

BUILDING INSTRUCTIONS



RF SHARK
AM-SSB-CW 0.04 - 30 MHz
www.heinzstampfl.ch



SHORT WAVE RECEIVER KIT
DOUBLE SUPERHET, 10.7 MHz-455 kHz AM/LSB/USB/CW
0.04 - 30 MHz

STAMPFL+
HAM ELECTRONICS

TECHNICAL DATA



- SYMMETRICALLY OPERATED FIRST MIXER (AD831)
- DDS LOCAL OSCILLATOR (AD9851)
- 30 MHz TCXO AS A REFERENCE OSCILLATOR ± 0.1 PPM/20°C ± 1 PPM/-10+60°
- DDS SYMMETRIC OUTPUT
- 180 MHz DDS CLOCK (6 X 30 MHz)
- 8 POLE QUARTZ FILTER 1st IF
- SSB FILTER CFJ455K
- CORRECT FREQUENCY DISPLAY IN SSB MODE
- 10 Hz 100 Hz 1 kHz 5 kHz 9 kHz step width
- TWO ON THE BANDWIDTH 6 - 9 KHZ
- AUDIO CW FILTER
- OPTICAL ROTARY ENCODER (COPAL)
- LIGHTED MULTIMEC BUTTONS
- DIRECT DIAL BUTTONS AMATEUR RADIO AND BROADCASTING FREQUENCIES
- MEMO BUTTON SAVES ALL SETTINGS BEFORE SWITCHING OFF
- SMA OUTPUTS TCXO, DDS-LO, 1ST IF (SPLITTER PSC2-1) FOR EG. PANADAPTER
- 3.5 MM KH (STEREO)
- 50 OHM BNC ANTENNA CONNECTOR
- ANALOG S-METER "ONLY RELATIVE DISPLAY"
- MANUAL PRESELECTOR
- WEIGHT: 1.7 KG
- 480 MA POWER CONSUMPTION
- 11-15V POWER SUPPLY
- LENGTH 290 MM DEPTH 135 MM HEIGHT 110 MM

HINTS

ES BESTEHT KEIN GARANTIEANSPRUCH AUF DEN BAUSATZ!
Bei Kurzschlüssen und rauchenden Köpfen bitte "ERSTE HILFE" nutzen.

TOOLS

- Phillips screwdriver
- Flat nose pliers
- Soldering iron
- Multimeter
- Electronics pliers
- Allen wrench 2 mm
- Tweezers
- Magnifying glass
- Third hand



Images are high resolution.
Can be enlarged!

Assembly Instructions from:

- Heinz Stampfl, HB9KOC
- Mario Graf (grafdesign.ch)

Thank you for the support !

- Rolf Hasler, HB9QN
- Dr. Ernst Kirschbaum, DL2EBV
- Alfred Klüss, DF2BC
- Mathias Köhler, DL9YEB
- Carmen Sommer

OOPS! MALFUNCTION, FAULT? FIRST AID (PROCEDURE)

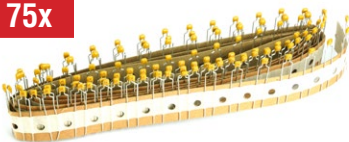
1. Collect a detailed report
2. Include photos of your construction in the E-Mail
2x (front and back of the print)
3. Remain Calm
4. Wait for help

E-MAIL ADRESSE

info@heinzstampfl.ch



75x



Component type exists twice

0.1 μ F Use components from the strip!

The remaining lot is of lesser precision.



FUNCTIONAL STATEMENT - RF SHARK

After the shortwave receiver kit of Junior 1 appeared in 2014, Junior 1D followed in 2016. Thanks to the detailed building instructions and the matching-free design, the less experienced radio hobbyist was able to complete the kits with a sense of achievement. The now third shortwave receiver kit is still suitable for hobbyists without special high-frequency measuring devices.

Description and function of the various components

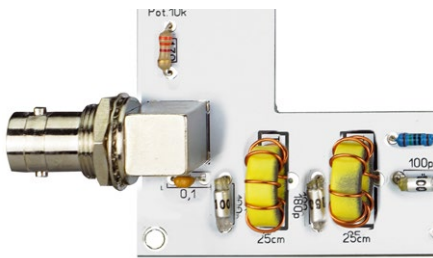
ANALOG PART:

The HF arrives at a 5-pole 30 MHz low pass filter via the antenna input. The TP has the task of avoiding FM radiation and should have the highest possible blocking effect over a wide frequency range. A steeply falling flank is not important here. The filter also does nothing to suppress image frequency.

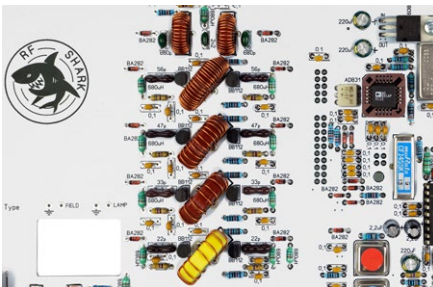
In the case of receivers with a high intermediate frequency, the HF could be passed on to the first mixer directly or via fixed bandpasses without an image frequency problem. This is not possible with RF SHARK! The reason is the low 1st IF of only 10.7 MHz. If the preselector were not used, a second equivalent receiving channel with 21.4 MHz plus the target receiving frequency would be heard. RF SHARK's preselector consists of 4 manually tunable circles and a low pass filter. The highest possible coil quality is very important. The higher the quality, the narrower the pass band and the smaller the loss. In this case, Amidon T80 ring cores are used. The input and output capacities enable operation in 50-ohm technology.

A compromise must be made for the values of these coupling capacitors. If small capacitance values are preferred, the filter becomes more selective. Unfortunately, the insertion loss then increases. The reason lies in the capacitive voltage divider, which then increases the insertion loss. The reason lies in the capacitive voltage divider, which results from the transverse capacities of the BB112. A double rotating capacitor is out of the question for reasons of cost, space and procurement. So the choice fell on the original capacitance diodes Siemens BB112. The switching of the individual filter areas can be done with relays or switching diodes. In this case BA282, BA283 switching diodes are used. These diodes are ideal for this application.

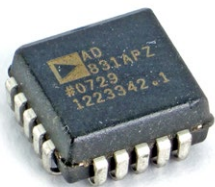
The low pass filter is not special, this relieves the first mixer of signals above 3 MHz. The preselector type normally shows signals above 3 MHz in 50 ohm technology. The preselector type normally shows its striking insertion loss in 50 ohm technology! Every dB insertion loss is no longer good and only leads to additional noise for the receiver. Things look a little better with Shark. The reason is the excessive resonance. This comes out a little better. This occurs when the output load is significantly higher than 50 ohms. Due to the symmetrical input circuitry of the 1st mixer, this is approx. 1.3k Ω . The prefiltered HF now reaches a very important part of every analog receiver.



30 MHz Low Pass Filter



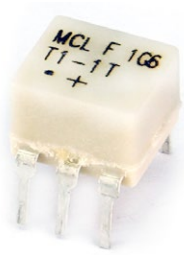
Preselector



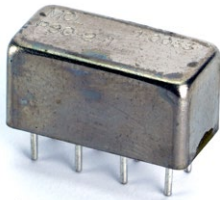
1. Mixer

FUNCTIONAL STATEMENT - RF SHARK

THE MIXER::



HF Transformer



HF Splitter



Quartz filter



SSB Filter

The first mixer in RF SHARK is an active double balance mixer with a high dynamic range. If the mixer is additionally supplied symmetrically by means of an RF transformer, as in this circuit, the maximum modulation increases by 3 dB. Sum and difference signals consisting of the antenna and local oscillator frequencies are formed at the output of the first mixer. The mixer output is divided into two equivalent channels by means of an RF splitter, thus enabling the 1st IF to be brought out in broadband. The second signal path is followed by an 8-pin quartz filter. This only allows the difference signal to pass. The quartz filter is forcibly matched using a 1.5 k resistor. If the quartz filter were operated directly with the output resistance of the first mixer, the filter's transmission curve would be very poor due to strong ripples and asymmetrical edges. Thanks to the possibility of compensating the insertion loss in the first mixer, the resistance adjustment by means of 1.5 kΩ has no negative impact.

The output of the quartz filter should be terminated with 1.5 kΩ. The filter is well adapted due to the parallel connection of the inputs of the two A4100D and the TDA1572. The filtered IF signal, which is greatly reduced in bandwidth, is now ready to be converted into the second and last IF of 455 kHz. RF SHARK offers two AM bandwidths. For this, not the filters are switched, but entire receiver blocks. The A4100D is optimized for AM reception and shows very good noise behavior. The IC is not suitable for SSB reception due to the lack of a regulated IF output. The TDA1572 also shows very good technical data and has this output. It enables a product detector to be connected using a small coupling capacity.

An ideally working AGC for SSB must regulate the recipient as quickly as possible and keep the recipient insensitive during speech or character pauses. In the SSB part of RF SHARK, this is easily achieved using a large charging capacitor.

Unfortunately, the AGC is a bit too slow on the rising flank. Strong SSB signals can lead to distortion. In this case the ATT -24 dB remedy. In other words, an ideal SSB AGC is not possible with broadcast ICs. For true one-sided reception, the two side bands must be separated!

This task is carried out by the SSB filter CFJ455K from Murata, which was installed in many amateur radio devices in the 80s and 90s.

The language can only be understood by adding the missing carrier. Each sideband needs its own beat frequency of 453 and 457 kHz. These signals are obtained from freely programmable oscillators from Cardinal. Unfortunately, the application range is between 1 and 133 MHz. This is the reason for the 4-fold working frequency, which is then divided by a factor of 4 using double-D flip-flops. The lower and upper sidebands must be compensated by 2 kHz so that the frequency display is consistent with the SSB reception frequency. The programmable oscillators from Cardinal are also suitable here.

When you select the sideband, not only does the matching local oscillator become active, but also the one that mixes the 1st IF into the 2nd. The missing 2 kHz are added or subtracted here. In the AM mode of operation, a third crystal oscillator of the same type emits a central signal.

New in RF SHARK is a moving coil instrument for the display of the relative field strength. This also serves as a coordination aid when operating the preselector. A 4 ohm loudspeaker ensures powerful reproduction. But first, diodes that work as switches must feed the various audio outputs to the speaker amplifier. A 2.7nF capacitor in front of the volume control frees the LF of HF residues.

For a better signal-to-noise ratio, the mass of the headphone jack is at the «minus» via a 100 Ω resistor. A stereo version is mandatory for headphone operation!

FUNCTIONAL STATEMENT - RF SHARK

THE DIGITAL PART::

As in the previous JUNIOR 1D kit, an ATMEL processor takes over the control and LCD display. The processor continuously emits high-frequency interference. These are to be suppressed directly at the outputs using a filter. The low-frequency components are subsequently screened again using a low-pass filter.

An additional measure to suppress interference radiation is the ground area on the underside of the board. The signal quality of the local oscillator is of the utmost importance for a clean reception!

The quality is directly related to the clock frequency of the DDS.

A basic rule says: The maximum required output frequency should not be higher than 40 - 50% of the clock frequency. In RF SHARK it is 180 MHz obtained from a 30 MHz TCXO of high accuracy that is multiplied 6 times. In RF SHARK, the ratio of DDS clock and generated LO signal is always less than 23%..

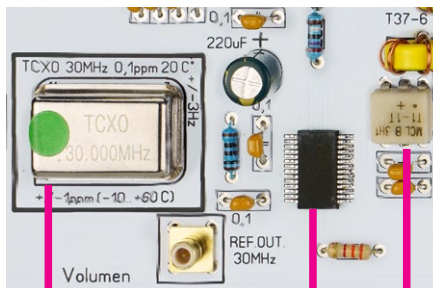
If the DDS signal generated is also taken off symmetrically by means of an HF transformer, the purity increases, because the interference signals contained can only cancel each other out. After passing through the 40.7 MHz low pass filter, the LO signal is ready to be fed to the first mixer. A very big improvement is the optical quality encoder. The slightly higher additional costs are definitely worth it! Not only is a long lifespan ensured, the zero-play concentricity guarantees an excellent feeling of coordination.

The bands can be selected directly using the "Amateur" or "Radio" buttons. The LCD display with 4 x 20 characters shows the start and end frequencies of the desired band.

All control signals and the supply voltage are fed to and returned from the analog section in duplicate via plug contacts. In a nutshell, RF SHARK is a powerful, safe and easy-to-use shortwave receiver.



Processor

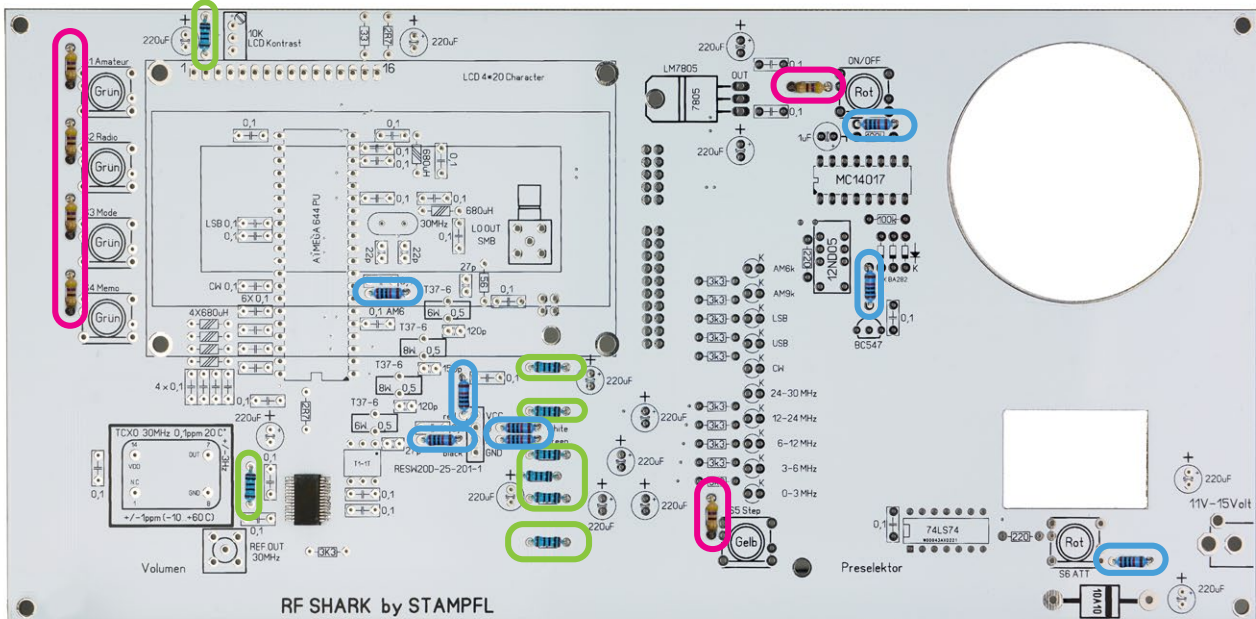


TCXO 30MHz
DDS AD9851
Output Transformer T1-1T

RESISTANCE: 1



We first assemble the flat components: We start with the resistors, which we check for the correct value with the multimeter before soldering.



6x



Carbon film resistors: 470R

Color code: yellow | violet | brown | gold

Installation direction doesn't matter. (Included in excess 1x)

8x



Metal film: 100R

Color code: brown | black | black | black | brown

Installation direction doesn't matter.

8x



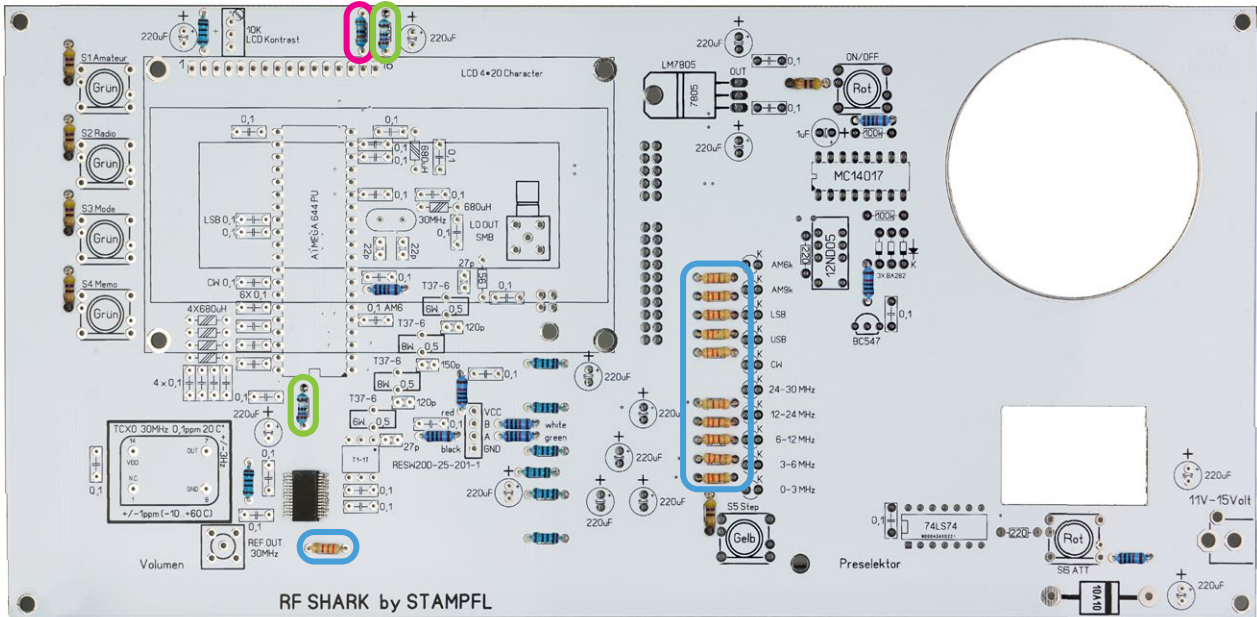
Metal film resistors: 10k

Color code: brown | black | black | red | brown

RESISTANCE: 2



We first assemble the flat components: We start with the resistors, which we check for the correct value with the multimeter before soldering.



