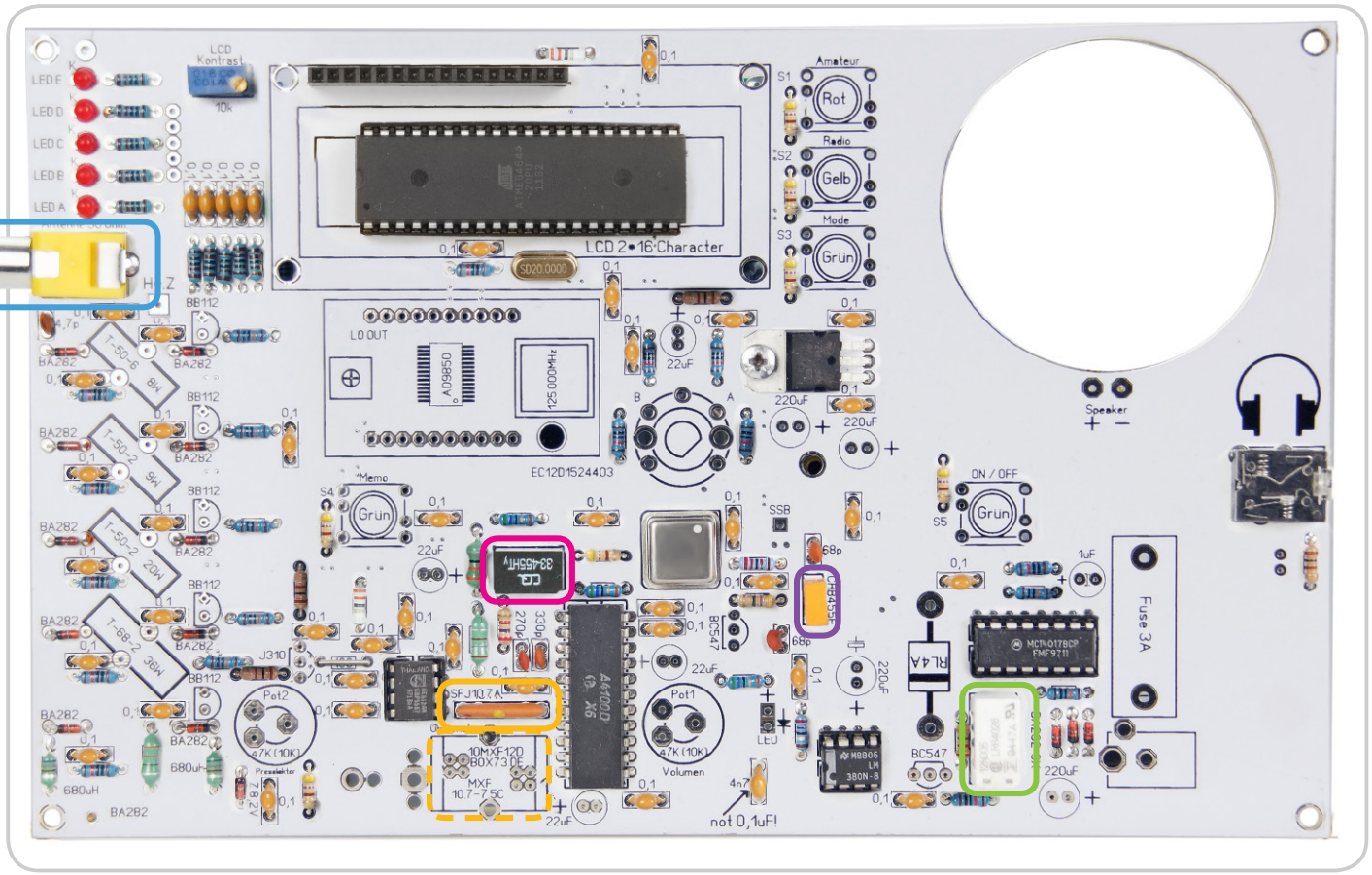
1x

10 Speed 10K Potentiometers
It is used later for the contrasts adjustment of the LCD display.

1x

Headphone jack

MISCELLANEOUS: 13



1x

Filter: 33-455HT or LT455HTW

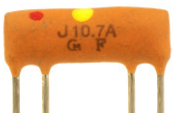
1x

Switch-on Relais: 12ND05

1x

Cinch antenna socket

1x



Ceramic filter: 10,7MHz-(Optional: 8-pin quartz filter: 10MXF12D by „Funkamateur“ or MXF 10.7 - 7.5C)

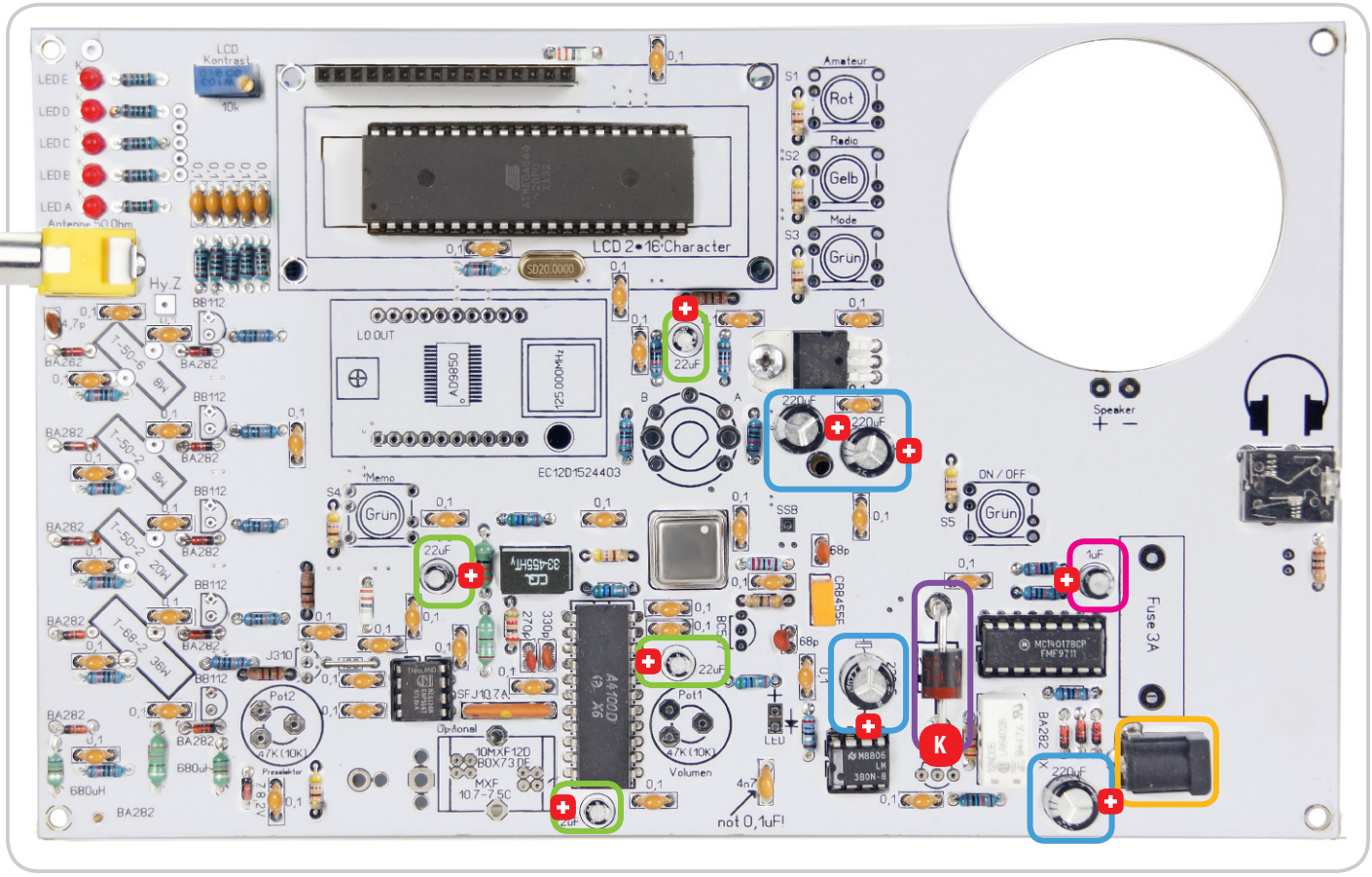
Alignment does not matter.

1x

Ceramic resonator

Alignment does not matter.

ELECTROLYTIC CAPACITORS: 14



Electrolytic Capacitors: 1uF
ATTENTION!: Observe polarity!
The longer wire is the positive pole.

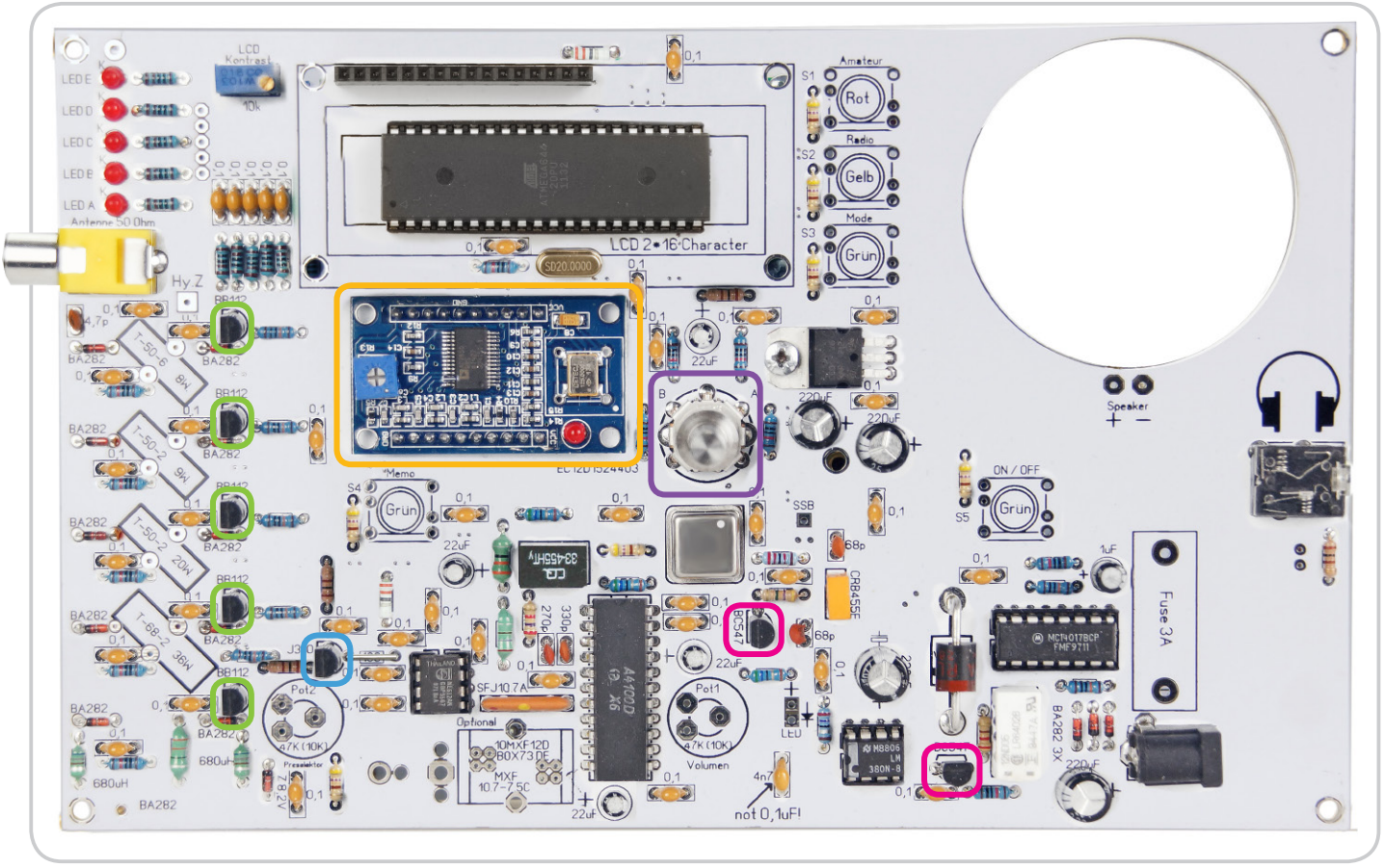
Electrolytic Capacitors: 22uF
ATTENTION!: Observe polarity!
The longer wire is the positive pole.

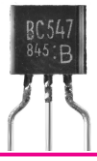
Electrolytic Capacitors: 220uF
ATTENTION!: Observe polarity!
The longer wire is the positive pole.

Power jack

Reverse polarity protection diode: RL4A or 10A10 Keep mounting direction in mind!

DDS MODULE: 15





2x

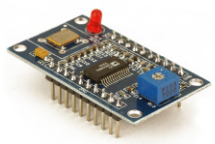
Transitors: **BC547**
Keep mounting direction in mind!

5x

Capacity diodes: **BB112**
Keep mounting direction in mind!

1x

Fet: **J310**
Keep mounting direction in mind!



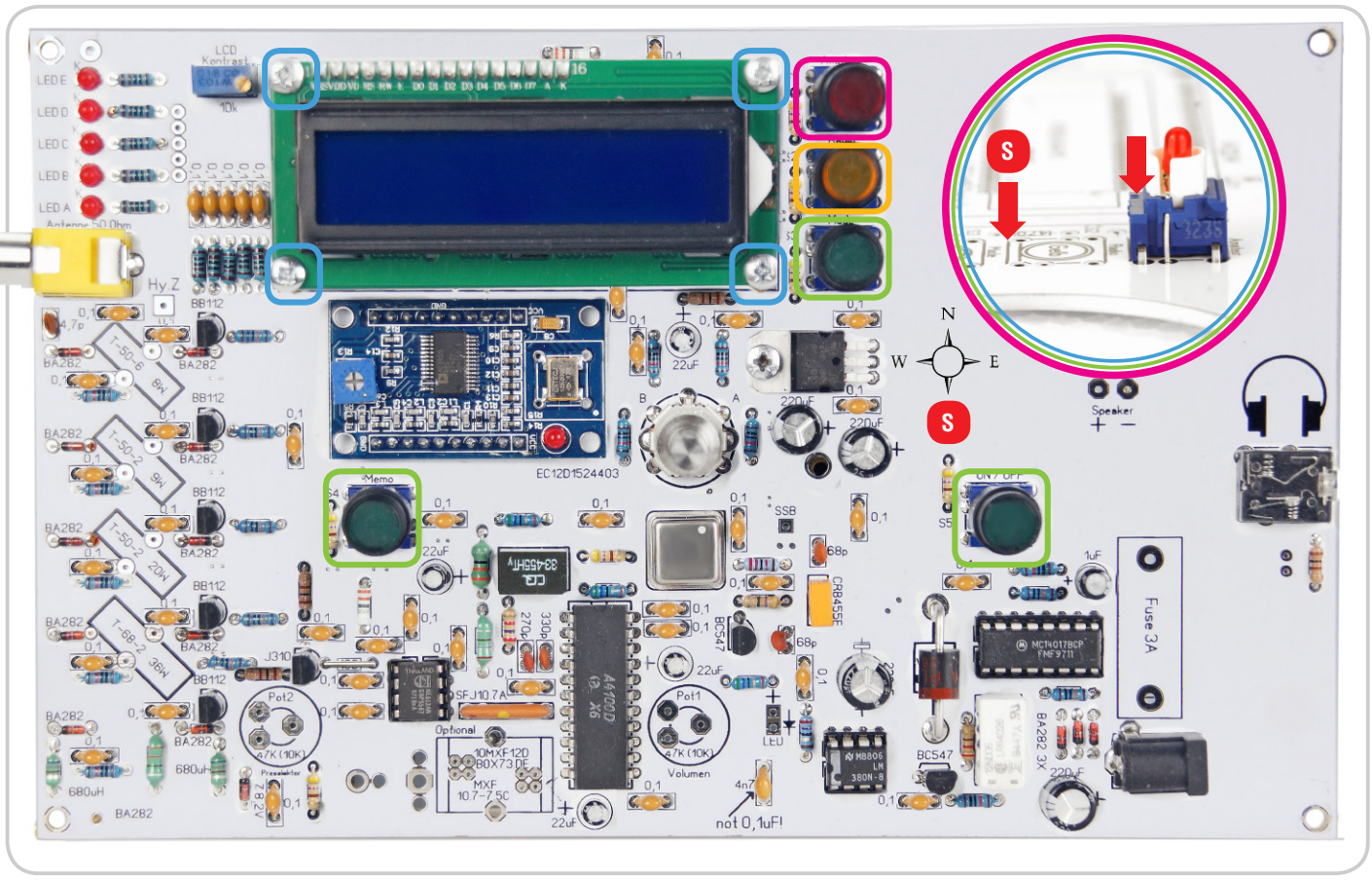
1x

DDS Module
Keep mounting direction in mind!

1x

Rotary encoder and **Extender**

PUSHBUTTONS: 16



1x

Button red with **Cap** and **Socket**
Keep mounting direction in mind!
(Indentation pointing south) see detail photo

3x

Button green with **Cap** and **Socket**
Keep mounting direction in mind!
(Indentation pointing south) see detail photo

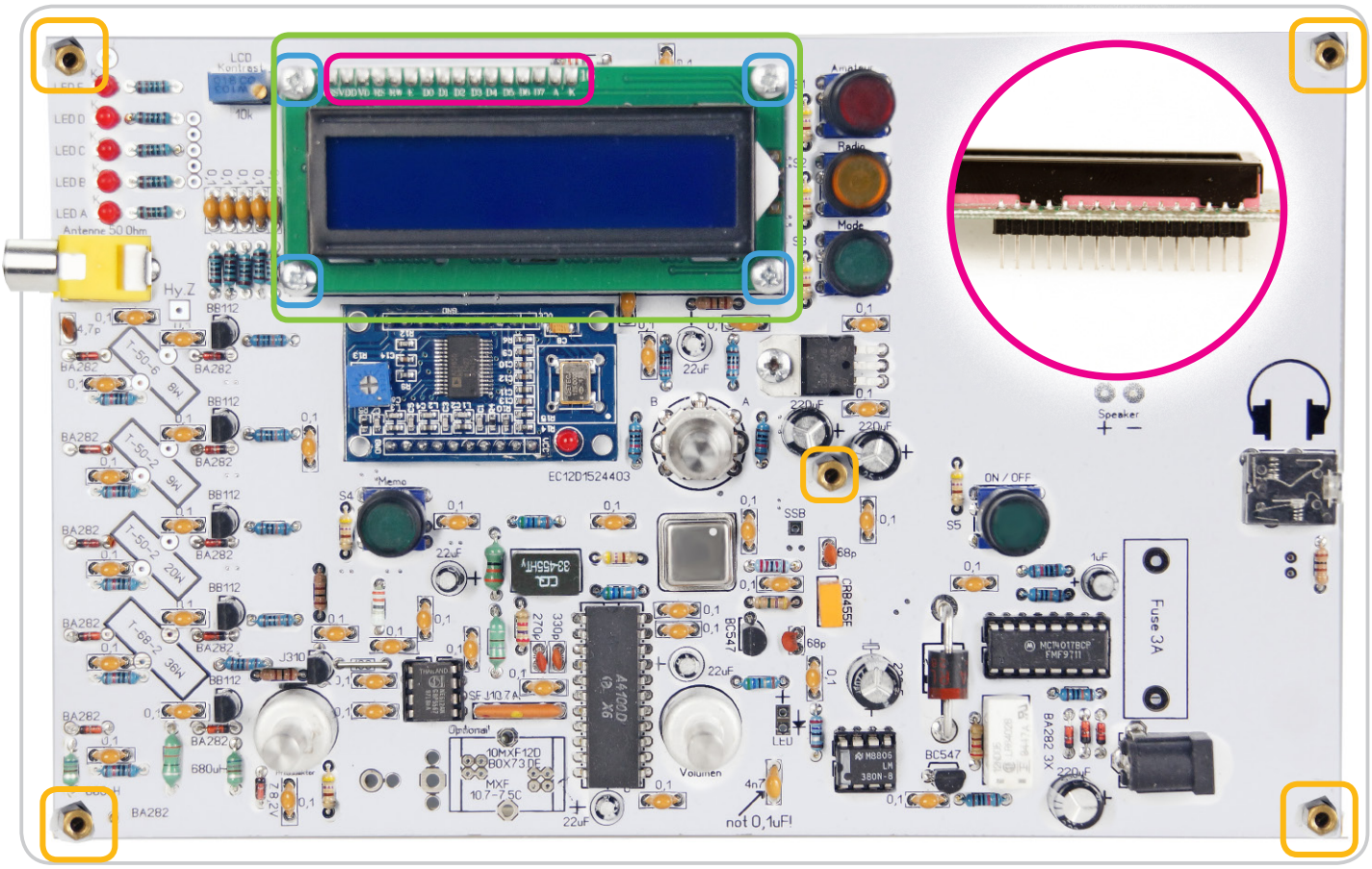
4x

Spacers: M3x12
Screws: M3x5

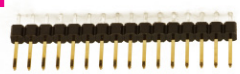
1x

Button yellow with **Cap** and **Socket**
Keep mounting direction in mind!
(Indentation pointing south) see detail photo

DISPLAY ASSEMBLY: 17



1x



Pin strip (short contacts)
Solder at the top of the **Display**.

1x

Insert the Display on the socket strip (see point 12).