1x



Metal layer resistance : **33R**
Color code: orange | orange | black | gold | brown

2x



Metal layer resistance: **2R7**
Color code: red | violet | black | silver | brown
Installation direction doesn't matter.

11x

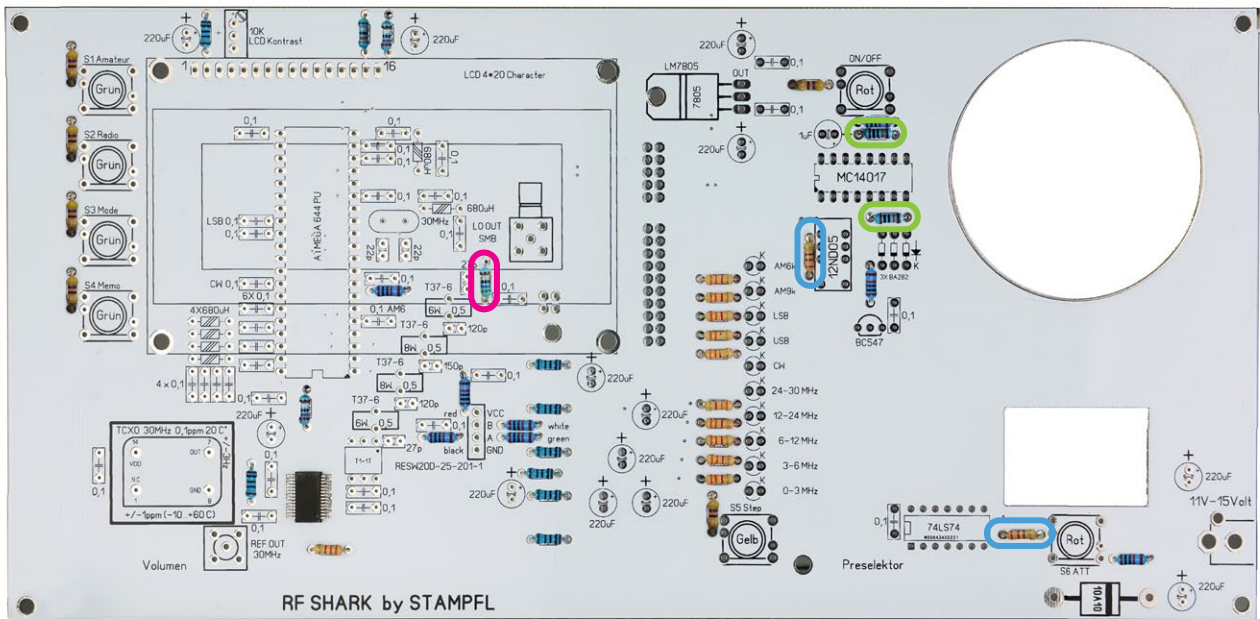


Carbon film resistors: **3K3**
Color code: orange | orange | red | gold

RESISTANCE: 3



We first assemble the flat components: We start with the resistors, which we check for the correct value with the multimeter before soldering.



1x



Metal layer resistance : 56R
Color code: green | blue | black | silver | brown
Installation direction doesn't matter.

2x



Metal layer resistance : 100K
Color code: brown | black | black | orange | brown
Installation direction doesn't matter.

2x



Carbon film resistors: 220R
Color code: red | red | brown | gold
Installation direction doesn't matter.

1x



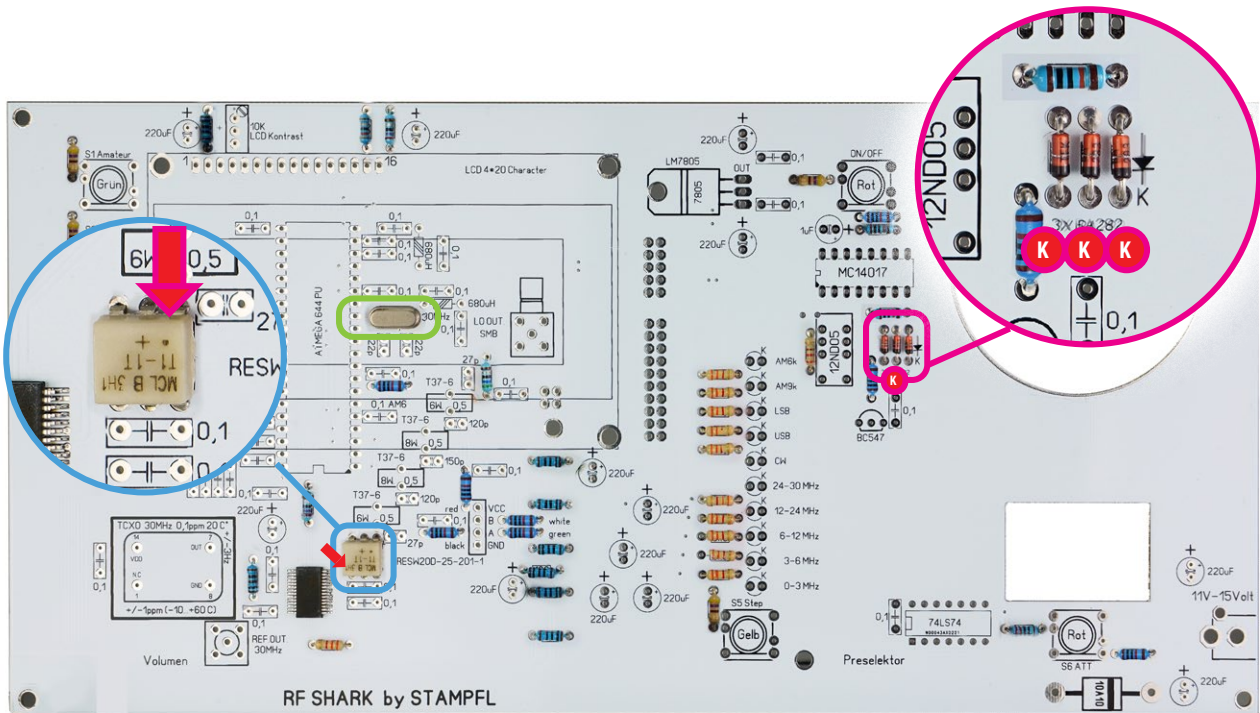
Metal layer resistance: 220R
Color code: red | red | brown | silver | brown
Can also be included as a metal film in the kit.
Included in the bag with the screws.



DIODES, QUARTZ, HF TRANSFORMER: 4



ATTENTION!:
Keep the mounting direction in mind!



3x

K



Switching diode type: BA282 / BA283
Keep the mounting direction in mind.



1x



20 MHz Quarz
Installation direction doesn't matter.
Printed circuit board (30 MHz) is wrong



1x



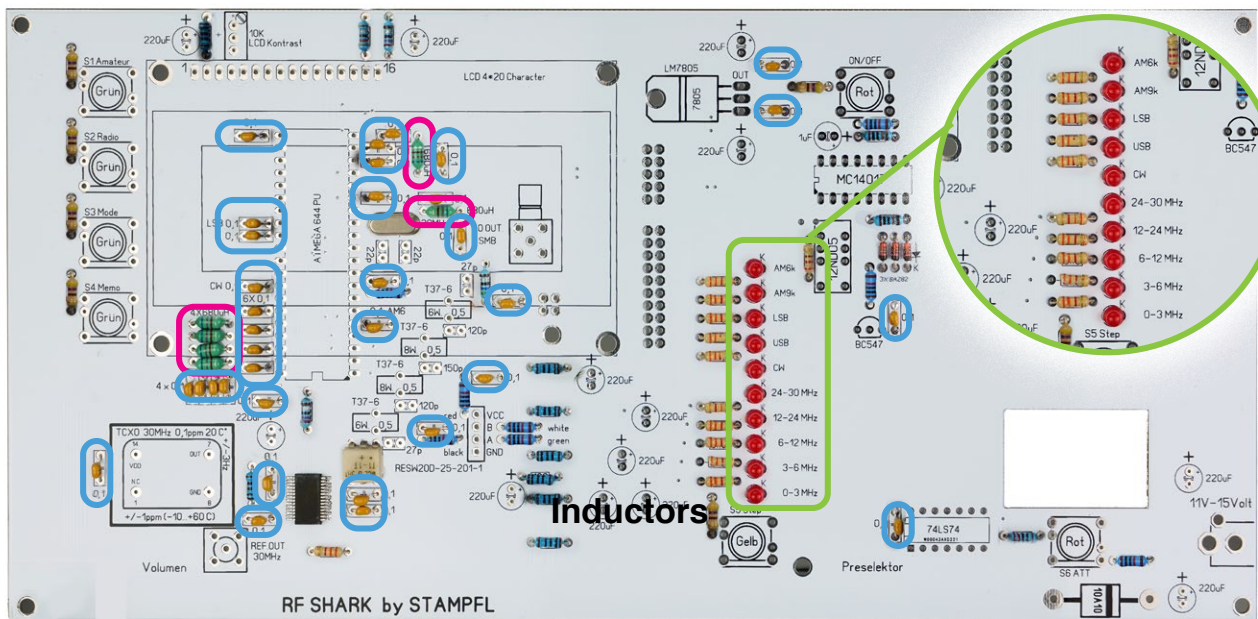
HF TRANSFORMER
Note the dot!



CHOKES, LEDs, BLOCKING CAPS: 5



ATTENTION!:
Keep the mounting direction in mind!



6x



Inductors: 680 μ H

Color code: blue | gray | brown | silver

Installation direction doesn't matter. (Included in excess 1x)



10x



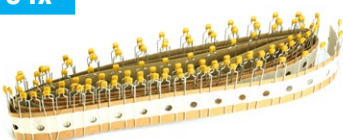
LED: 3 mm

The shorter leg is the negative pole (K)

Observe mounting direction (Included in excess 1x)



34x



Blocking capacitors 0,1 μ F

Installation direction doesn't matter.
Abundant!

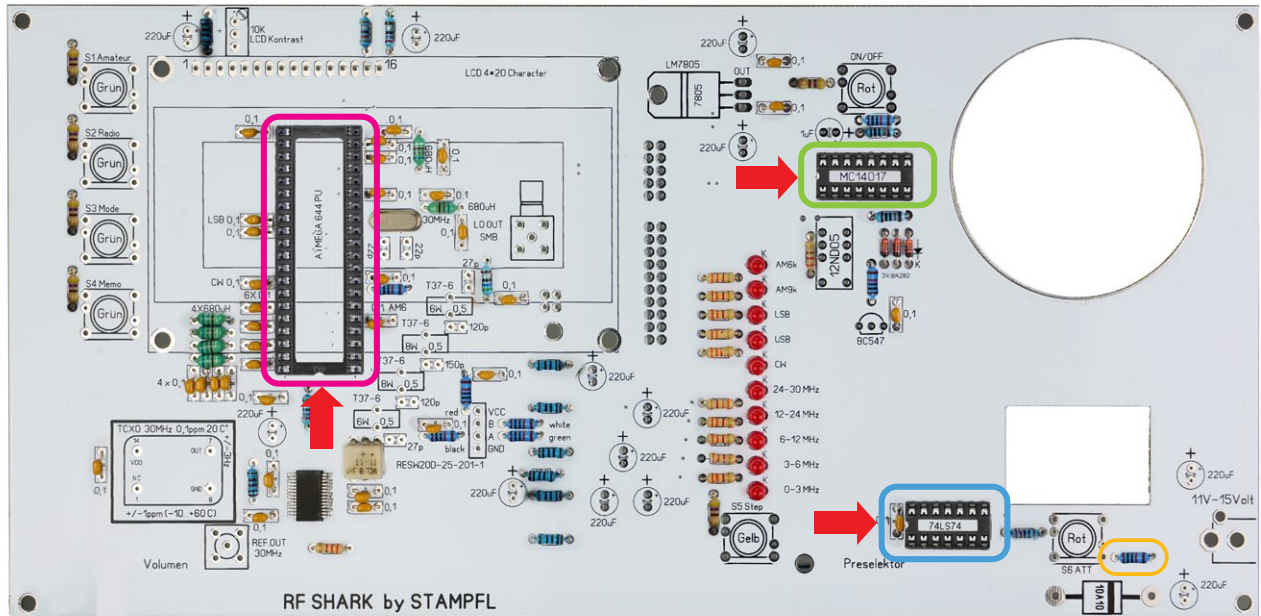
IC SOCKETS: 6



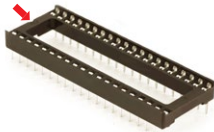
BEWARE OF MARKING!

The base and print must match.

Make sure that no short circuits are made.



1x

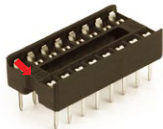


Socket **40 pol**

Make sure that no short circuits are made !



1x

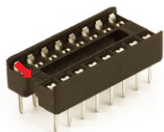


Socket: **16 pol**

Make sure that no short circuits are made !



1x



Socket: **14 pol**

Make sure that no short circuits are made !

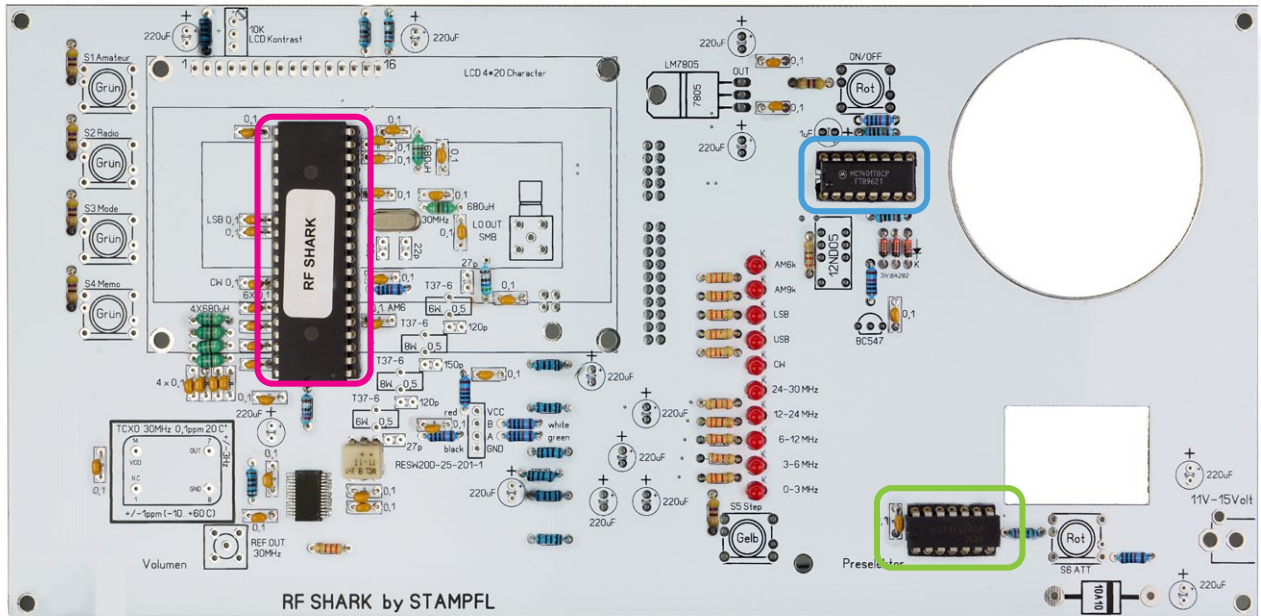


IC: 7



BEWARE OF MARKING!

Make sure that no short circuits are made.



1x

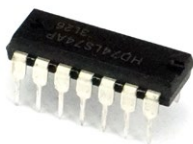


IC: ATMEGA644

ATTENTION !: Pay attention to the location!
Bend the IC legs slightly inwards on the surface.



1x

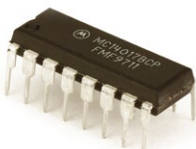


IC: 74LS74 (NICHT 74HC74 VERWENDEN)

ALERT !: The IC type and position must be observed!
Bend the IC legs slightly inwards on the surface.