4x

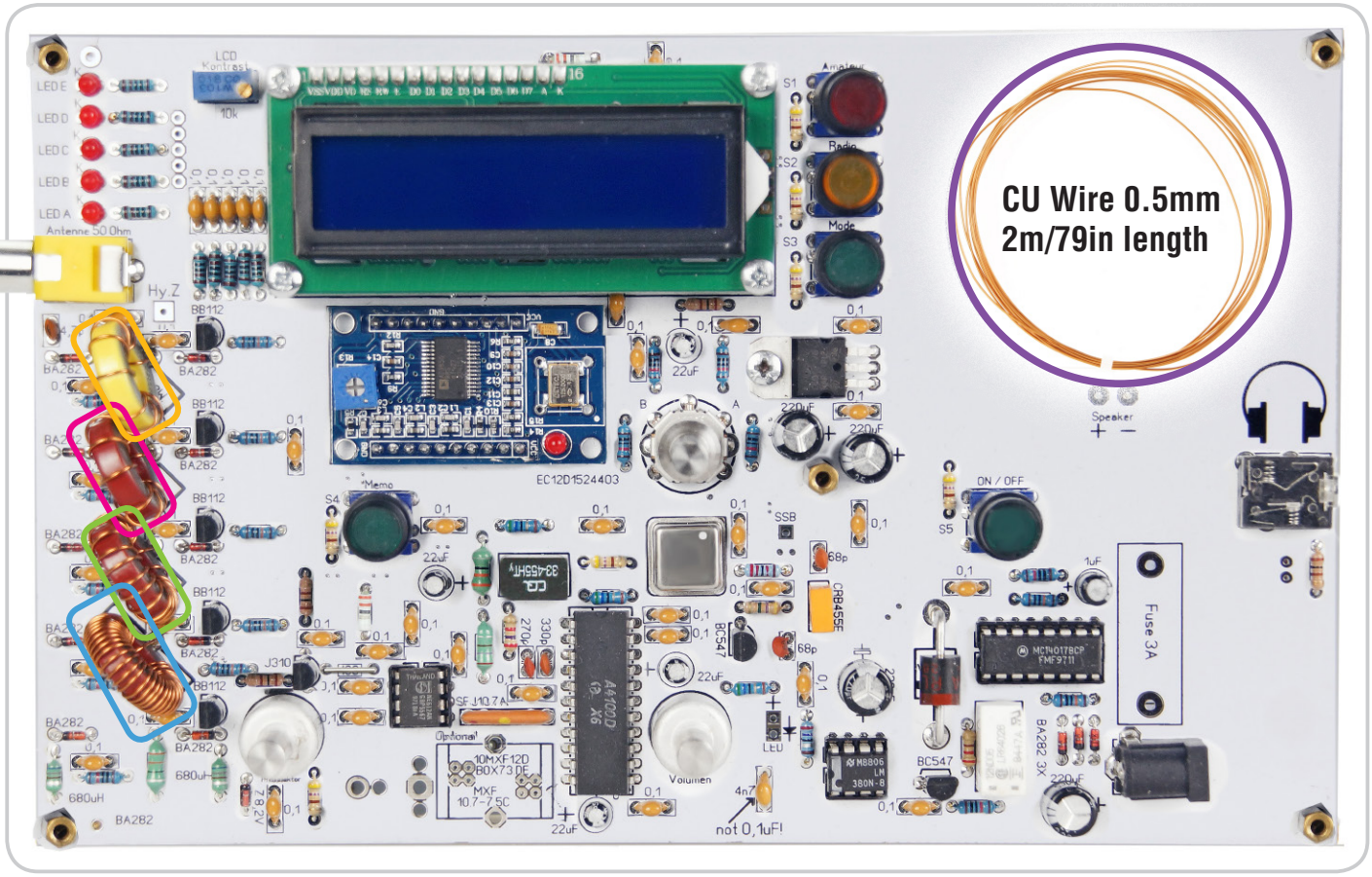
Bolt on Display with M3x5 Screws.

5x

Mount spacer with: M3x20.
Fix spacer with: M3x5.

TOROIDES: 18

METHOD!:
Wrap the wire on toroid, shorten it and pre-tin the ends.
The wire can be tinned directly at a temperature of 350 ° c.



1x

Toroid: red
Wire length: 30cm/12in
Windings: 9 (First thread is considered a winding)

1x

Toroid: red
Wire length: 50cm/20in
Windings: 20 (First thread is considered a winding)

1x

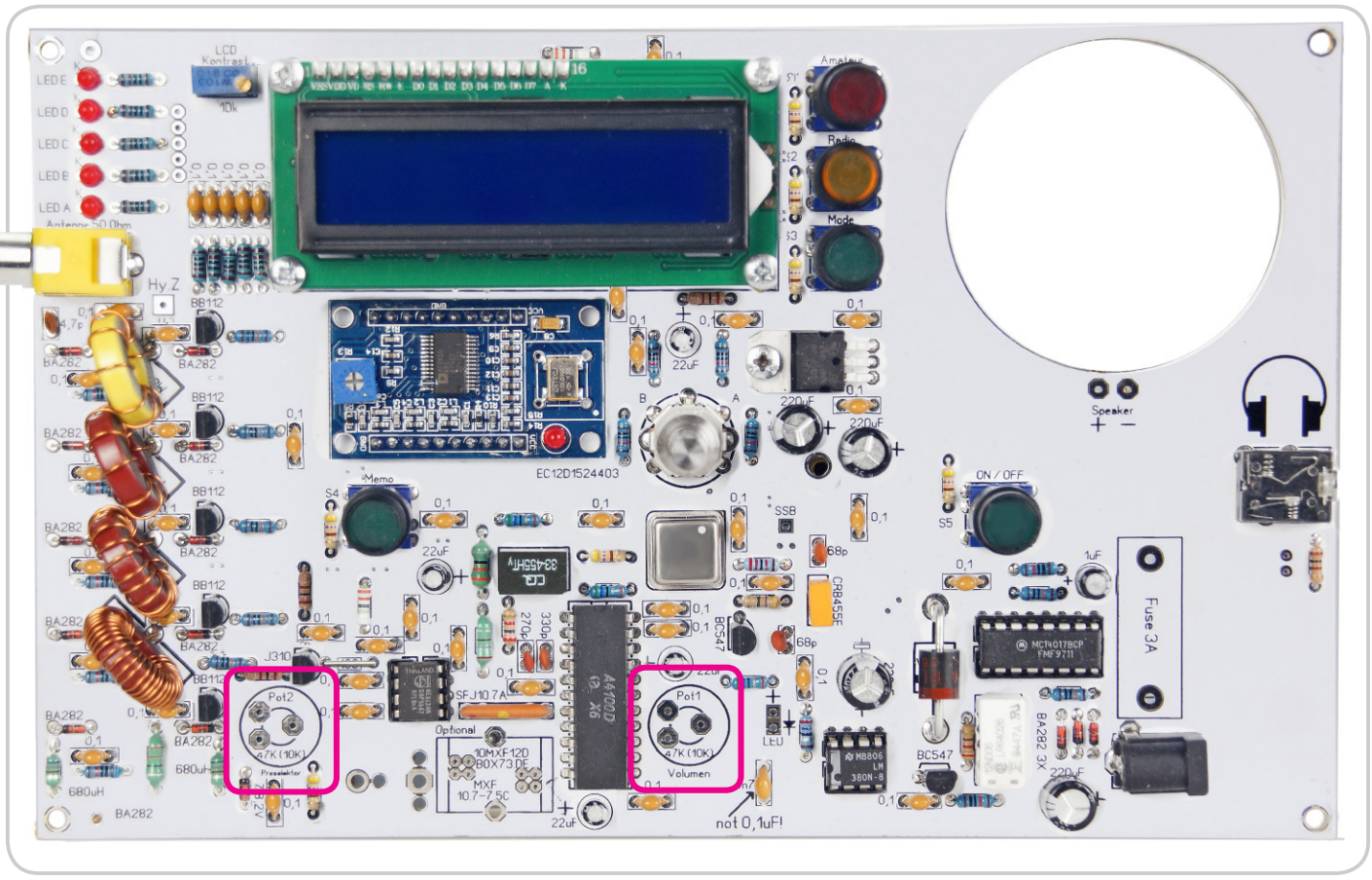
Toroid: red
Wire length: 90cm/35.5in
Windings: 36 (First thread is considered a winding)

1x

Toroid: yellow
Wire length: 30cm/12in
Windings: 8 (First thread is considered a winding)

POTENTIOMETERS TYPE A: 19

NOTE!:
Kit is delivered partly with TYP A. Type B is always included.



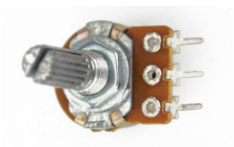
2x

Partly included

Poti: Volume and Preselector
Pay attention to vertical installation!
Advantage: Quick installation.
Disadvantage: Can lead to cold soldering joints in prolonged use.

POTENTIOMETERS TYPE B:

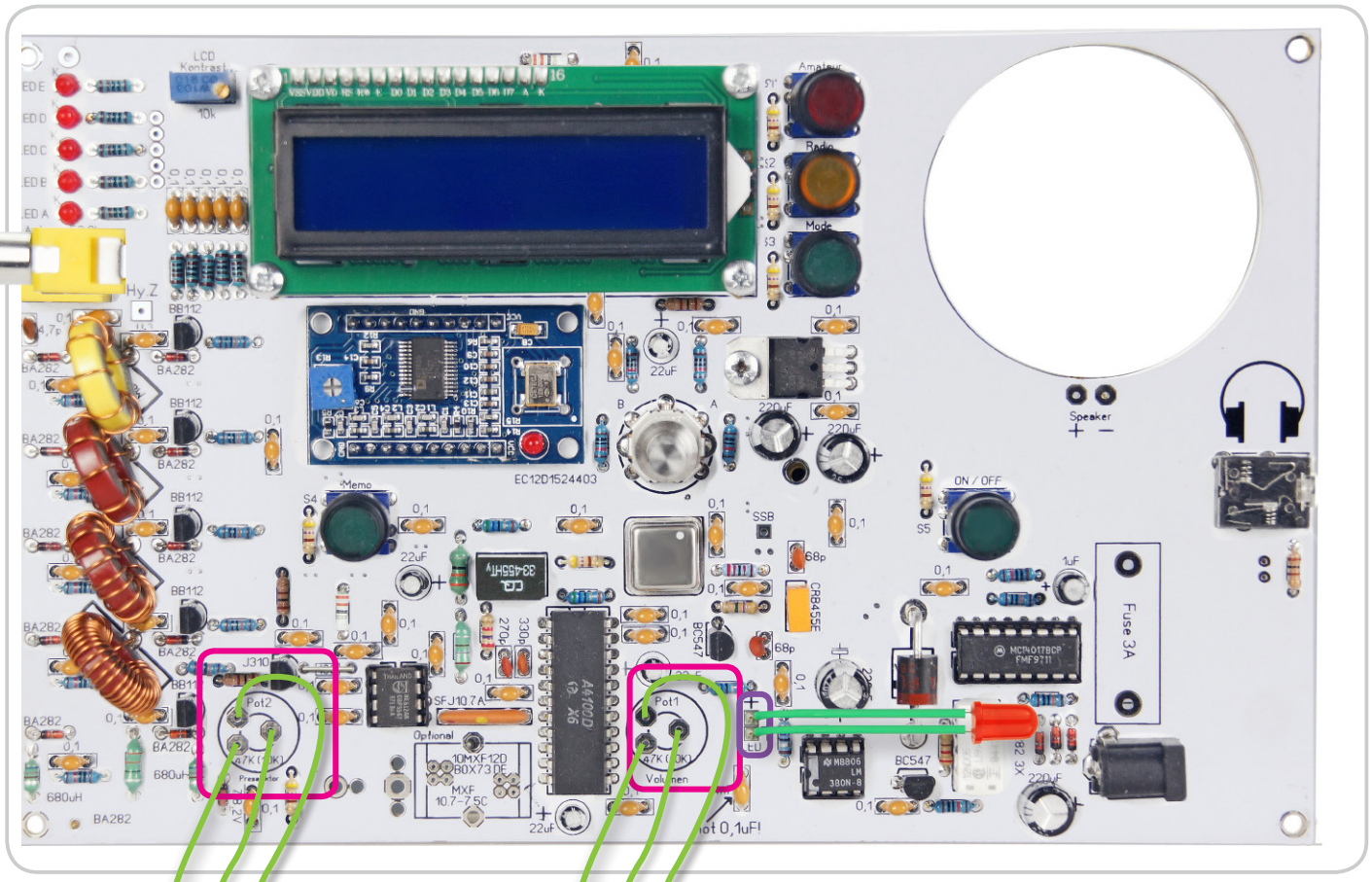
2x



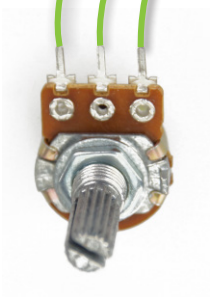
Always included

Poti: Lautstärke und Preselector
Loosen nut and washer from Poti!
Advantage: No direct radial and axial Impact on the PCB.
Disadvantage: Must be wired.