1x

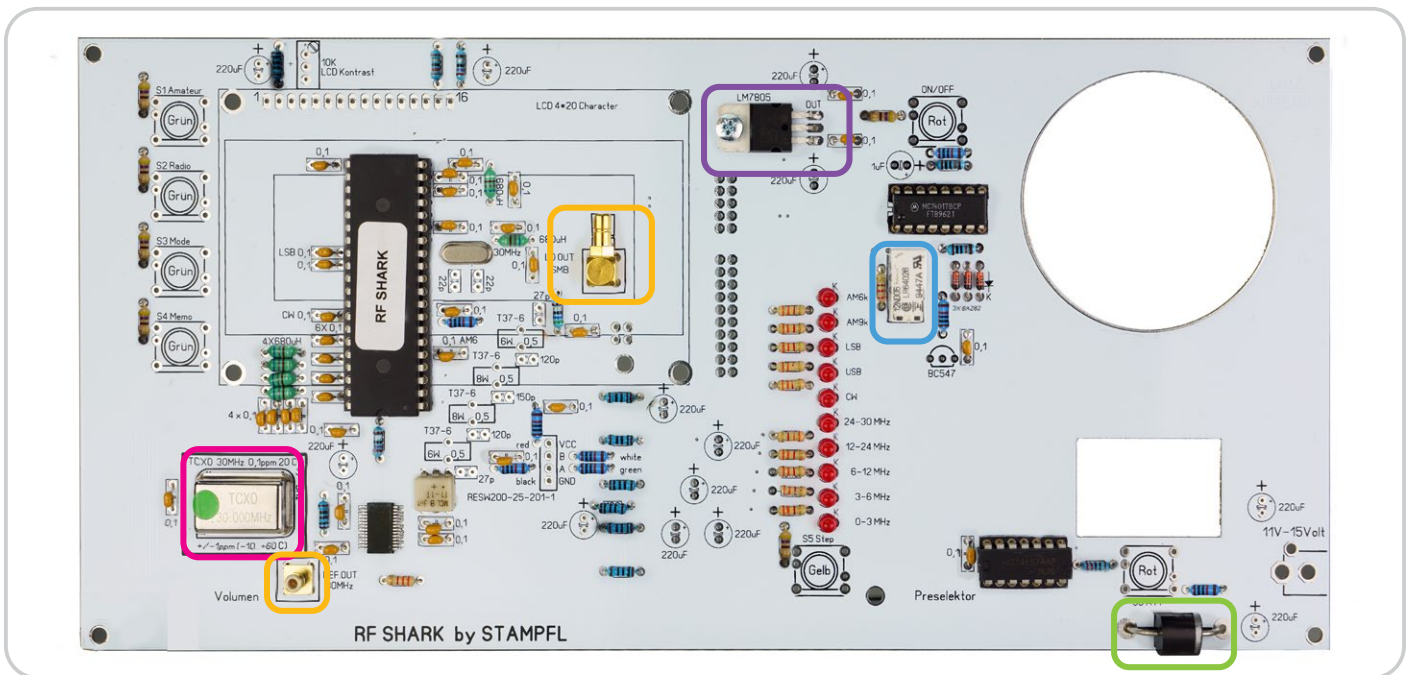


IC: MC14017

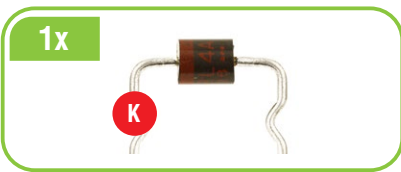
ALERT !: The IC type and position must be observed!
Bend the IC legs slightly inwards on the surface.




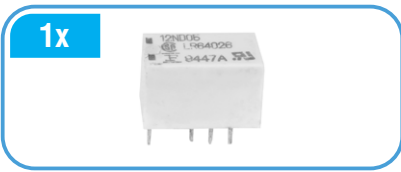
MISCELLANEOUS: 7



Reference oscillator: 30 MHz TCXO
Keep the mounting direction in mind. 



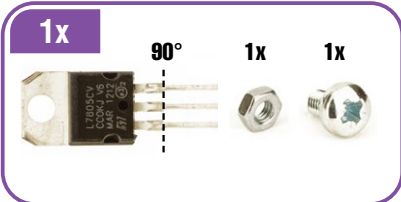
Diode: 10A10 oder RL4A
Keep the mounting direction in mind. 



Switch-on relays: 12ND05

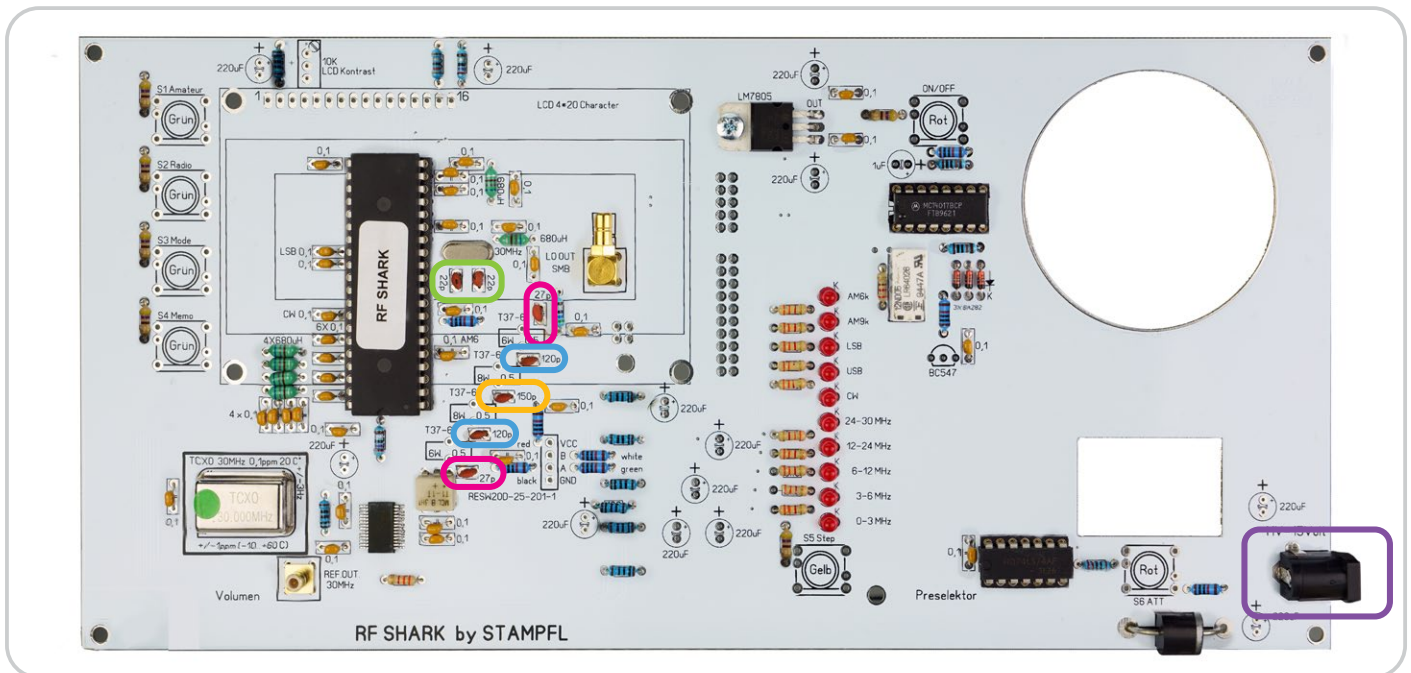


SMB sockets: standing, angled
Keep the mounting direction in mind. 



On the 7805 voltage regulator, we bend the 3 feet at a 90 degree angle so that it coincides with the mounting hole on the circuit board. Fix and solder using M3 x 5mm screw and suitable nut.

DISC CAPACITORS: 7



2x



Disc capacitor: 27p
Installation direction doesn't matter.

2x



Disc capacitor: 22p
Installation direction doesn't matter.

2x



Disc capacitor: 120p
Installation direction doesn't matter.

1x



Disc capacitor: 150p
Installation direction doesn't matter.

1x



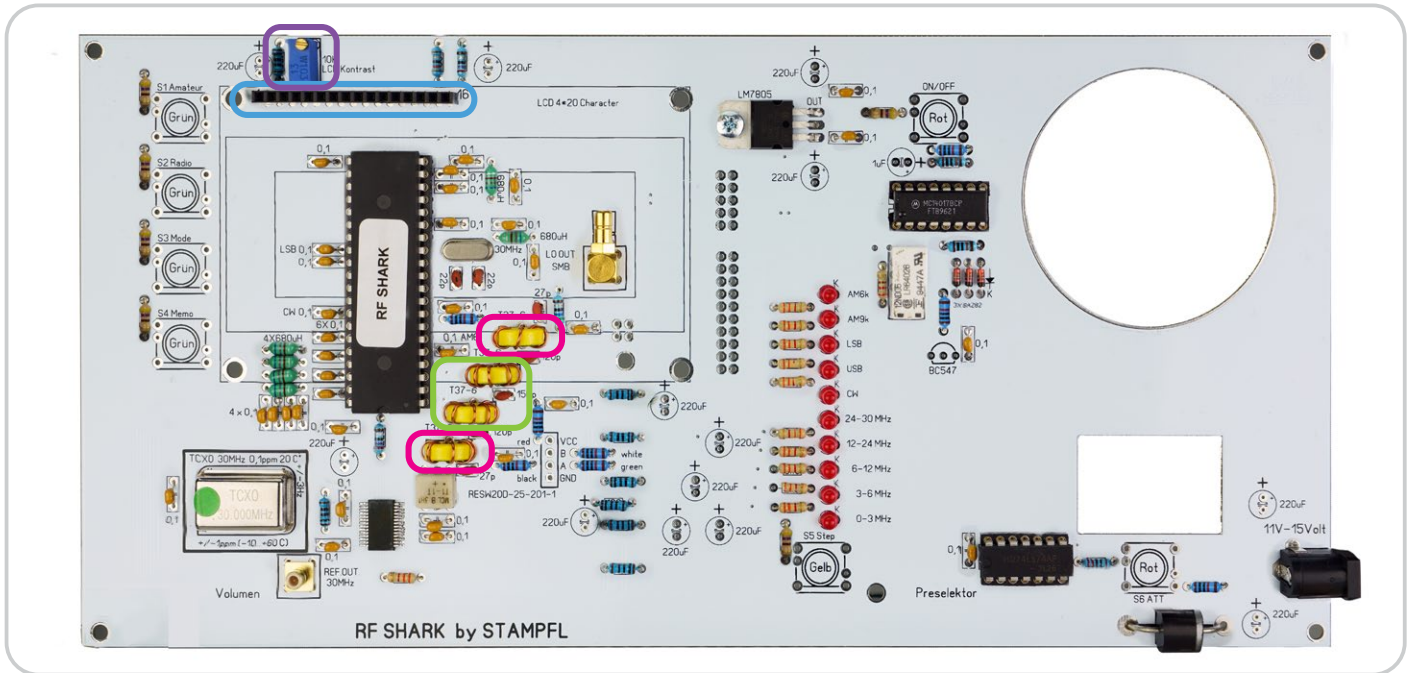
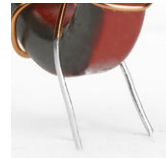
DC socket
In the small bag with the push button and brass spacers.

TOROID, SOCKET HEADER, POT: 8



METHOD!:

Wind wire on toroid, shorten and pre-tin. From 350 ° the wire can be tinned directly.



2x



Toroid: T37-6

Wire length: 18 cm / 7 in

Coils: 6 (The first insertion is considered one turn.)

In the RX packaging

2x



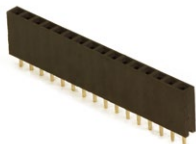
Toroid: T37-6

Wire length: 18 cm / 7 in

Coils: 8 (The first insertion is considered one turn)

In the RX packaging

1x



16-pin socket connector (LCD)

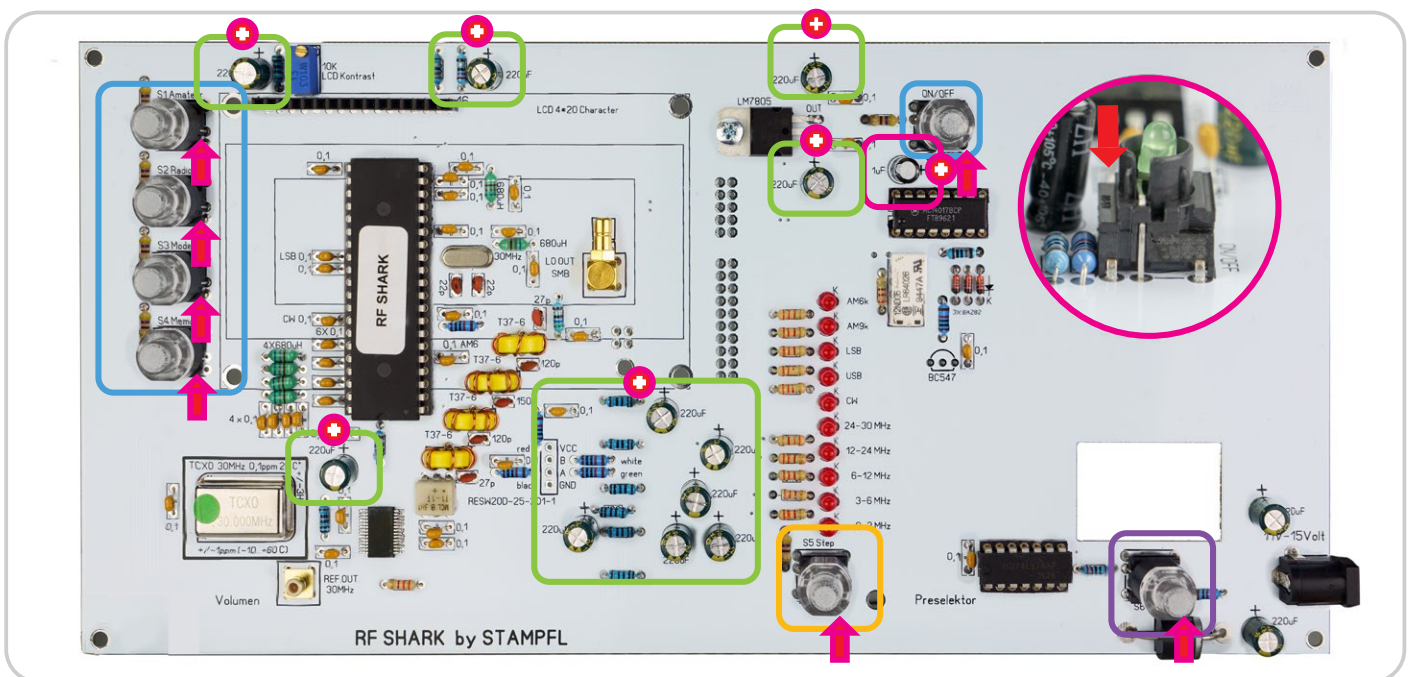
1x



25 turn 10K Poti

It will later be used to adjust the contrast of the LCD display.

Electrolytic Capacitors & Buttons: 9



1x



Electrolytic capacitor: **1 µF**
ATTENTION !: Pay attention to polarity!
 The longer wire is the positive pole.



13x



Electrolytic capacitor: **220 µF**
ATTENTION !: Pay attention to polarity!
 The longer wire is the positive pole..



5x



Push button with extension and greencap
 Keep the mounting direction in mind!
 (Note the step in the button housing) see detailed photo



1x



Push button with extension and yellow cap
 Keep the mounting direction in mind!
 (Note the step in the button housing) see detailed photo



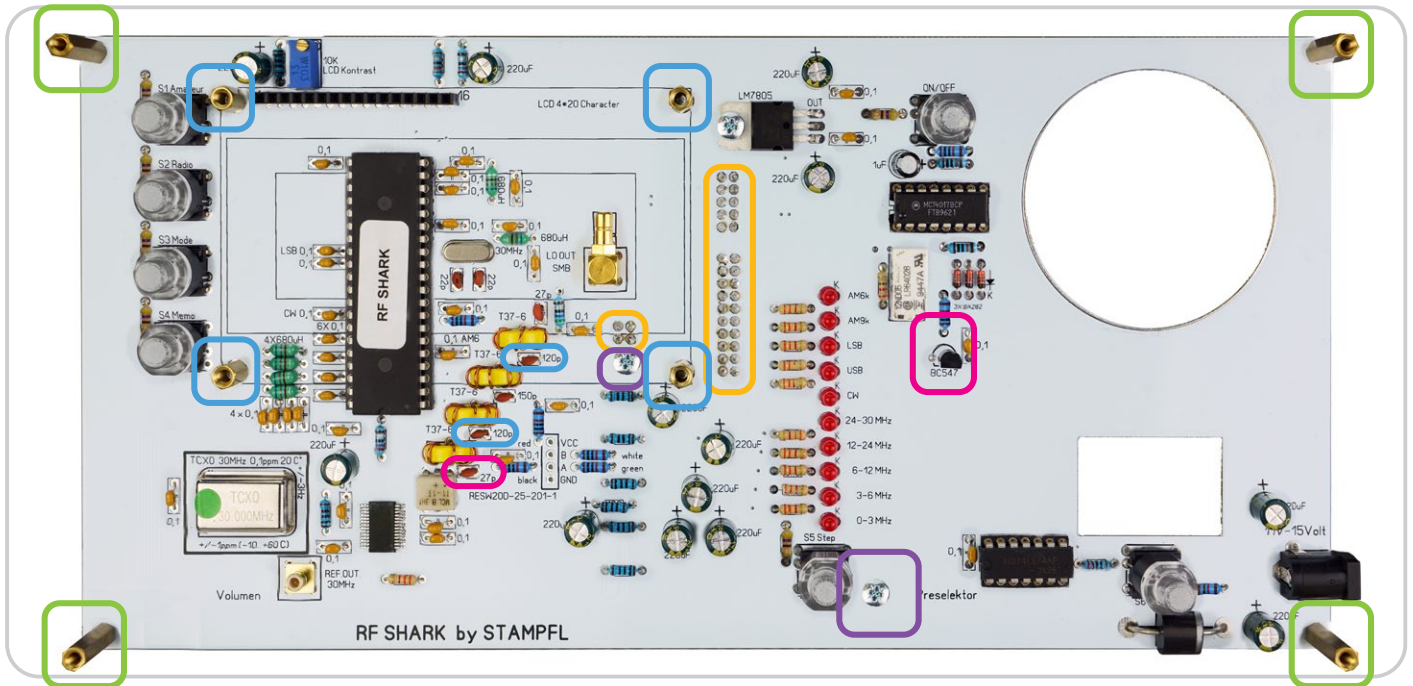
1x



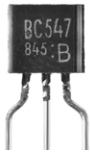
Push button with extension and red cap
 Keep the mounting direction in mind!
 (Note the step in the button housing) see detailed photo



TRANSISTOR / SPACER / SOCKET STRIPS: 10



1x



Transistor: BC547

Keep the mounting direction in mind.