POTENTIOMETERS TYPE B: 20

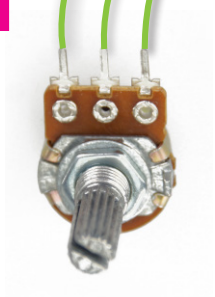


1x



Poti: Preselector

1x



Poti: Volume

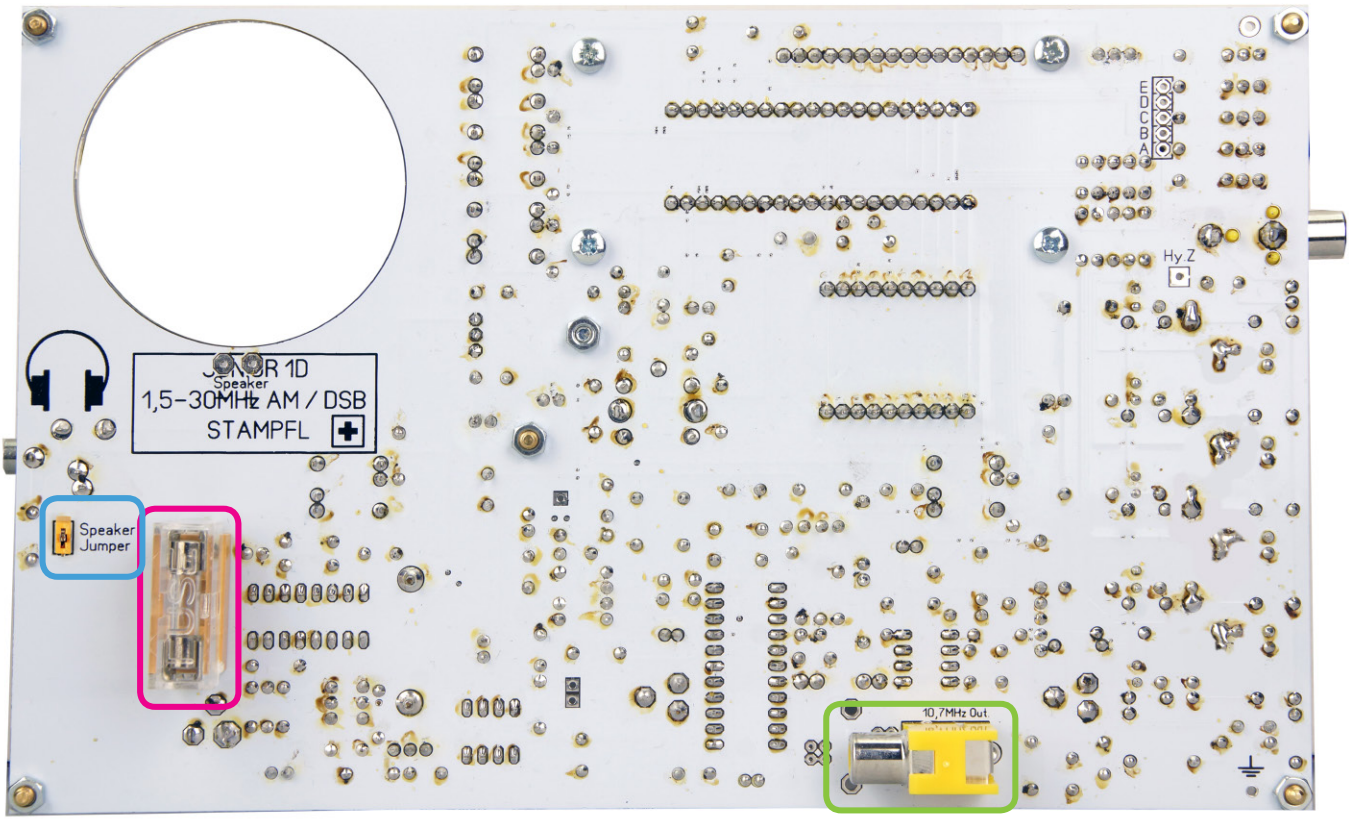
Cable length: 6x70mm/2.75inc

1x

LED: 5mm Signal strength level: Weak
continuous lighting at DSB is normal
The longer wire is the positive pole.
Cable: 2x80mm/3.14inc

BACK: 21

180° Turn PCB 180°



1x

Fuse holder & **Fuse**

1x

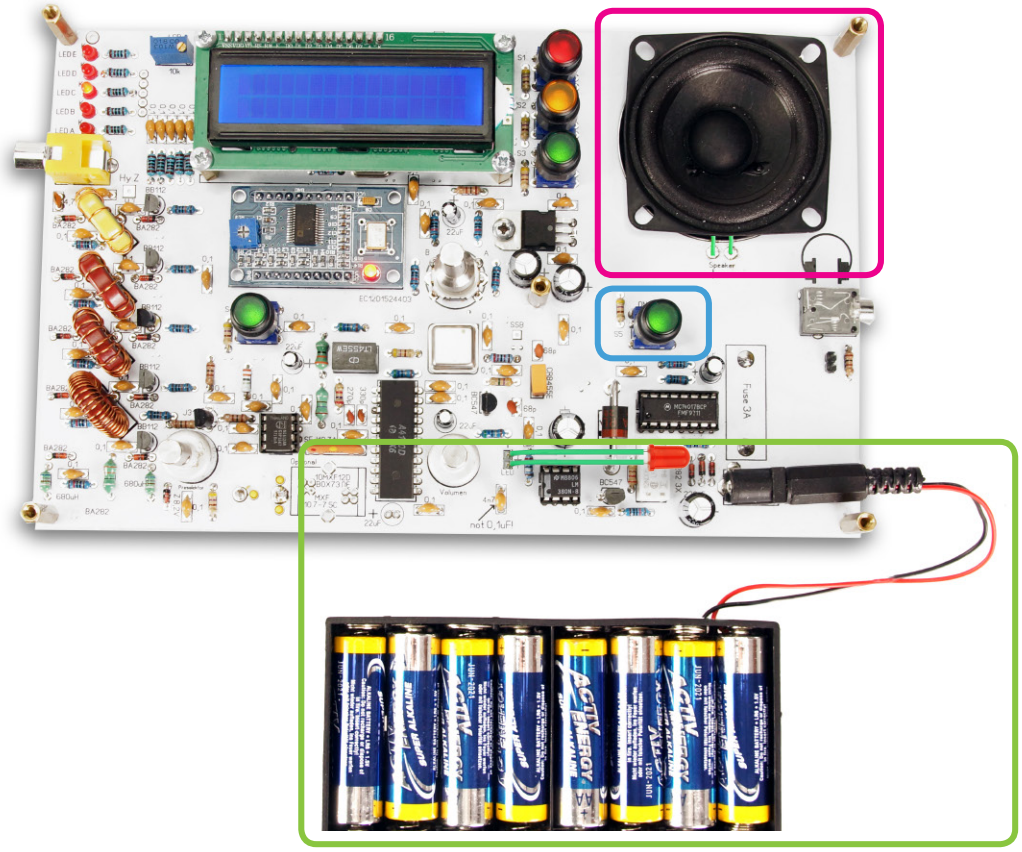
Cinch Connector: (10,7MHz IF Output)
for MR. PAN

1x

Pin strip: 2Pol
Jumper free: With headphones (STEREO only)
Jumper short: With external speakers

POWER CHECK: 22

Positive (internal contact red)

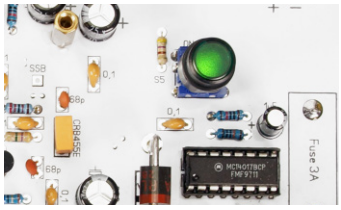


1x

Loudspeaker: Connect to board.
2x40mm flex

1x

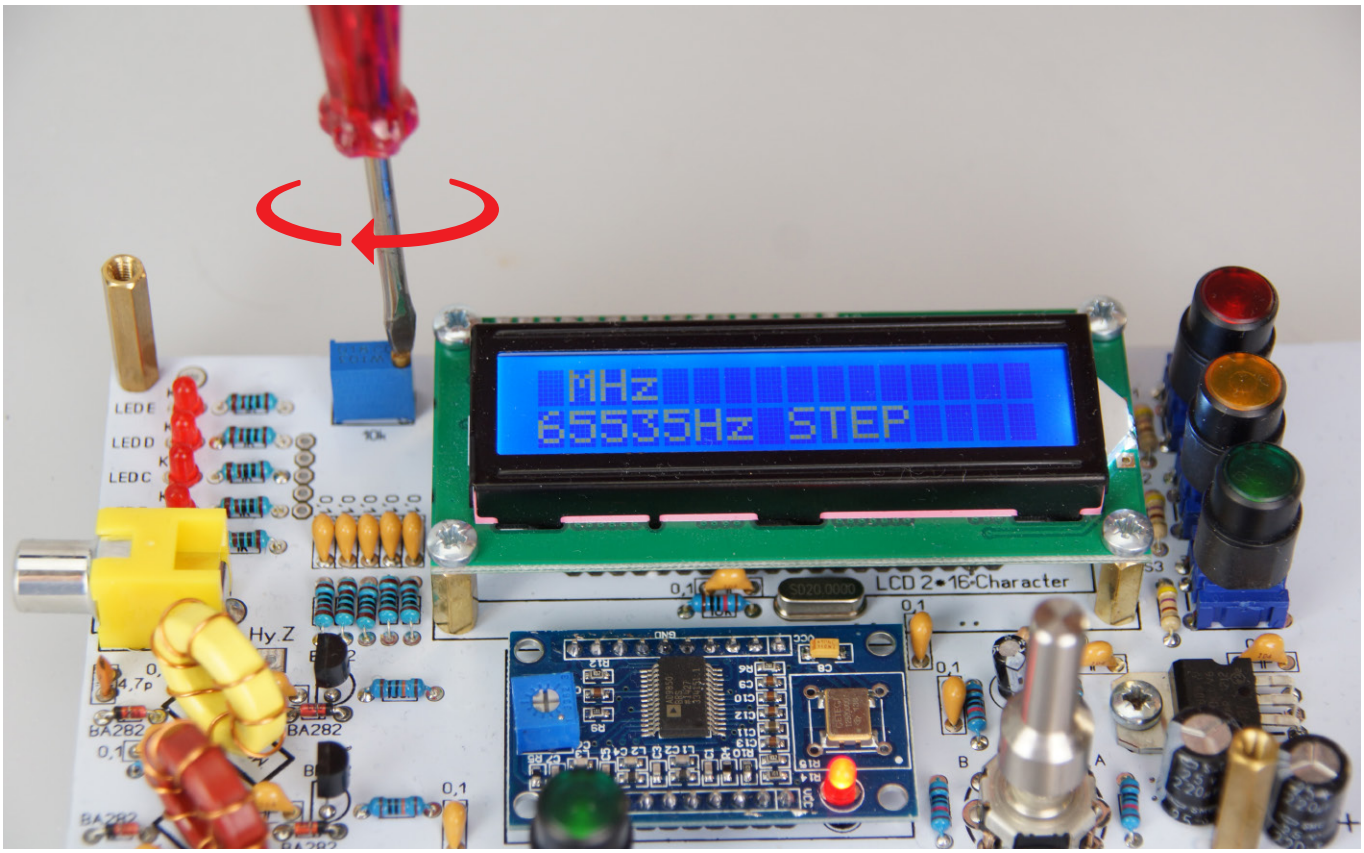
Battery Pack: Solder the connector
Positive (internal contact red).



ON / OFF control
The receiver makes a click sound when switching on.
All buttons as well as the display must light up.

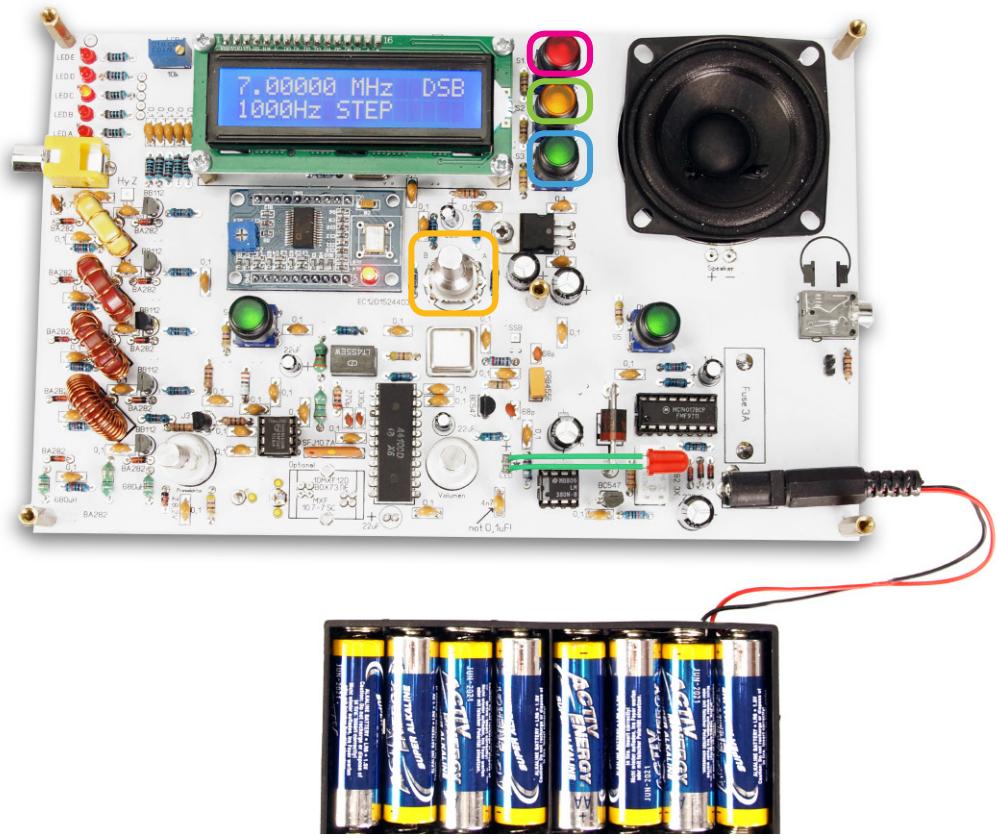
ADJUST DISPLAY CONTRAST: 23

Contrast increases clockwise



Adjust the display contrast via the 10-speed potentiometer.
When the memory is empty, the display shows only MHZ - 65535Hz STEP

SYSTEM CHECK: 24



1 **Check the AMATEUR button**

Repeatedly pressing the button will show all HAM radio bands.

2 **Check the RADIO button**

Repeatedly pressing the RADIO button will show all radio bands.

3 **Check the MODE button**

Repeatedly pressing the button will change the modulation modes: Am, DSB

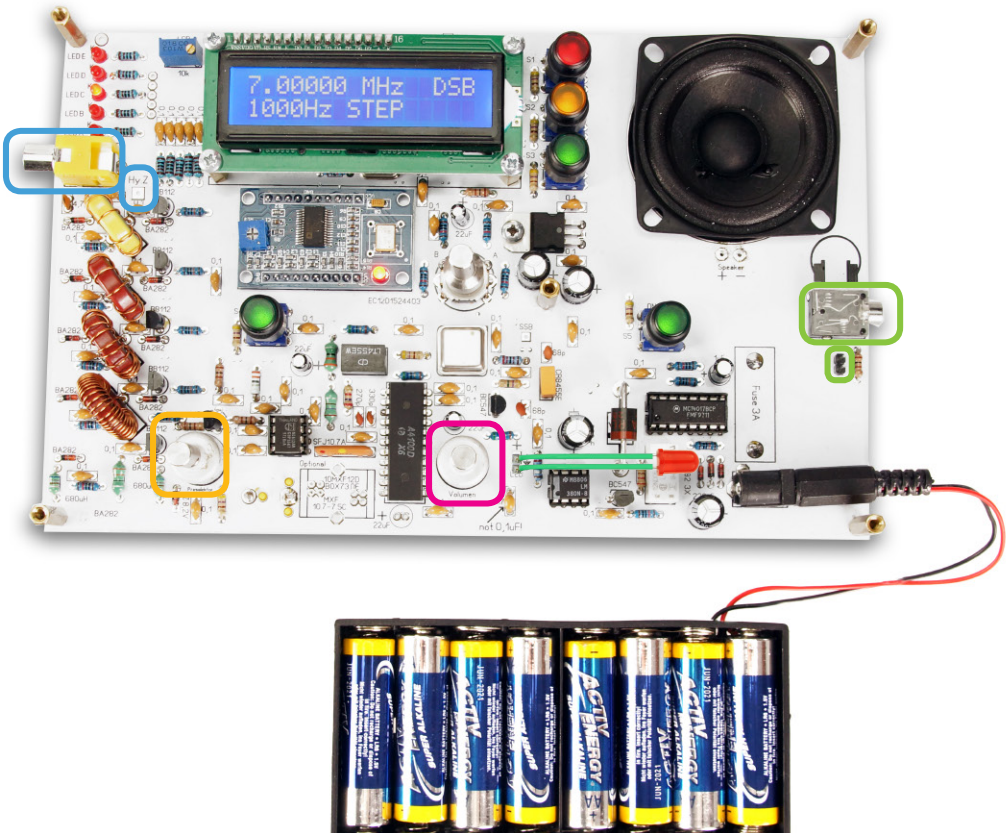
4 **Check the rotary encoder**

Repeatedly pressing the button will show all
Frequency steps. 10Hz, 100Hz, 1KHz, 5KHz, 9KHz.
Turning the encoder clockwise: Frequency increases.
Rotating the encoder counterclockwise: Frequency decreases.

5 **Check the MEMO button**

When you press the MEMO key, all settings will be re-activated saved.

EMPFANGSCHECK: 25



1 **Check the volume control**

Volume of the noise increases clockwise.

2 **Check the headphone connection**

Connect STEREO headphones to headphone jack. Remove jumper from pin strip.
See page 21.

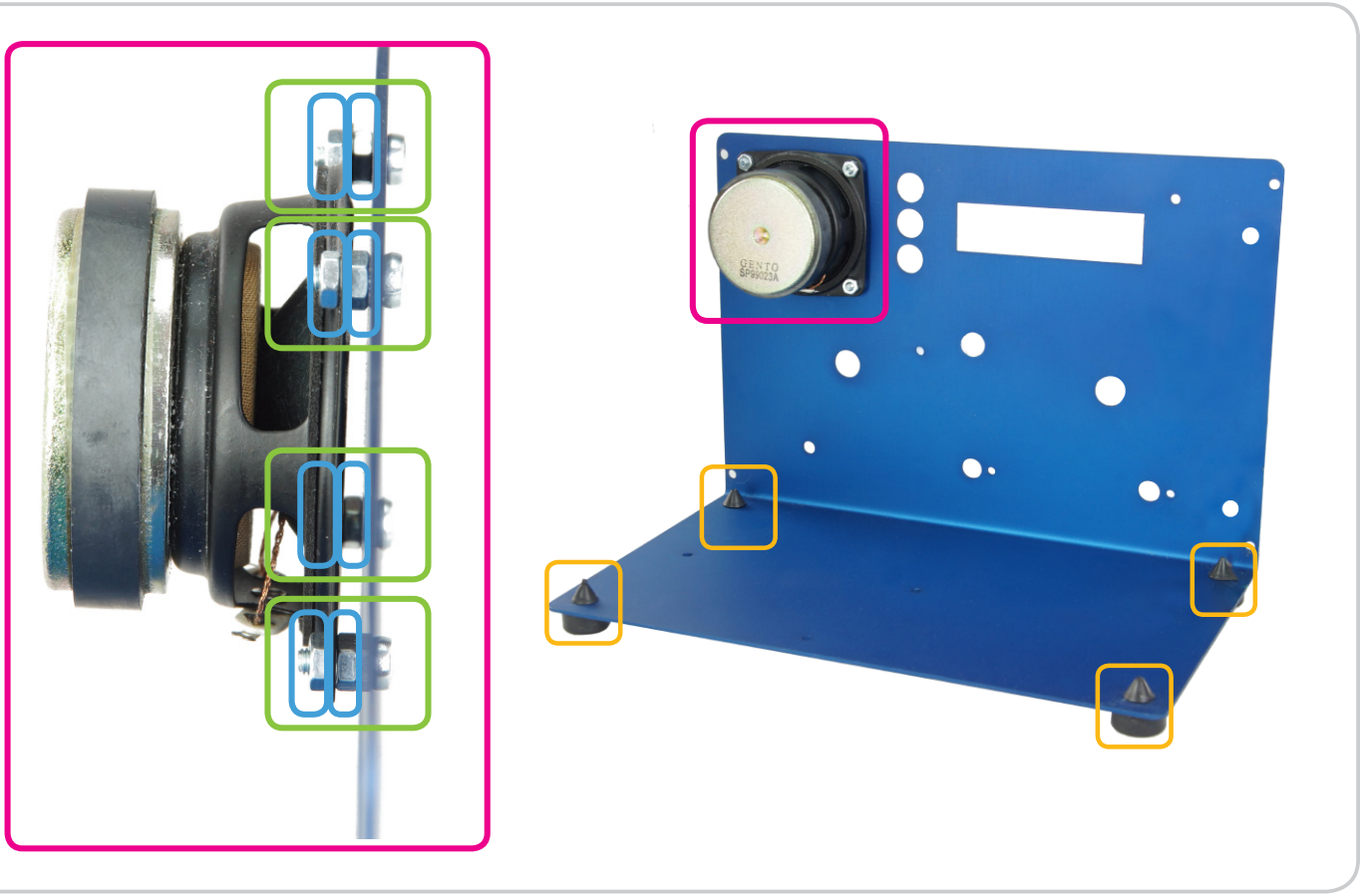
3 **Reception test**

Temporary connecting an antenna to the receiver.
Either via antenna connection 50 Ohm or directly with residual wire at the HZ input.