4x



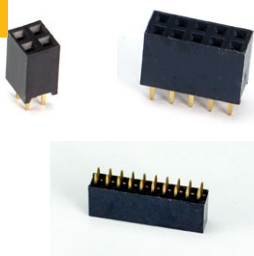
Spacers: M3 x 25 x 6 attach. (Long front)
Spacers with: M3 x 12 tighten. (Short back)

4x



Spacers: M3 x 12
Screws: M3 x 5

1x



Female headers: 2 x 2 / 2 x 5 / 2 x 10
 point backwards.
 See page 14.

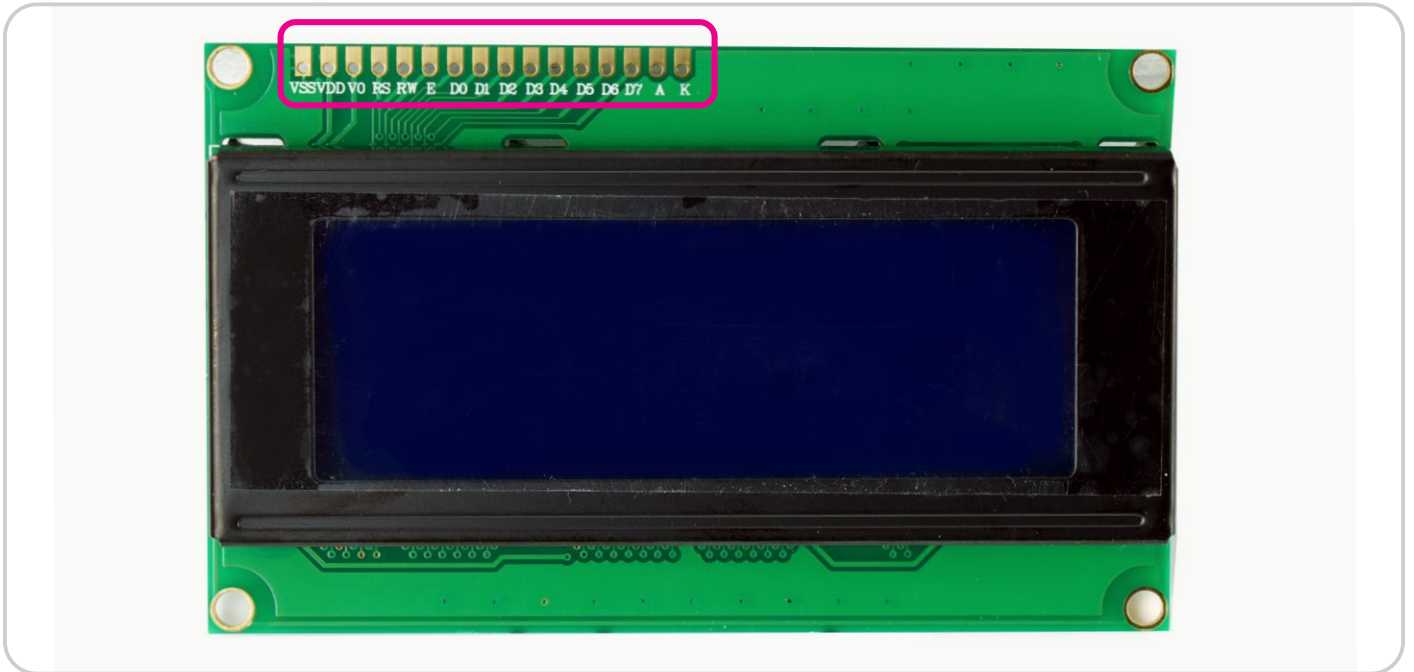


2x

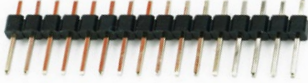


Spacers M3 x 12
Screws: M3 x 5
 Mount on the back of the print

DISPLAY: 11



1x

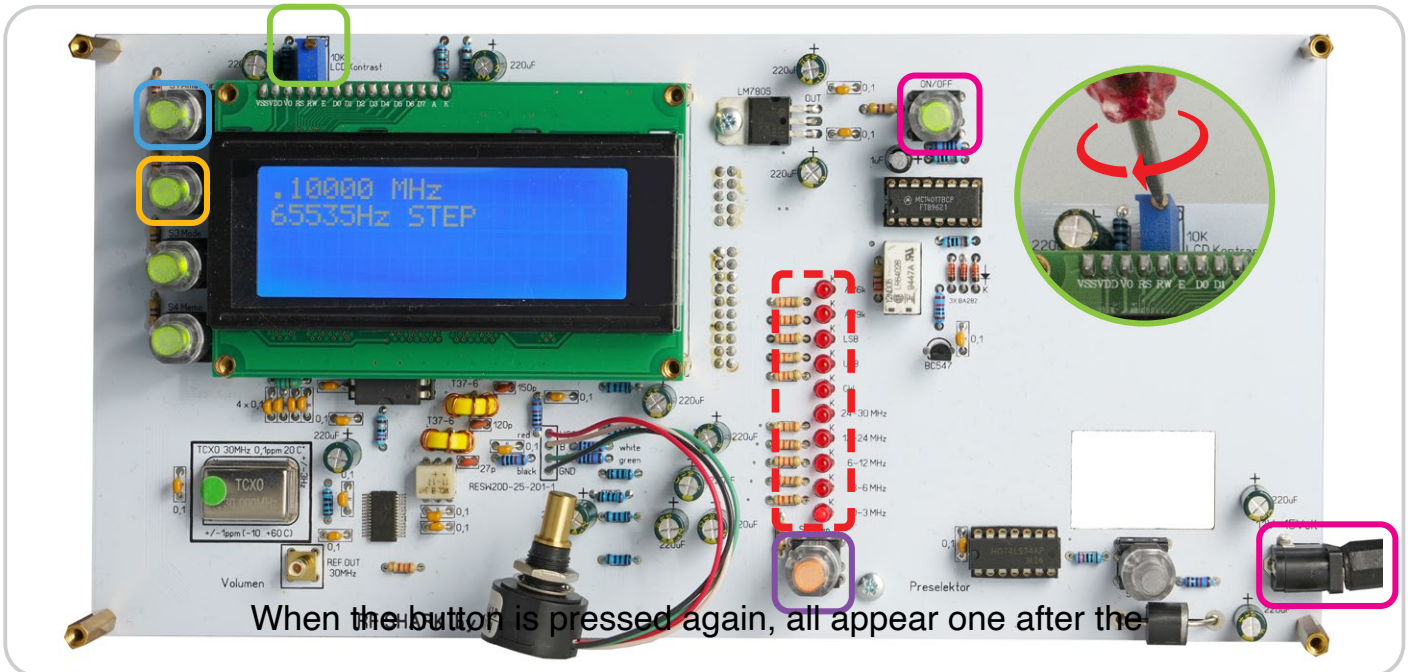


Pin header: 16 pin.
keep the mounting direction in mind.
Long pens point down.



FUNCTIONAL TEST: 12

LEDs are used to control the switching voltages for the preselector and the modulations.



When the button is pressed again, all appear one after the other

1 ON/OFF Control

Apply voltage. 11 - 15V. The controller board must be able to be switched on and off with a click. All buttons and the display must light up. ATT excluded.

2 Set the display contrast using the 25-turn potentiometer.

If the memory is empty, the display shows MHz - 65535 Hz STEP.

3 Check the amateur band button

When the button is pressed again, all amateur radio bands appear one after the other.

4 Check the radio button

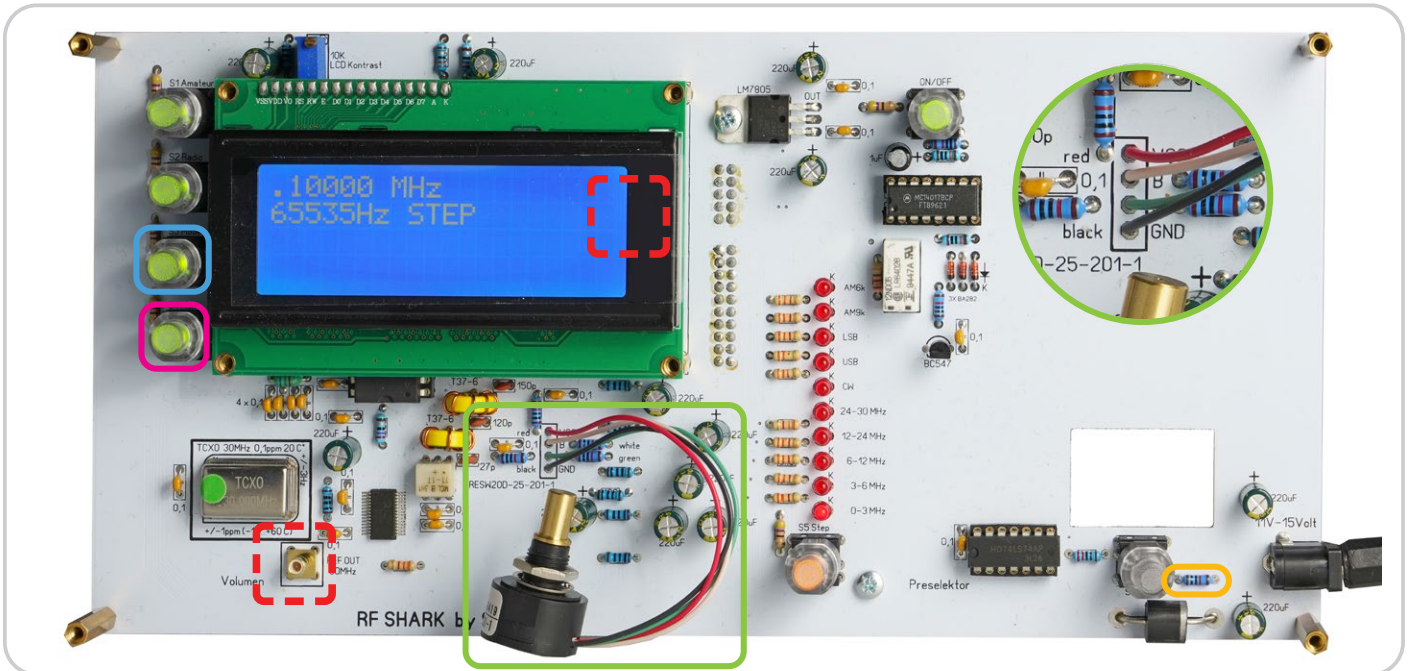
When the button is pressed again, all broadcast bands appear one after the other.

5 Check the STEP button

When the button is pressed again, all frequency steps appear in succession:
10 Hz, 100 Hz, 1K Hz, 5K Hz, 9 KHz.

FUNCTIONAL TEST: 13

The LO signal can be checked at the SMB socket under the display. Approx. 500 mV. The reference signal of 30 MHz of the TCXO can be checked at the standing SMB socket. IF ERROR SEE PAGE 14.



1 Check the **MODE** button

When the button is pressed again, all modulations appear one after the other.
AMN / AMW / LSB / USB / CW

2 Encoder installation and control

Note wire colors. See detailed photos.
Frequency increases clockwise.



3 Check the **MEMORY** button

When you press the memory button, all settings are saved until you switch on again.

4 Check the **ATTENUATOR** button

Lights up red when active.



POSSIBLE ERRORS AND CAUSES

Error: button (s) do not light up.

Cause: The button (s) are installed rotated by 180 degrees.

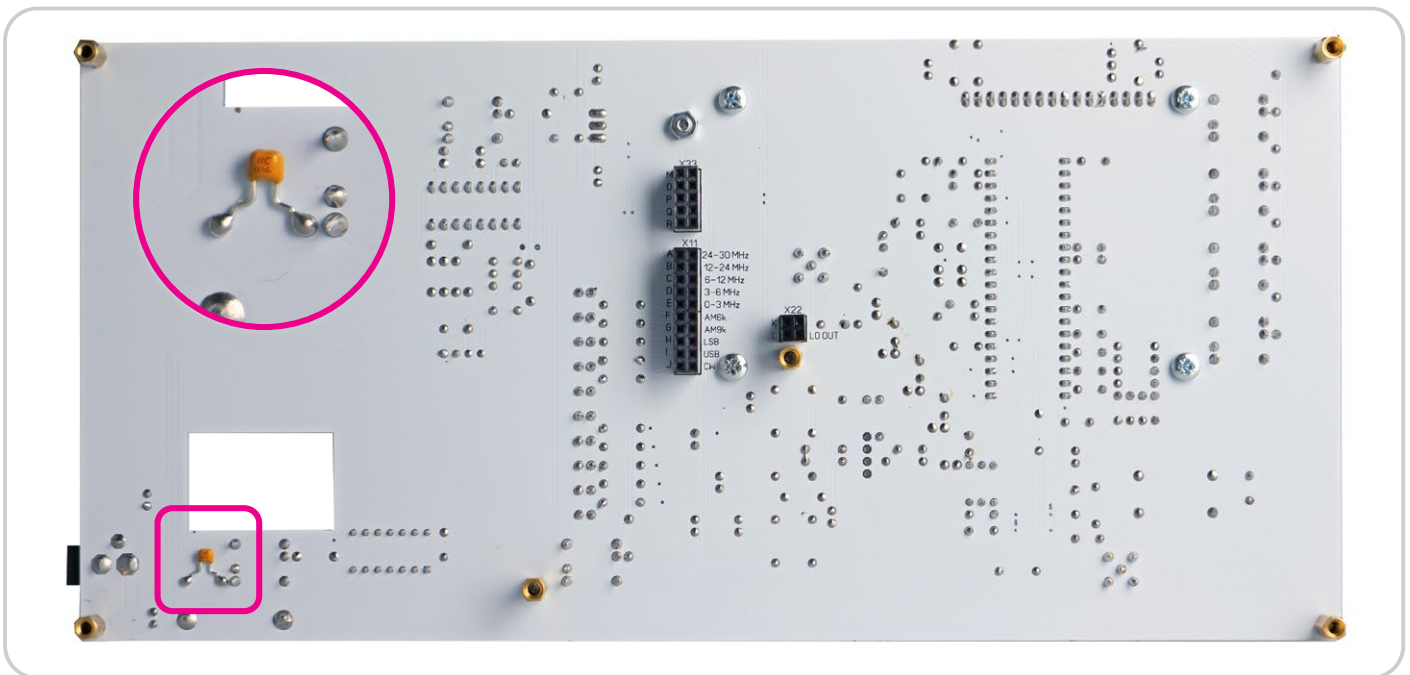
Error: display shows nothing.

Cause: Contrast POTI of the LCD display is not adjusted.

Cause: ATMEGA 644 not correctly in the socket.

Error: frequency falls when turning the encoder clockwise.

Cause: The green and white wires of the rotary encoder are soldered in the wrong position.



1 Installation 0.1 μ F capacitor

This capacitor serves to debounce the ATT button. Bouncing is a mechanically triggered interference effect in electromechanical switches and buttons.