4 **Check of the 5-stage preselector**

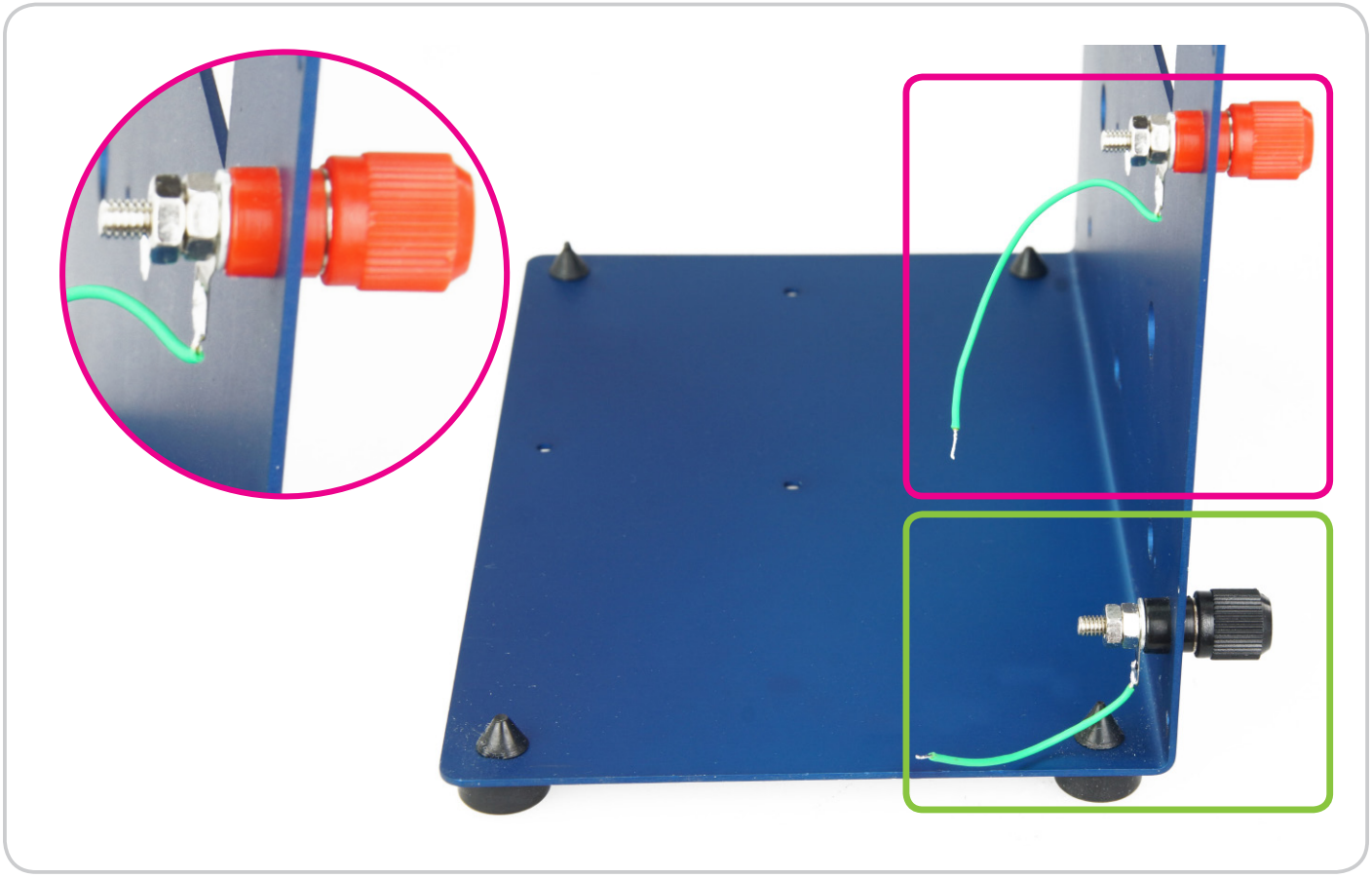
1.5-3MHz tune Preselector controller to maximum field strength.
3-6MHz tune Preselector controller to maximum field strength.
6-12MHz tune Preselector controller to maximum field strength.
12-24MHz tune Preselector controller to maximum field strength.
24-30MHz tune Preselector controller to maximum field strength.

SPEAKER ASSEMBLY: 26



1x		**Loudspeaker** **Connection contacts point downwards!**
4x		**Screw: M3x12**
8x		**Nut: M3**
4x		**Rubber Feed**

BUSHING ASSEMBLY: 27



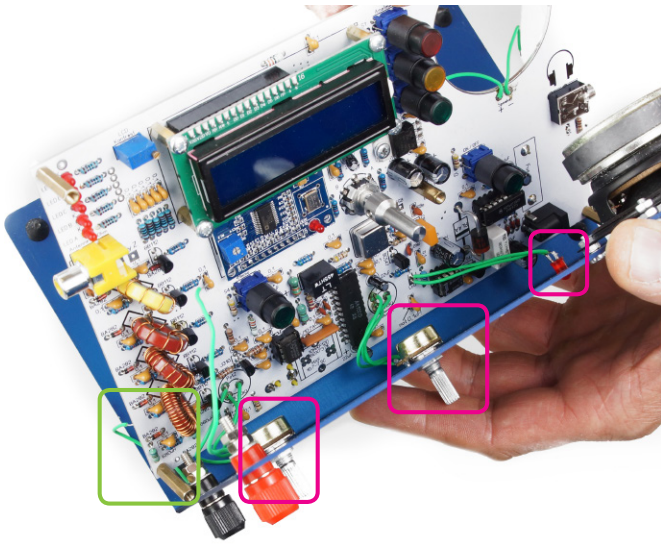
1x

Antenna socket
Wire length 90mm / 3.5inc

4x

Ground socket
Wire length 60mm / 2.35inc

PCB MOUNTING: 28

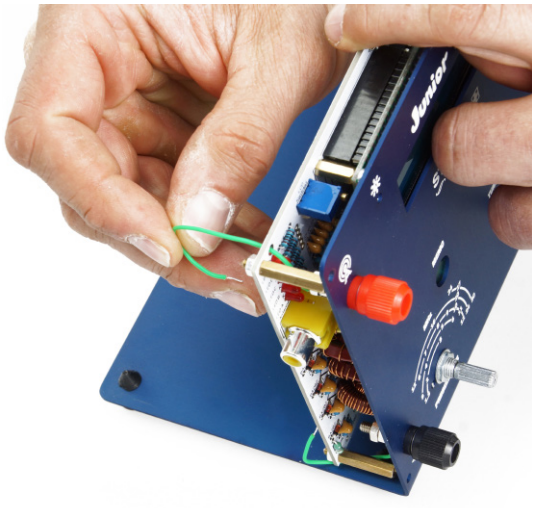


1 **Assembly: LED, Preselector, Volume**
LED is clamped into the bore.

2 **Connect the wire to the grounding GND.**

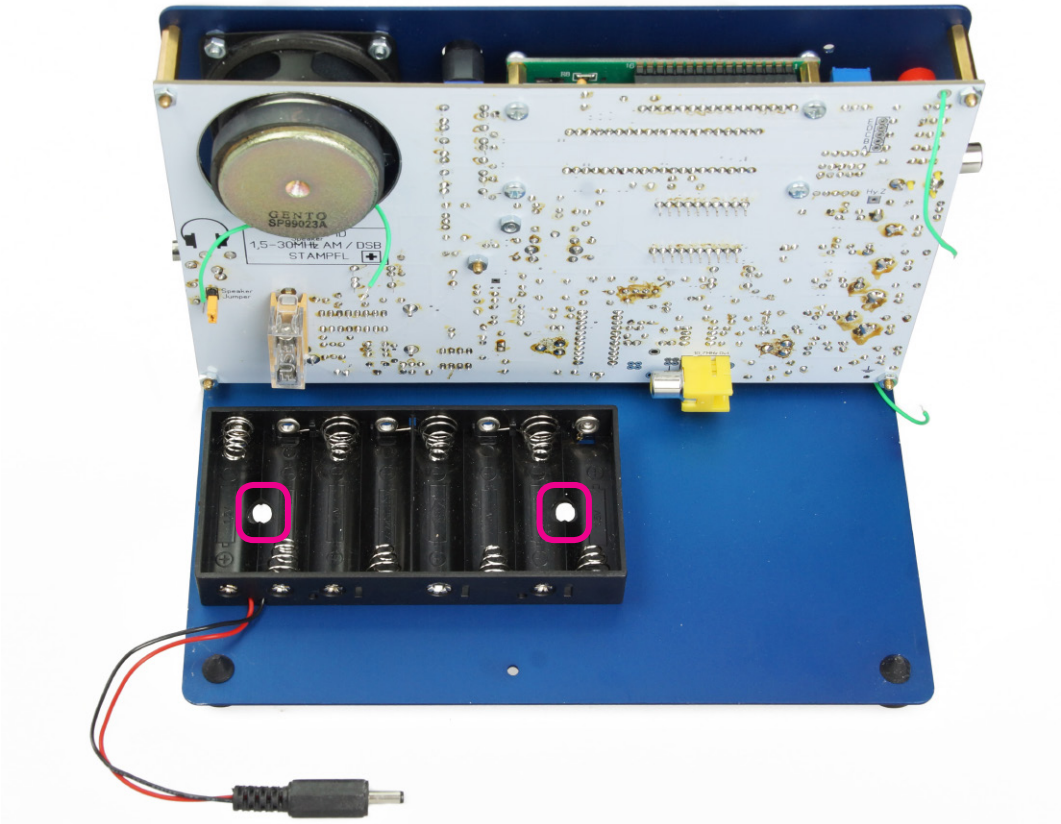
PCB CENTERING: 29

5x Tighten the A screws only loosely. Tighten the B screw loosely.
Then tighten the A screws. Then tighten B screws. finish it with tighten the C screws.



Thread Antenna wire and grounding wire through solder eyes.