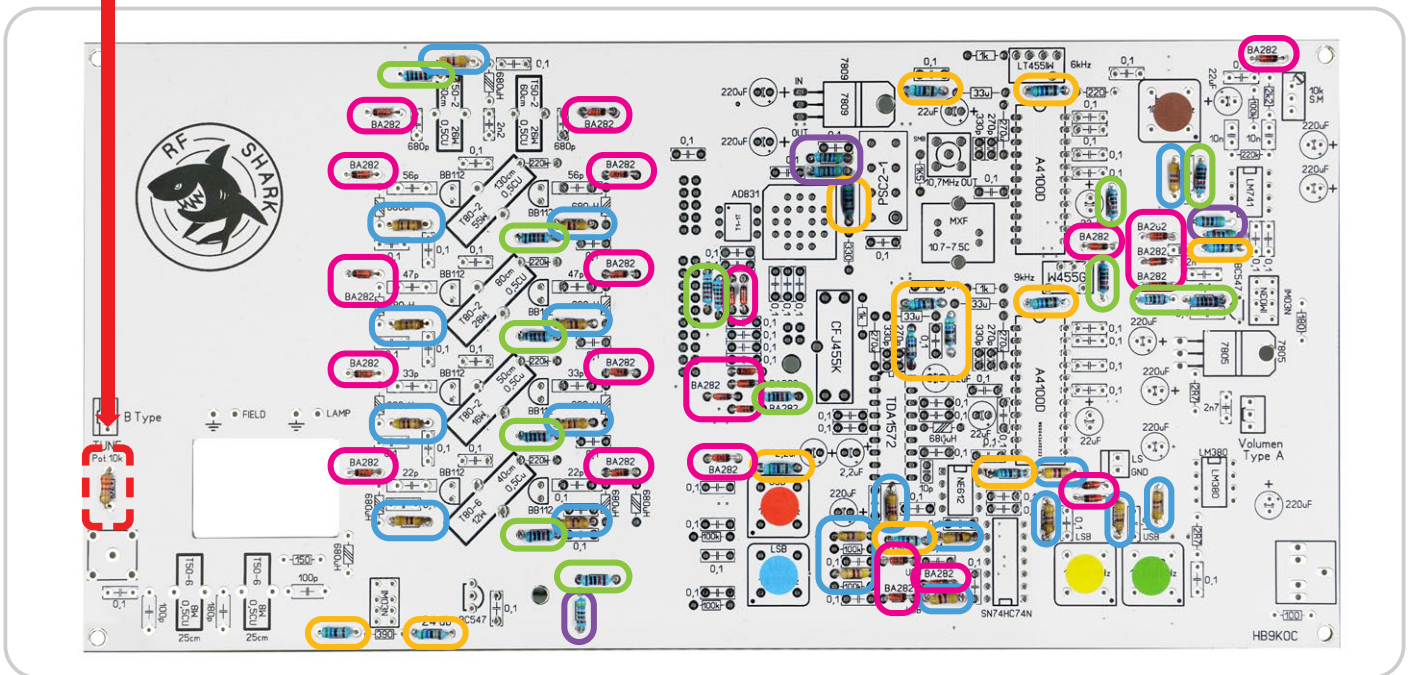


As far as the electronic assembly of the first board is finished and we continue after a break with the assembly of the receiver board.

RX BOARD RESISTORS, DIODES: 15



Solder in place of 470R - 3K3 resistor
Carbon film resistors: 3K3
Color code: orange | orange | red | gold



27x

K



Switching diode type: BA282 (BA283)

(Included in excess 1x) Observe mounting direction



14x



Metal Film Resistor :

10k

Color code : brown | black | black | red | brown

Included in excess 1x) Mount in either direction

19x



Carbon Film Resistor:

470R

Color code: yellow | violet | brown | gold

Mount in either direction

13x



Metal Film Resistor :

56R

Color code : green | blue | black | silver | brown

Mount in either direction

5x



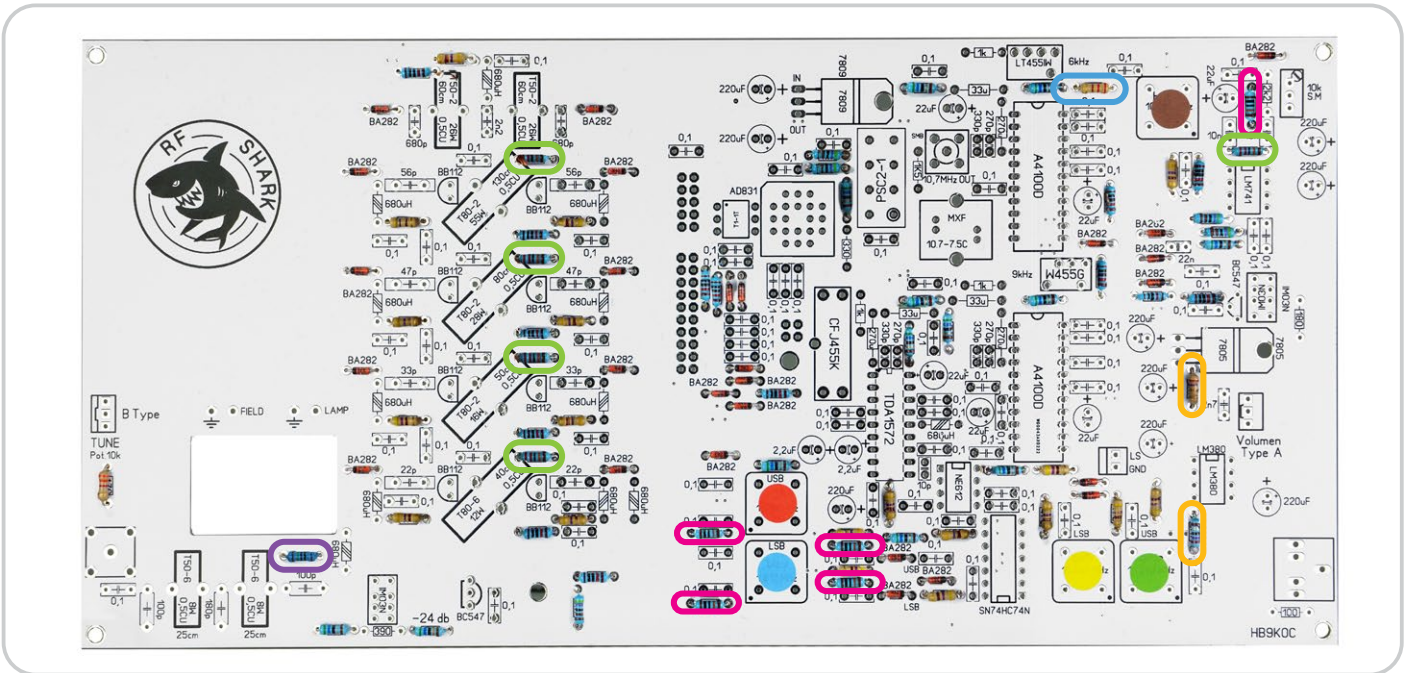
Metal Film Resistor :

4K7

Color code : yellow | violet | black | brown | brown

Mount in either direction.

RX BOARD RESISTORS: 16



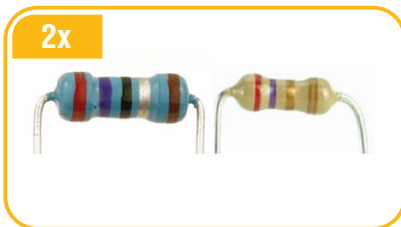
Metal film resistors: 100k
Color code: brown | black | black | orange | brown



Metal film resistors: 220k
Color code: red | red | black | orange | brown



Carbon resistors: 220R
Color code: red | red | brown | gold
 Installation direction doesn't matter.

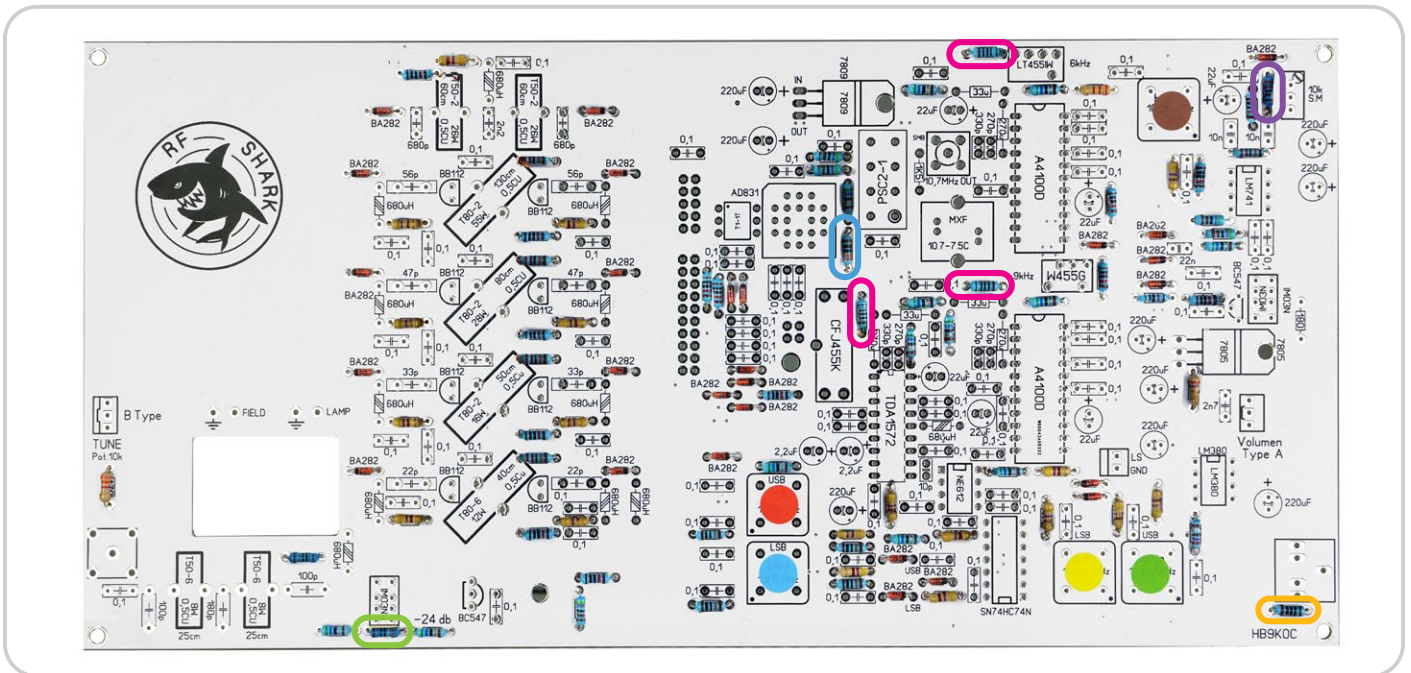


Resistors : 2R7
Metal film color code: red | violet | black | silver | brown
Carbon layer color code: red | violet | gold | gold
 Installation direction doesn't matter.



Metal film resistors: 150R
Color code: brown | green | black | black | brown
 Installation direction doesn't matter.

RX BOARD RESISTORS: 17



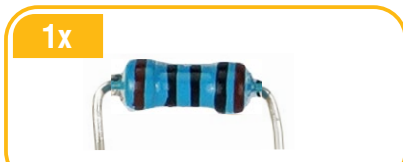
Metal Film Resistor : 1k
Color code: brown | black | black | brown | brown



Metal Film Resistor : 390R
Color Code: orange | white | black | black | brown



Carbon Film Resistor: 330R
Color code: orange | orange | black | black | brown
 Installation direction doesn't matter.



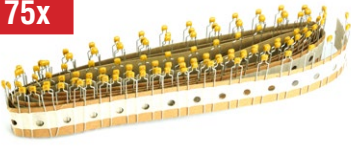
Metal Film Resistor : 100R
Color code: brown | black | black | black | brown
 Installation direction doesn't matter.



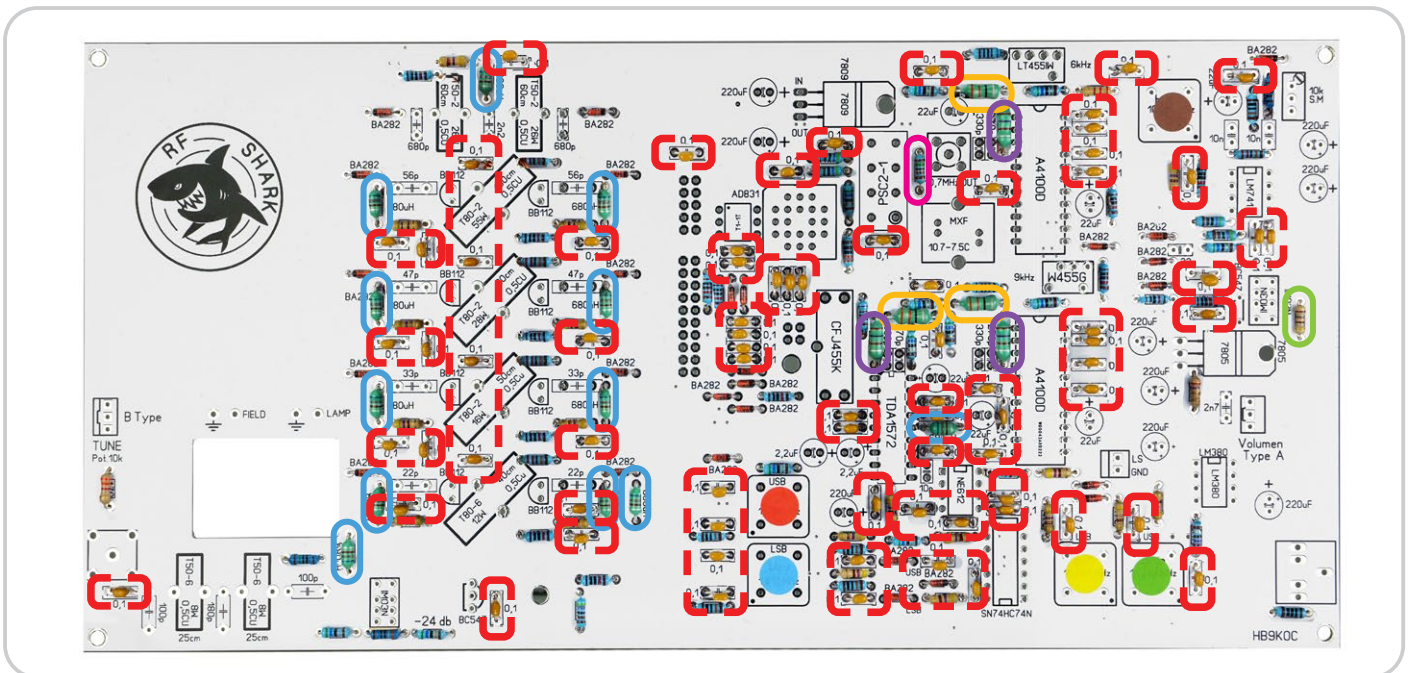
Carbon Film Resistor: 2k2
Color code: red | red | black | brown | brown
 Installation direction doesn't matter.

RX BOARD RESISTORS, CHOKES: 18

75x



Component type exists twice. Use 0.1 μF component from the strip! The remaining lots are of lesser precision.



1x



Metal Film Resistors: 1k5
 Color code: brown | green | black | brown | brown
 Installation direction doesn't matter.

1x



Carbon Film Resistors: 180R
 Color code: brown | gray | brown | gold
 Installation direction doesn't matter. (Included in excess 1x)

12x



Inductors: 680 μH
 Color code: blue | gray | brown | silver
 Installation direction doesn't matter.

3x



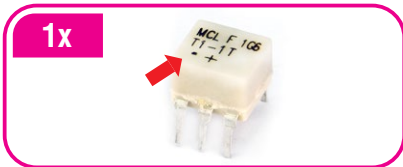
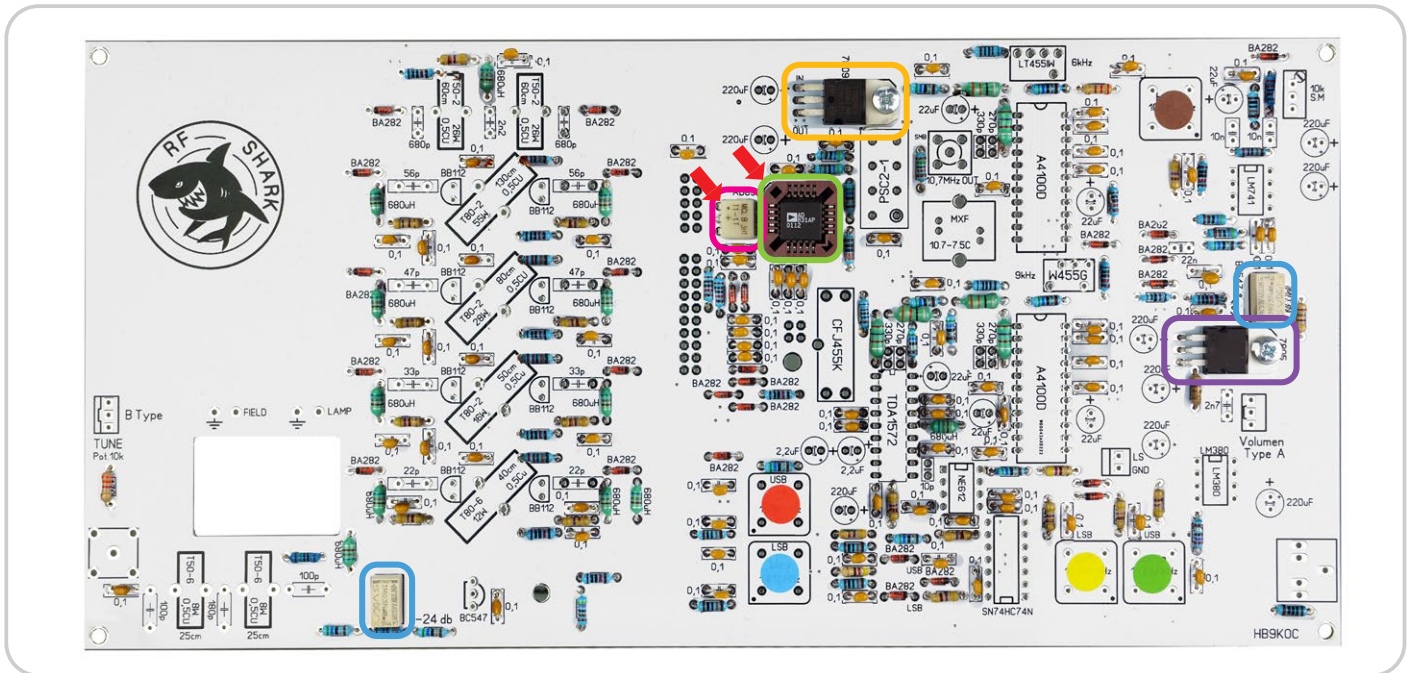
Inductors: 33 μH
 Color code: orange | orange | black | silver
 Installation direction doesn't matter.

3x

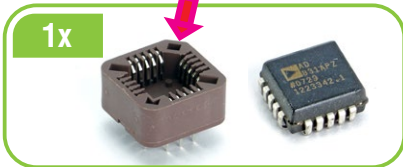


Inductors: 270 μH
 Color code: red | violet | brown | silver
 Installation direction doesn't matter.

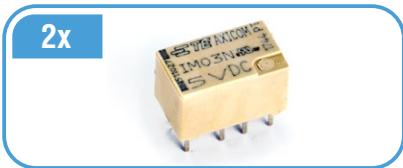
HF XFMR., MIXER, RELAY, CONTROLLER: 19



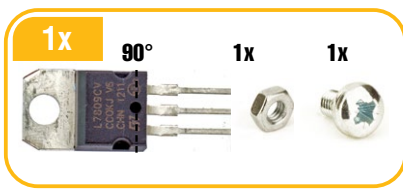
HF Transformer: T1-1T
 Keep the mounting direction in mind.



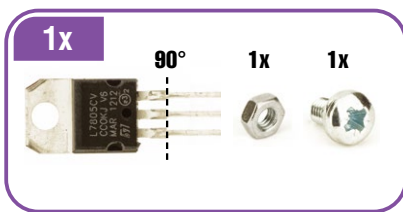
Socket & HF mixer: AD831
 Keep the mounting direction in mind.



5V Relays: IM03N
 Keep the mounting direction in mind.

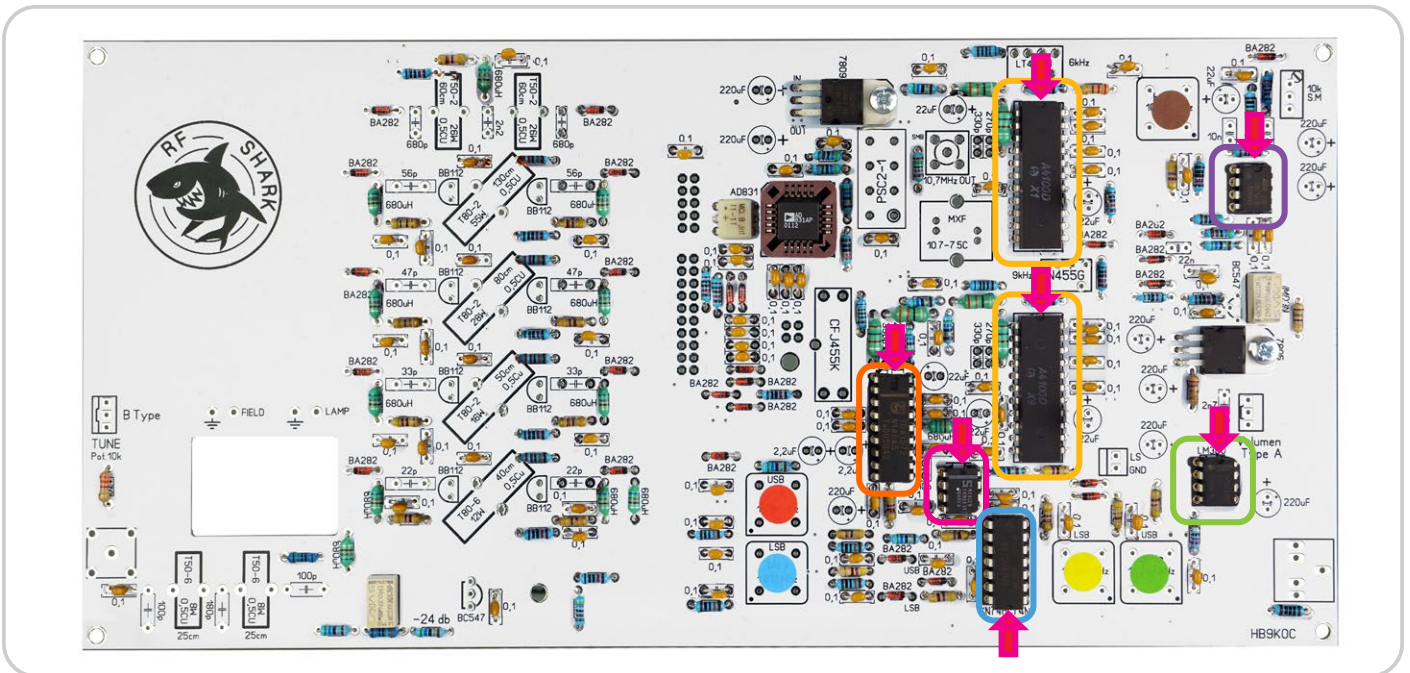


We bend the 3 feet on the voltage regulator **7809** at a 90 degree angle so that it coincides with the mounting hole on the circuit board. Fix and solder using M 3 x 5 mm screw and a suitable nut.

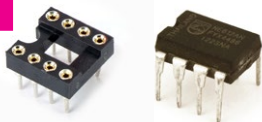


On the **7805** voltage regulator, we bend the 3 feet at a 90 degree angle so that it coincides with the mounting hole on the circuit board. Fix and solder using M 3 x 5 mm screw and a suitable nut.

IC: 20



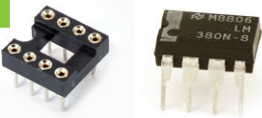
1x



Socket & IC: **NE612**
ATTENTION !: The IC type and position must be observed!



1x



Socket & IC: **LM380**
ATTENTION !: The IC type and position must be observed!



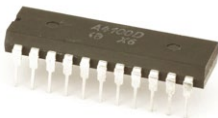
1x



Socket & IC: **SN74HC74N**
ATTENTION !: The IC type and position must be observed!



2x



IC: **A4100D** is soldered directly into the board.
ATTENTION !: The IC type and position must be observed!
Bend the IC legs slightly inwards on the surface.



1x



Socket & IC: **UA741CN**
ATTENTION !: The IC type and position must be observed!



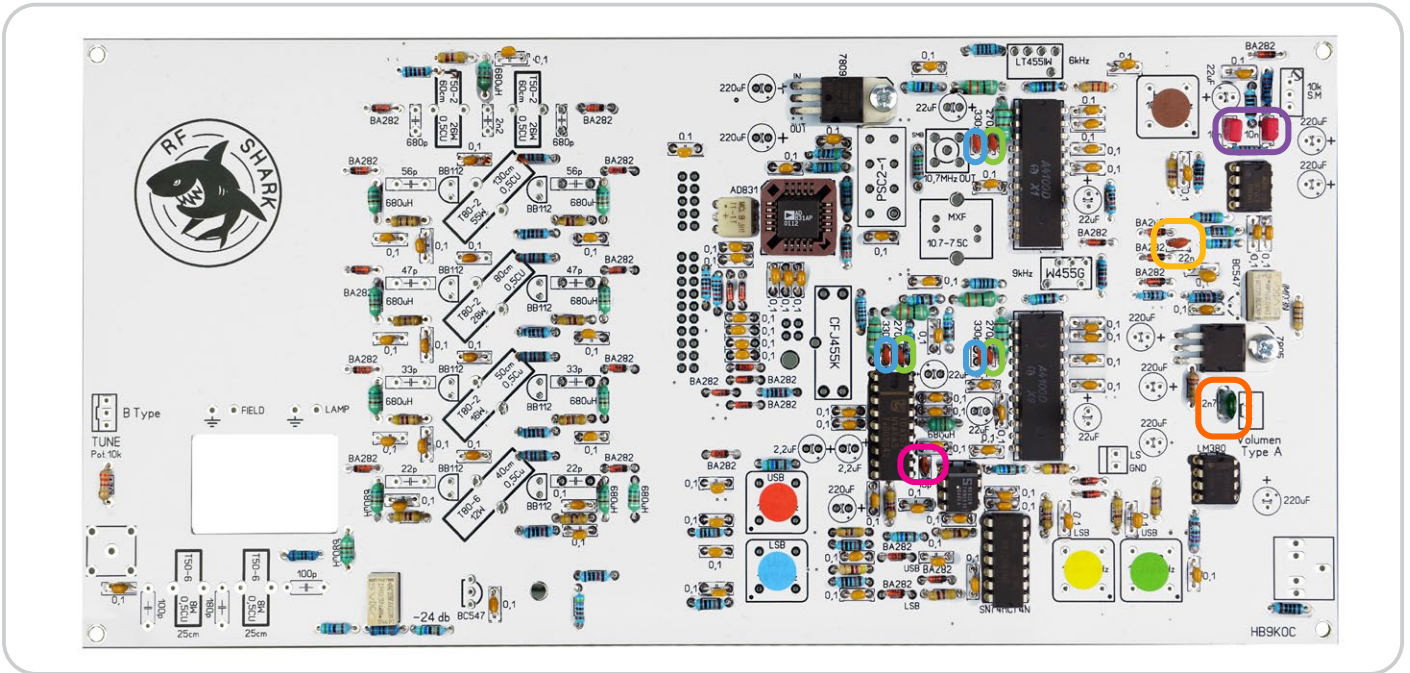
1x



Socket & IC: **TDA1572**
ATTENTION !: The IC type and position must be observed!



CAPACITORS: 21



Ceramic capacitor: 10 pF
Installation direction doesn't matter.



Ceramic capacitor: 270 pF
Installation direction doesn't matter.



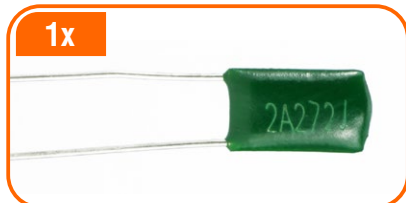
Ceramic capacitor: 330 pF
Installation direction doesn't matter.



Ceramic capacitor: 22 nF
Installation direction doesn't matter.

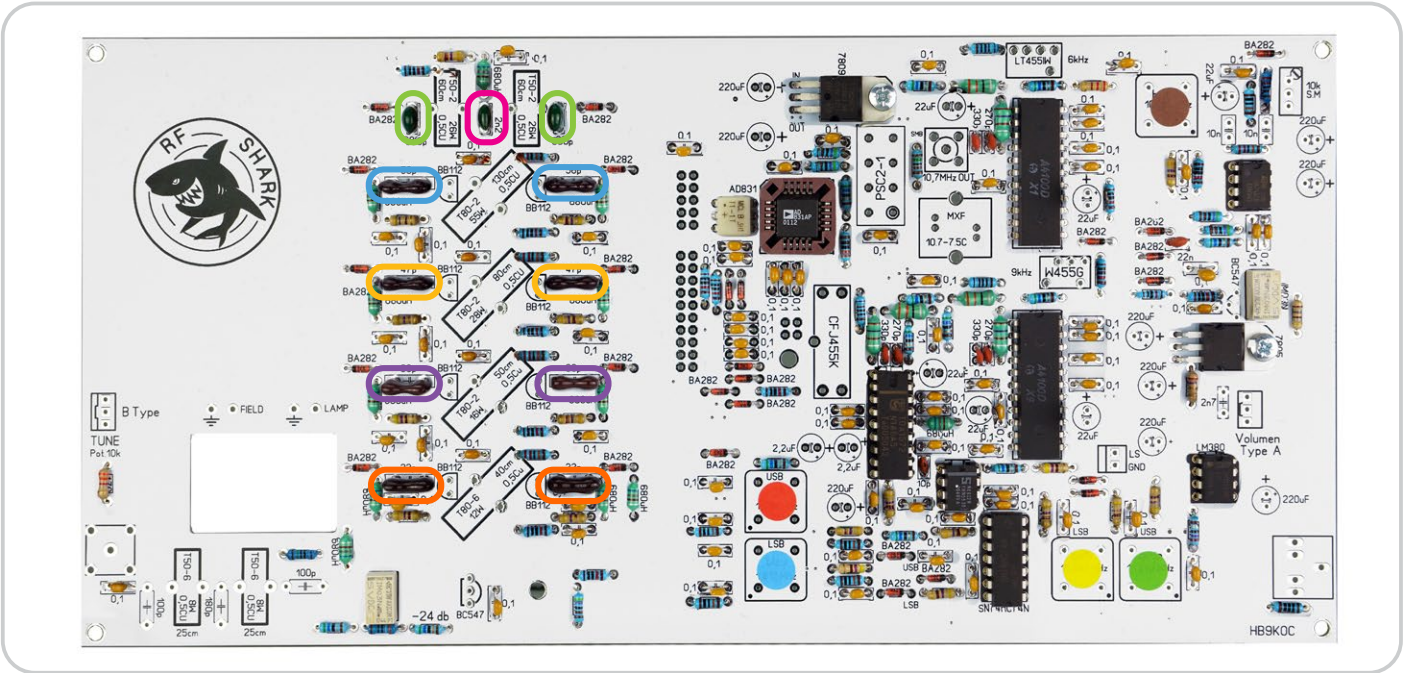


Film capacitor: 10 nF
Installation direction doesn't matter.



Film capacitor: 2n7
Installation direction doesn't matter.

CAPACITORS: 22



1x



Film capacitor : **2n2**
Installation direction doesn't matter.
Included in the bag with the HF splitter and spacers.

2x



Film capacitor : **680 pF**
Installation direction doesn't matter.

2x



Mica capacitor: **56 pF**
Installation direction doesn't matter.

2x



Mica capacitor: **47 pF**
Installation direction doesn't matter.

2x



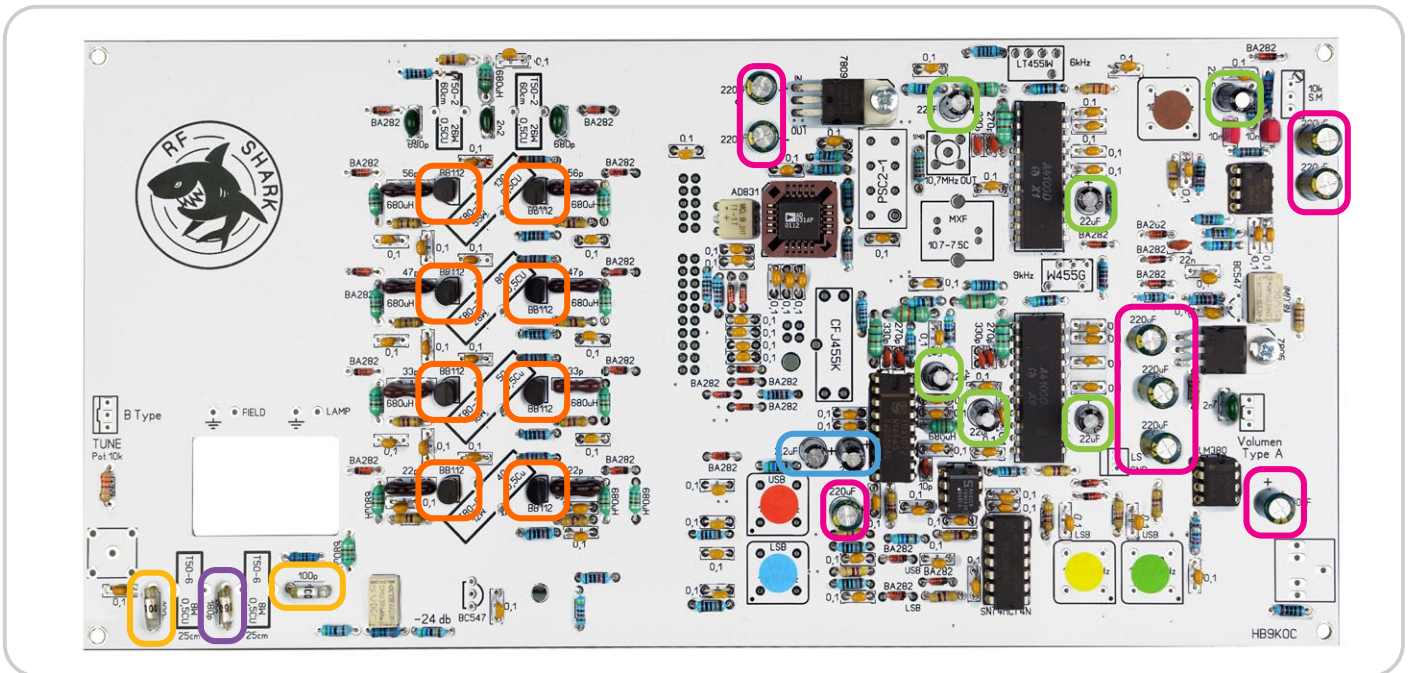
Mica capacitor: **33 pF**
Installation direction doesn't matter.