BATTERY PACK ASSEMBLY: 30



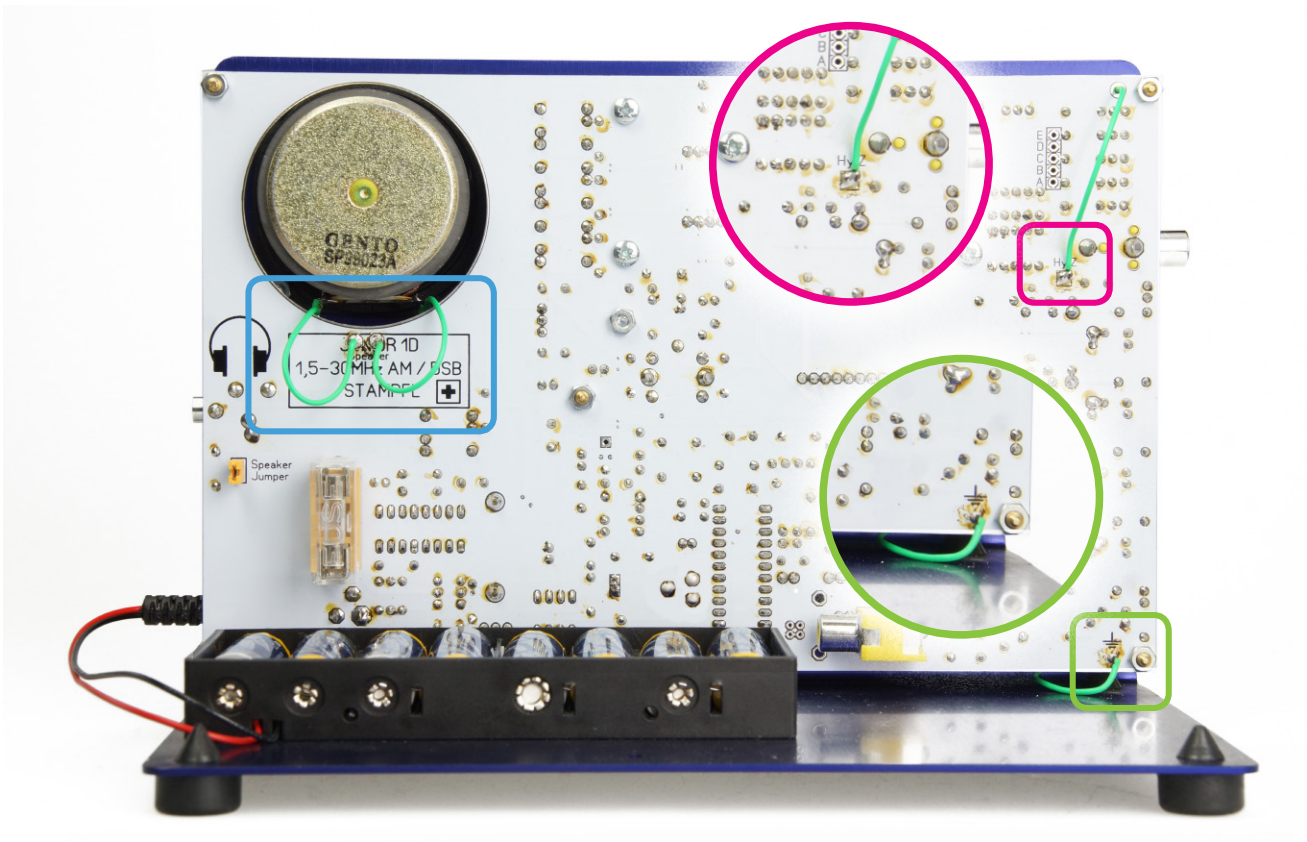
2x

Nylon screw M3

2x

Nut: M3

WIRES ON BACK: 31

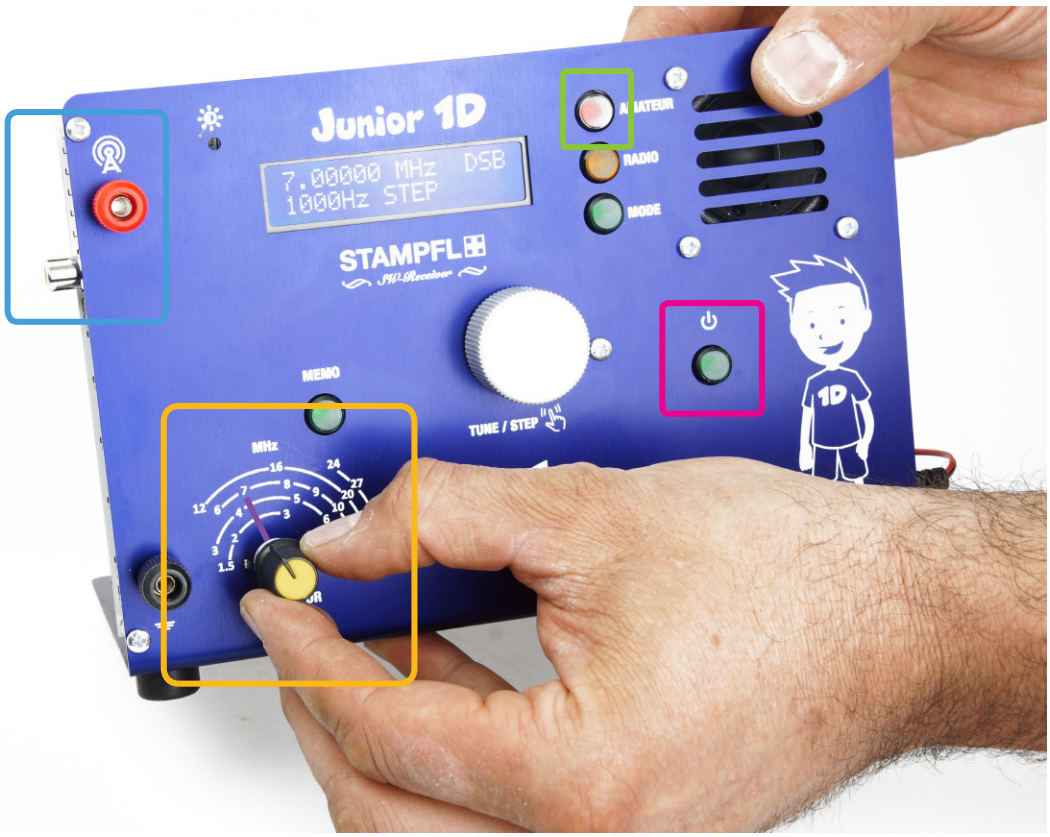


1 Solder the wire to the HY Z input.

2 Solder the wire to the grounding GND.

3 Solder the wires to the loudspeaker output.

ALIGN THE PRESELECTOR KNOB: 32



1 turn receiver on

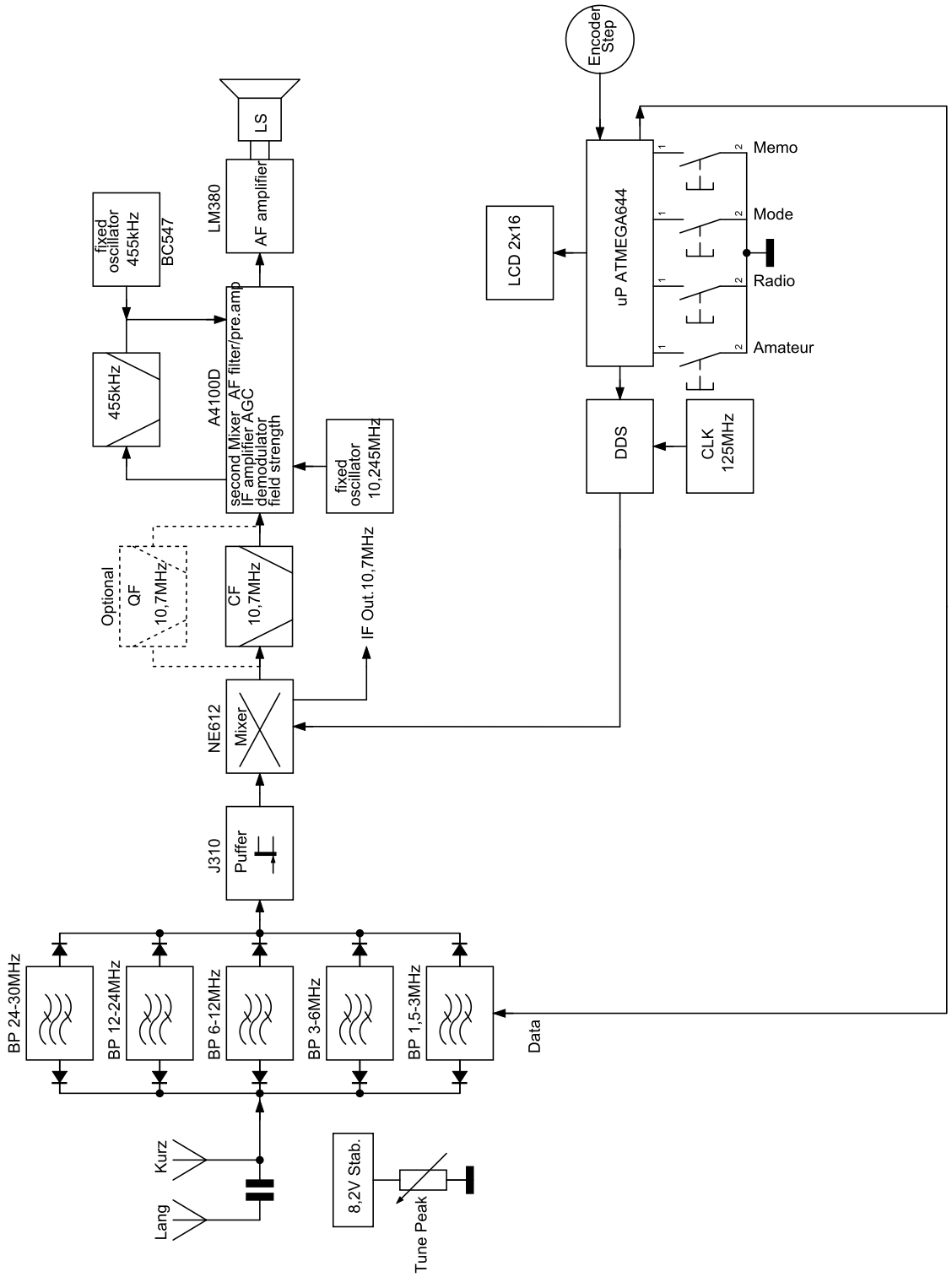
2 Select the reception frequency 7.0 MHz.

3 Connect the device to the antenna.

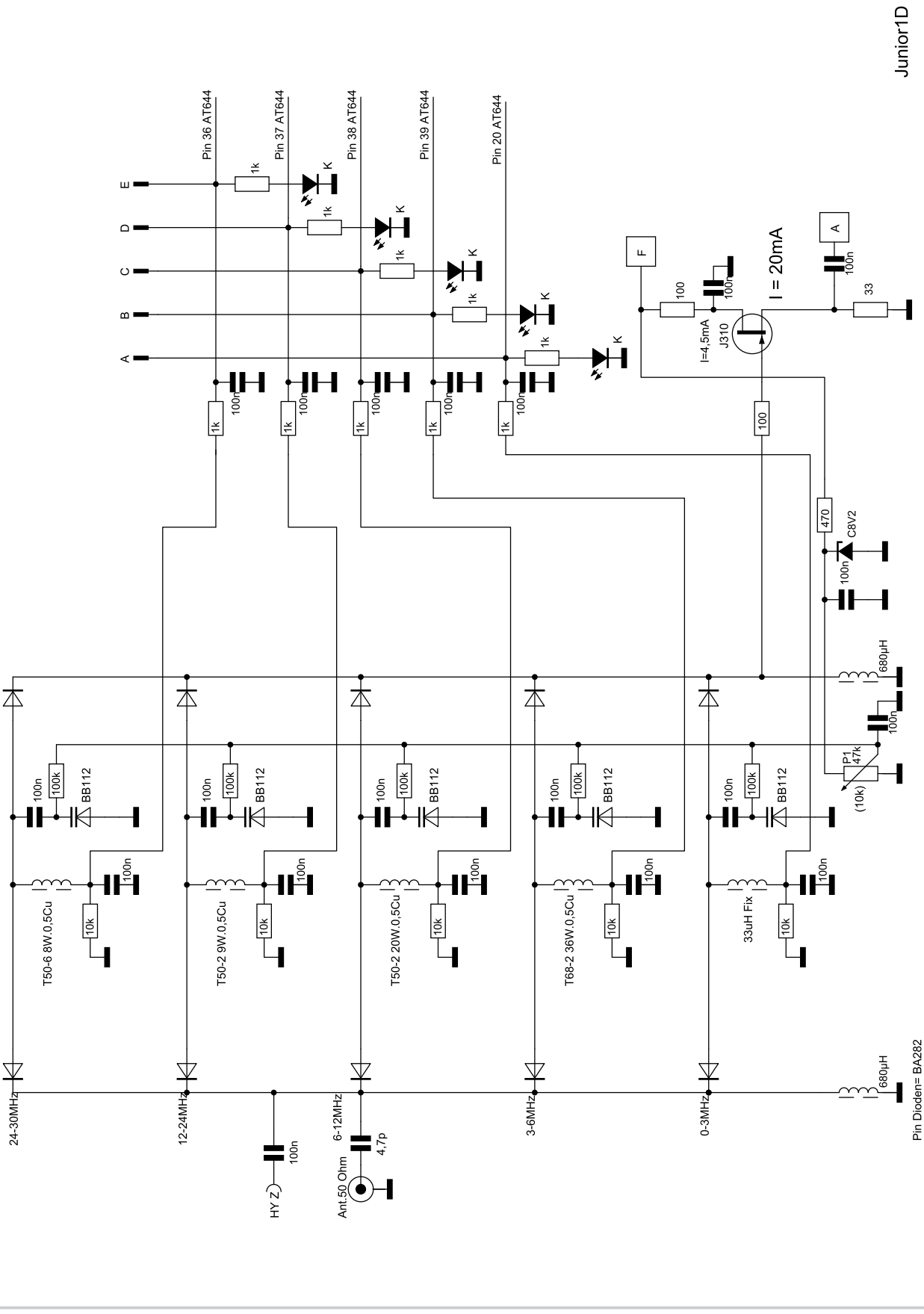
4 Set the Preselector to the maximum reception field strength.

5 Press the knob on the stem to show the direction 7 MHz.

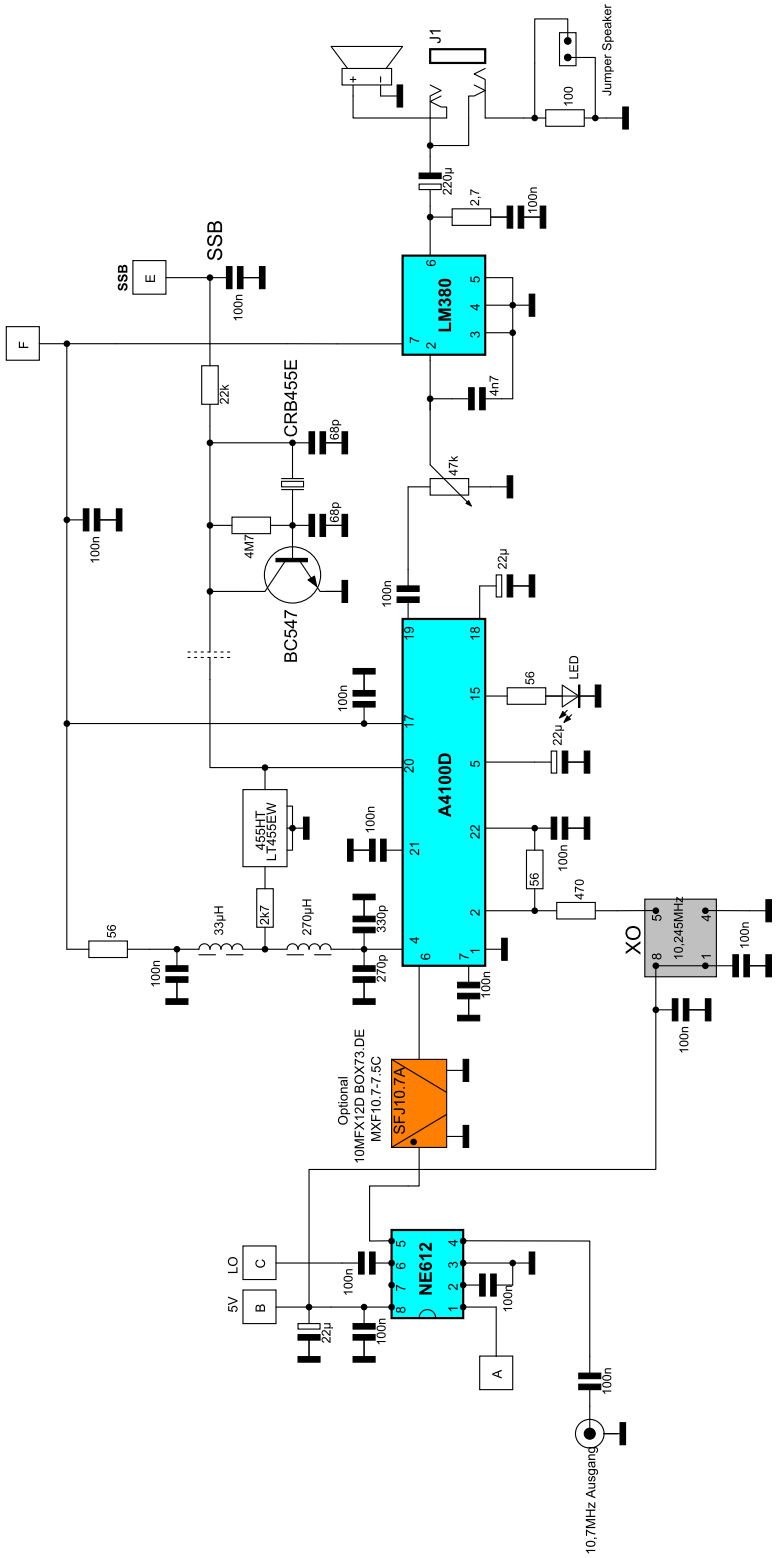
JUNIOR 1D BLOCK SCHEMATIC: 33



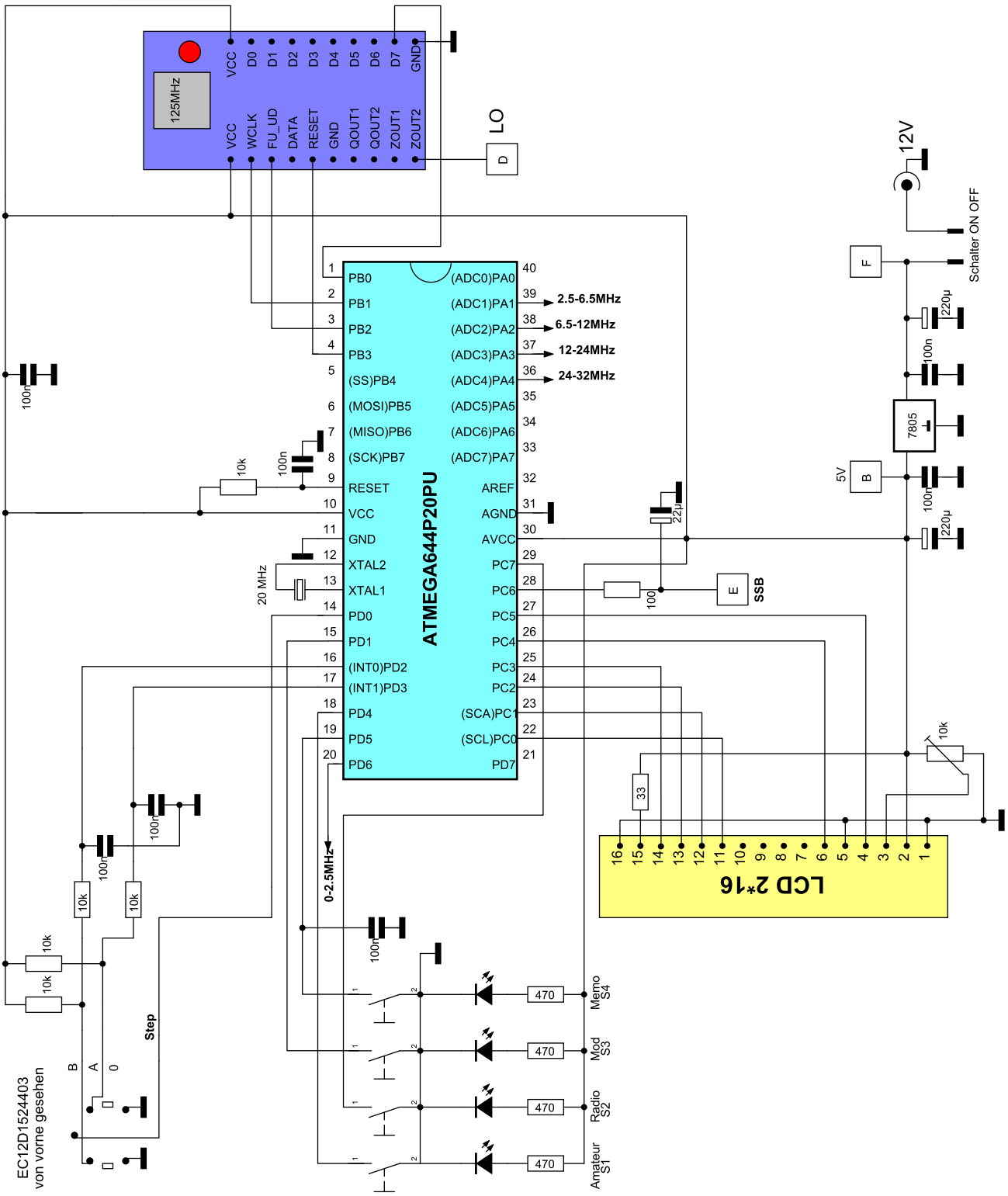
JUNIOR 1D INPUT CIRCUITS: 34



JUNIOR 1D HF PART: 35



JUNIOR 1D DDS VFO: 36



JUNIOR 1D ON/OFF CIRCUIT: 37