2x

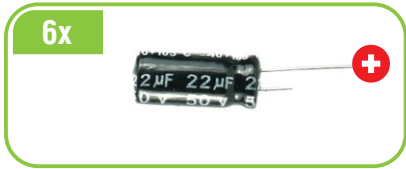


Mica capacitor: **22 pF**
Installation direction doesn't matter.

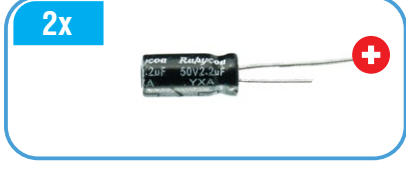
CAPACITORS: 23



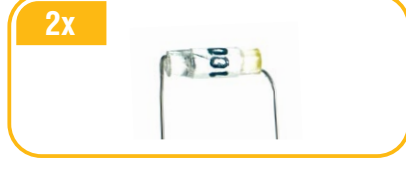
Electrolytic capacitor: 220 µF
 Keep the mounting direction in mind.
 (Included in excess 1x)



Electrolytic capacitor: 22 µF
 Keep the mounting direction in mind.



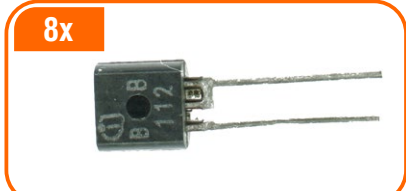
Electrolytic capacitor: 2,2 µF
 Keep the mounting direction in mind.



Styroflex® capacitor: 100 pF
 Installation direction doesn't matter.
Caution, heat-sensitive component. Keep the soldering process short!

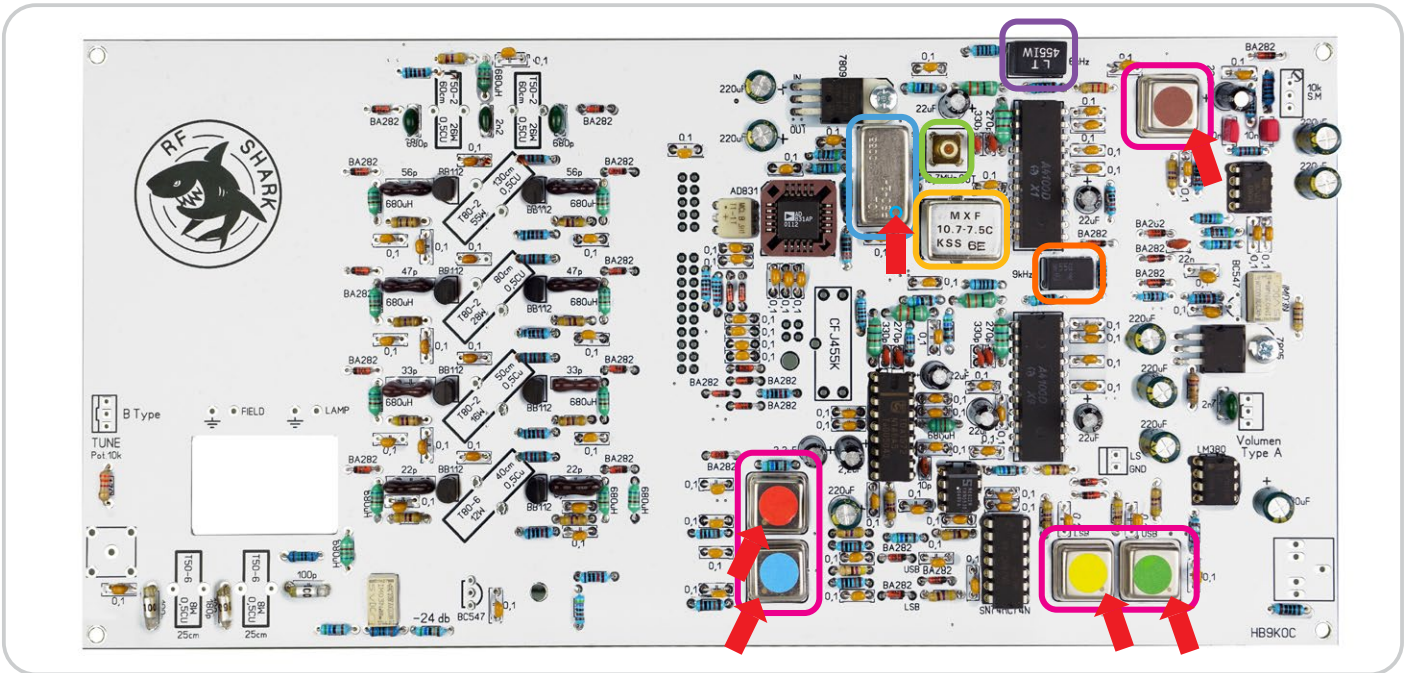


Styroflex® capacitor: 180 pF
 Installation direction doesn't matter.
Caution, heat-sensitive component. Keep the soldering process short!



Capacitance diode (Varactor diode)
 Keep the mounting direction in mind.

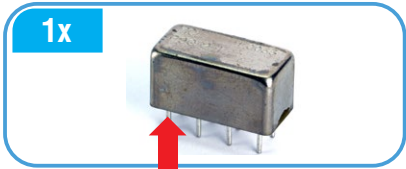
OSCILLATORS, SPLITTERS, FILTERS : 24



Oscillators:
Keep the mounting direction in mind.
 Marked with a dot on the housing. 



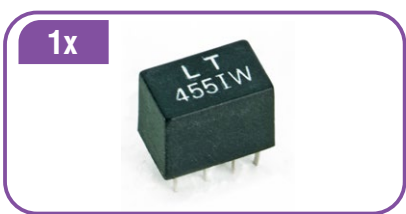
SMB socket: IF output
 Mounting direction doesn't matter.



Splitter:
Note the installation direction. Blue dot on Bottom = PIN 1. Also marked on PCB. 



Quartz Filter: 10.7 MHz
 Direction of installation shown.

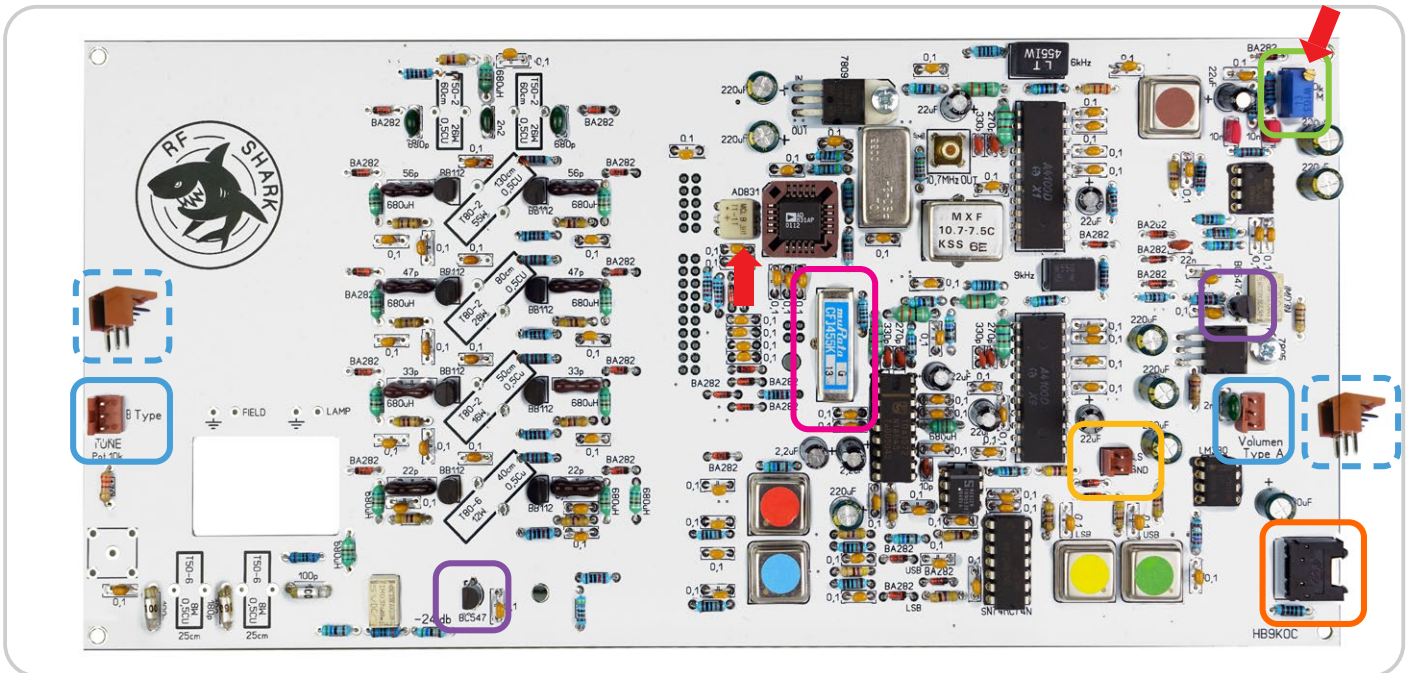


Ceramic filter: 455 kHz BW6 kHz
 Direction of installation shown.

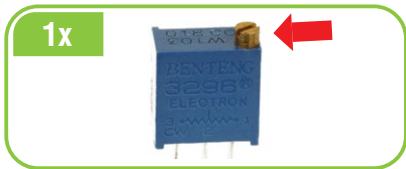


Ceramic filter: 455 kHz BW9 kHz
 Direction of installation shown.

FILTER, POTENTIOMETER, PLUG, SOCKET : 25



SSB Filter:
Direction of installation shown.



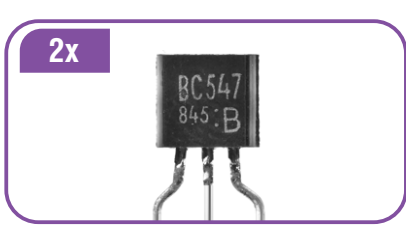
S-Meter Potentiometer: 25 turn
Keep the mounting direction in mind.



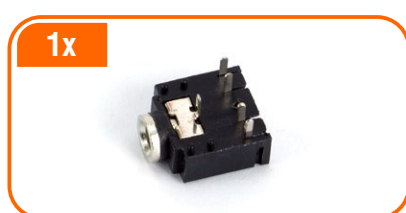

3 pin Post connector:
Contact pins both point to the right
Possibly available in an angled form.




2 Pol. Post connector: speaker
Keep the mounting direction in mind.

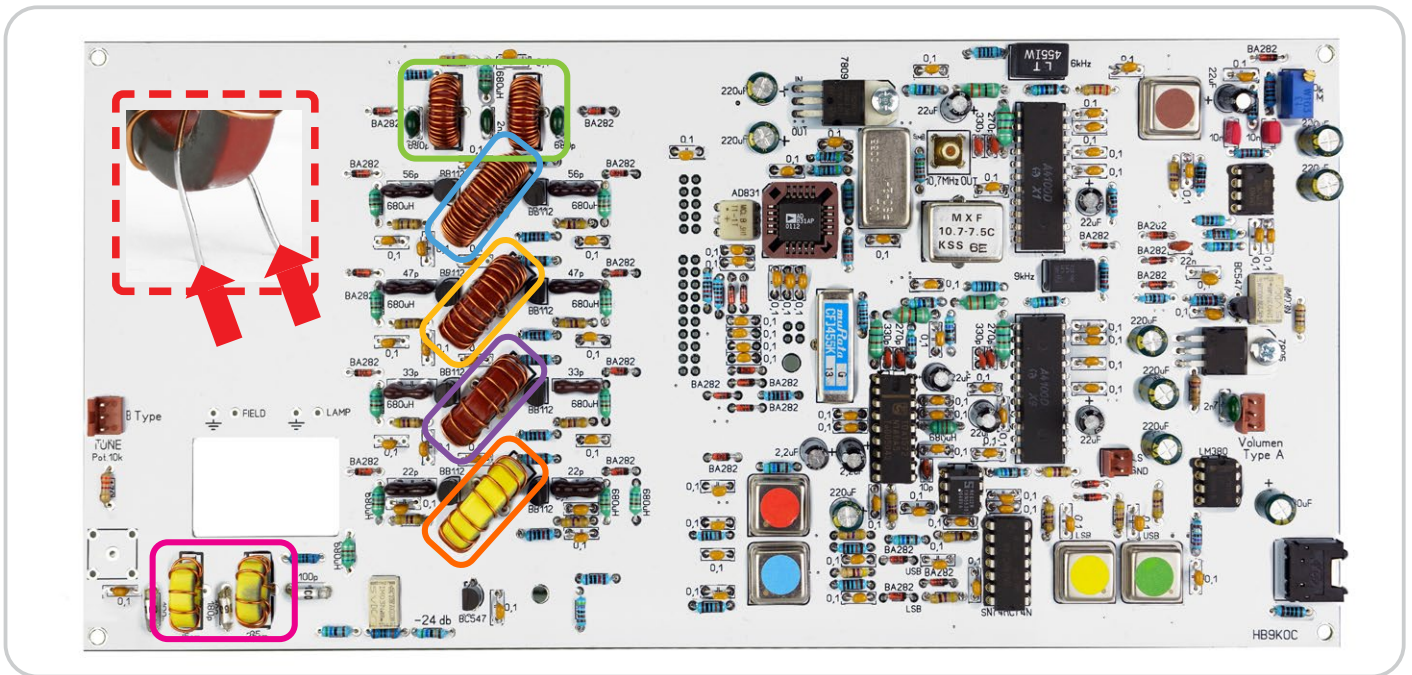
Transistor: BC547
Direction of installation given.



Headphone jack: Stereo
Direction of installation given.

TOROID COIL: 26

Wind wire on toroid, shorten and pre-tin.
From 350° the wire can be tinned directly.



2x



Toroid: **yellow**
Wire length: **25 cm / 10 in**
Turns: **8 (First turn is considered one turn.)**

2x



Toroid: **red**
Wire length: **60 cm / 23.5 in**
Turns: **26 (First turn is considered one turn.)**

1x



Toroid: **red**
Wire length: **130 cm / 51 in**
Turns: **55 (First turn is considered one turn.)**

1x



Toroid: **red**
Wire length: **80 cm / 31.5 in**
Turns: **28 (First insertion is considered one turn.)**

1x



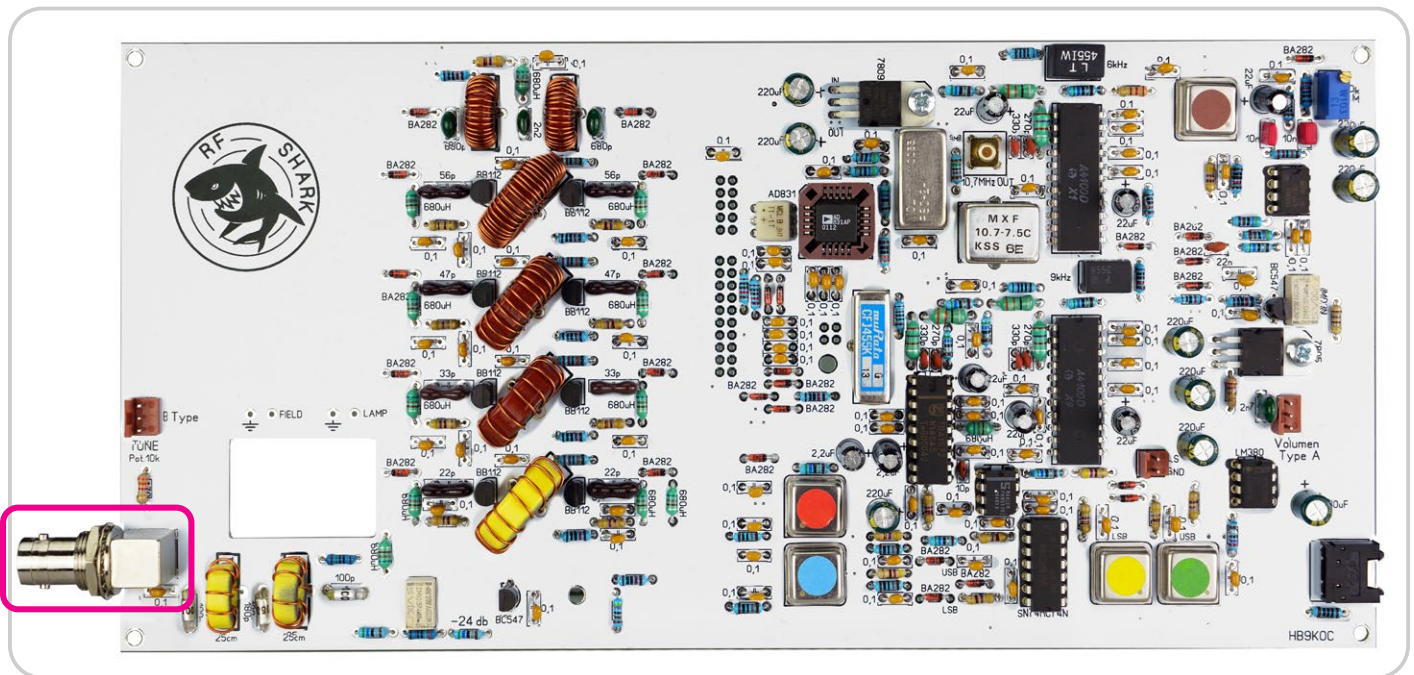
Toroid: **red**
Wire length: **50 cm / 19.6 in**
Turns: **16 (First implementation is considered one turn)**

1x



Toroid: **yellow**
Wire length: **40 cm / 15.7 in**
Turns: **12 (First implementation is considered one turn.)**

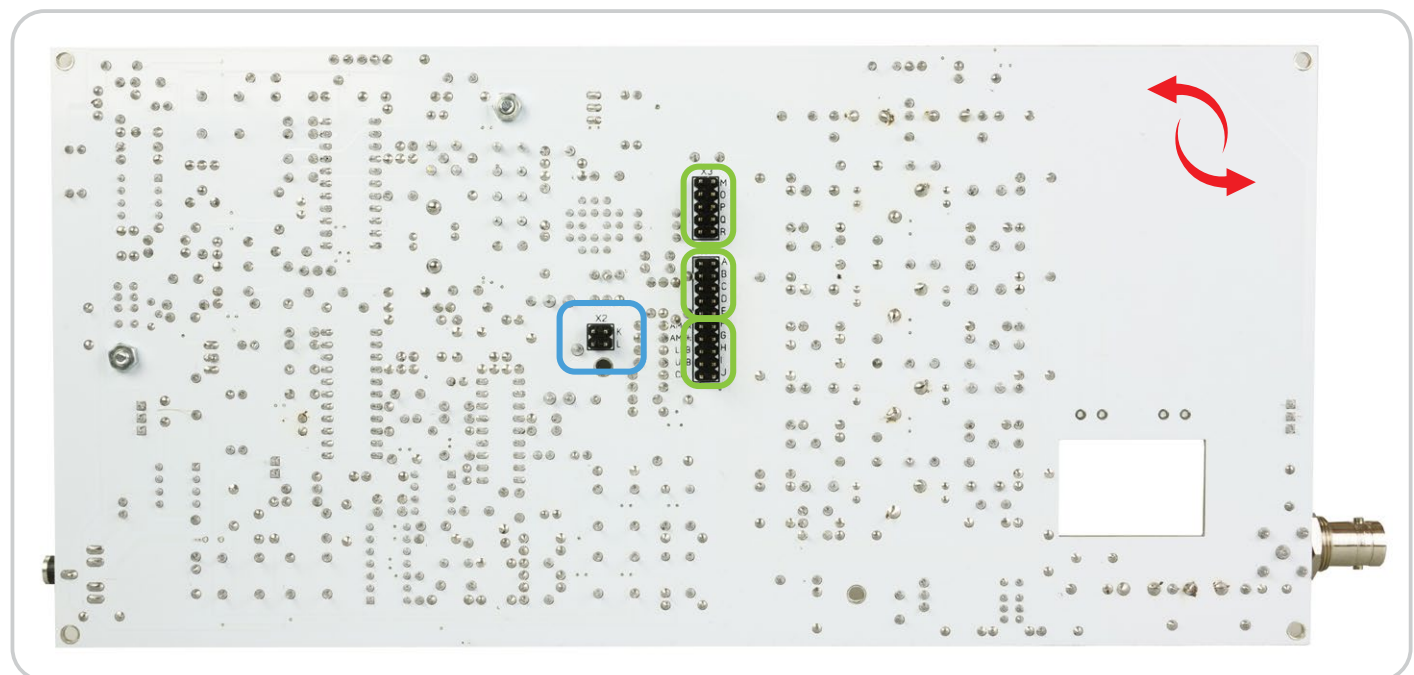
BNC SOCKET, PIN CONNECTORS : 27



1x



BNC socket:
Direction of installation shown.



3x



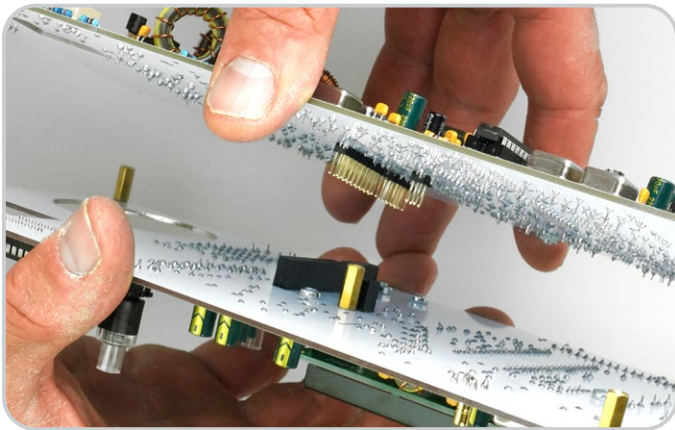
Pin connector: 2 x 5 Pol.
Direction of installation shown.

1x



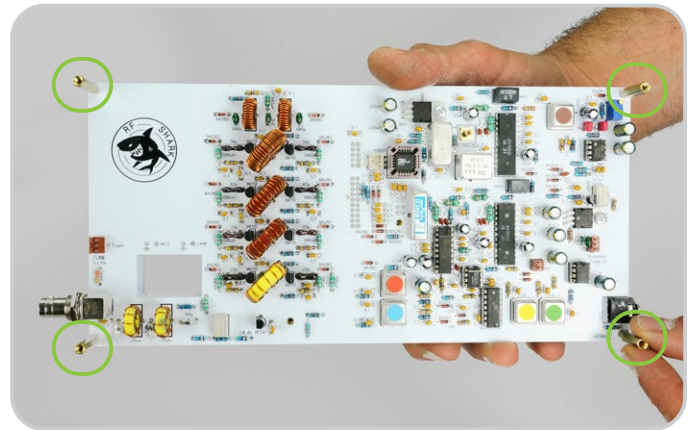
Pin connector: 2 x 2 Pol.
Direction of installation shown.

ASSEMBLY : 28



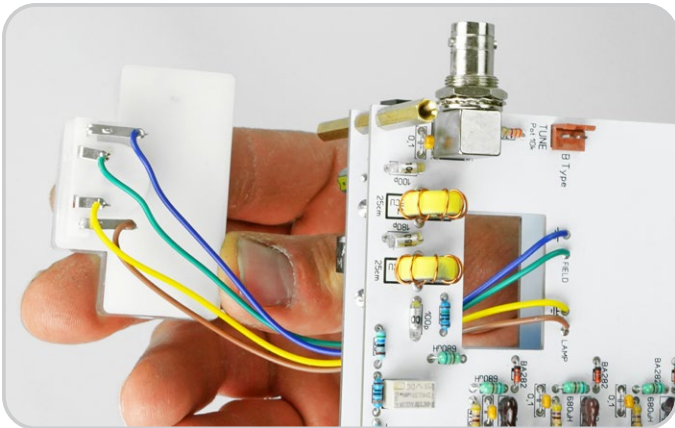
1

**Attention! PCB connection
check for correct position.**



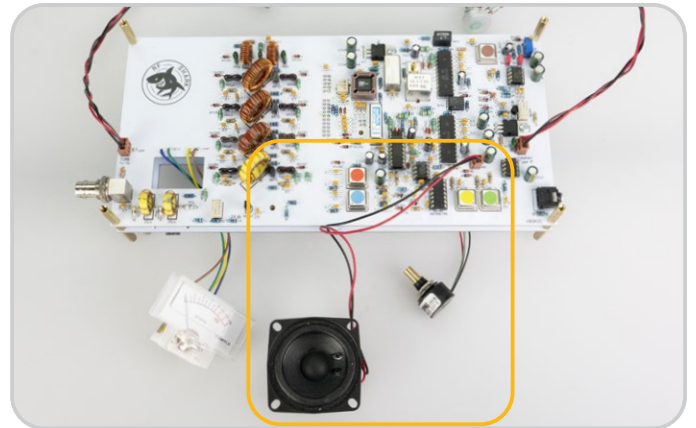
2

**Spacers: M 3 x 25 x 6
Fix the boards with
four spacers.**



3

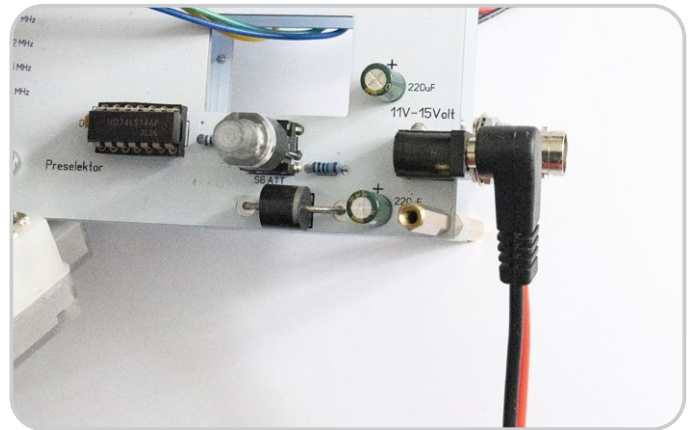
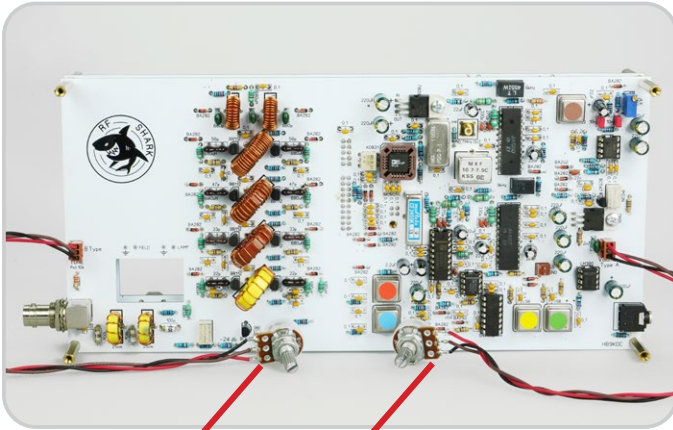
**Connect the S-meter
as shown.**



4

Connect speakers.

ASSEMBLY : 29



1

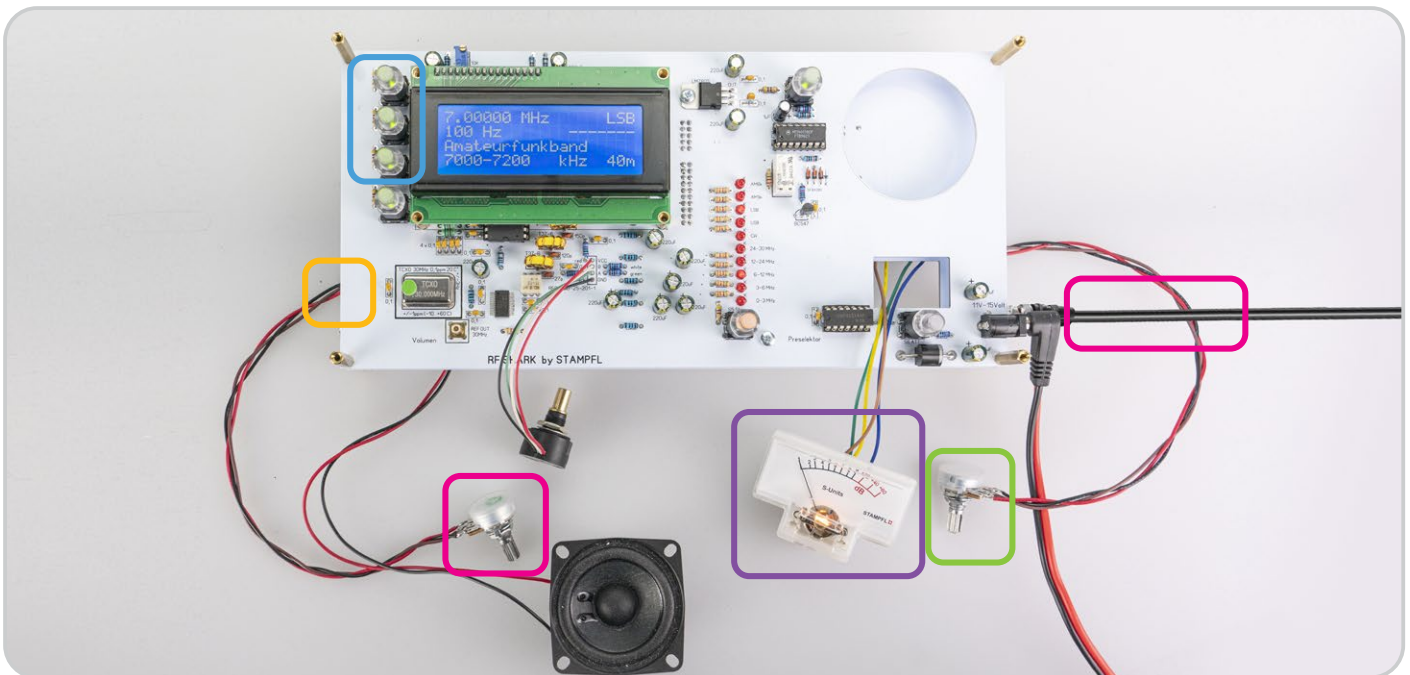
TYP A = Volume
TYP B = Preselector
Bend contacts 90 °
backwards (to avoid
touching housing)

2

1. Power supply 11-15V 1A

FUNCTIONAL TEST : 30

LEDs are used to control the switching voltages for the preselector and the modulation modes.

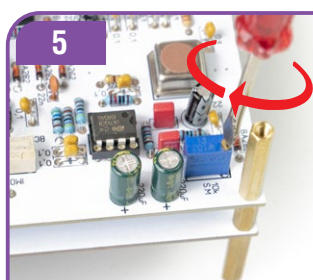


1 **Connect antenna**
Bring the volume control to the middle position.

2 **Preselector test**
Stations between 3 - 30MHz must be tuned to a maximum.

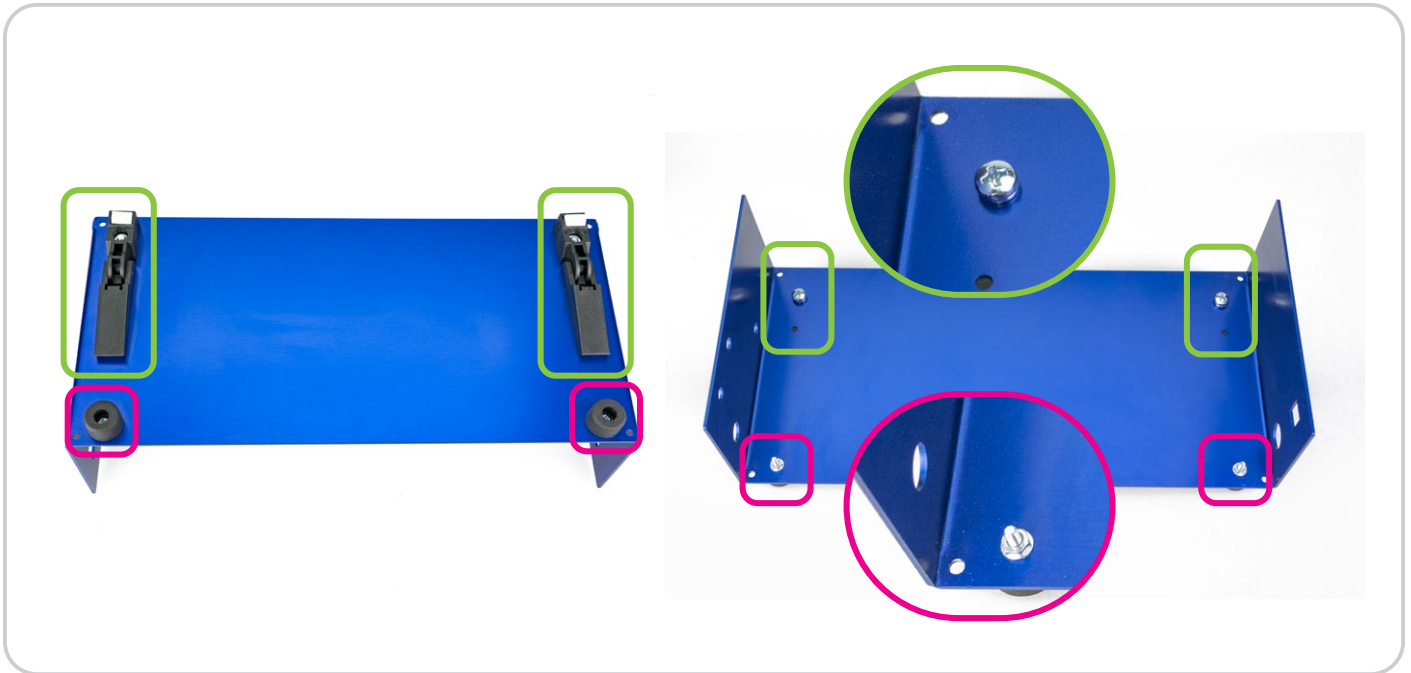
3 **Modulation test**
Check receiver in all mode types.

4 **Headphone test**
3.5 mm stereo version! No mono!



5 **Set the S-meter**
With the defined HF generator in position AMN or AMW in the frequency range 0.1 - 2.999 MHz at a level of -73 dBm set the deflection to S9. Set the S-Meter without the generator using a strong radio transmitter.

INSTALLATION : 31



2x



Rubber feet, washer: **M 3**, nut: **M 3**,
Phillips screw: **M 3 x 12**

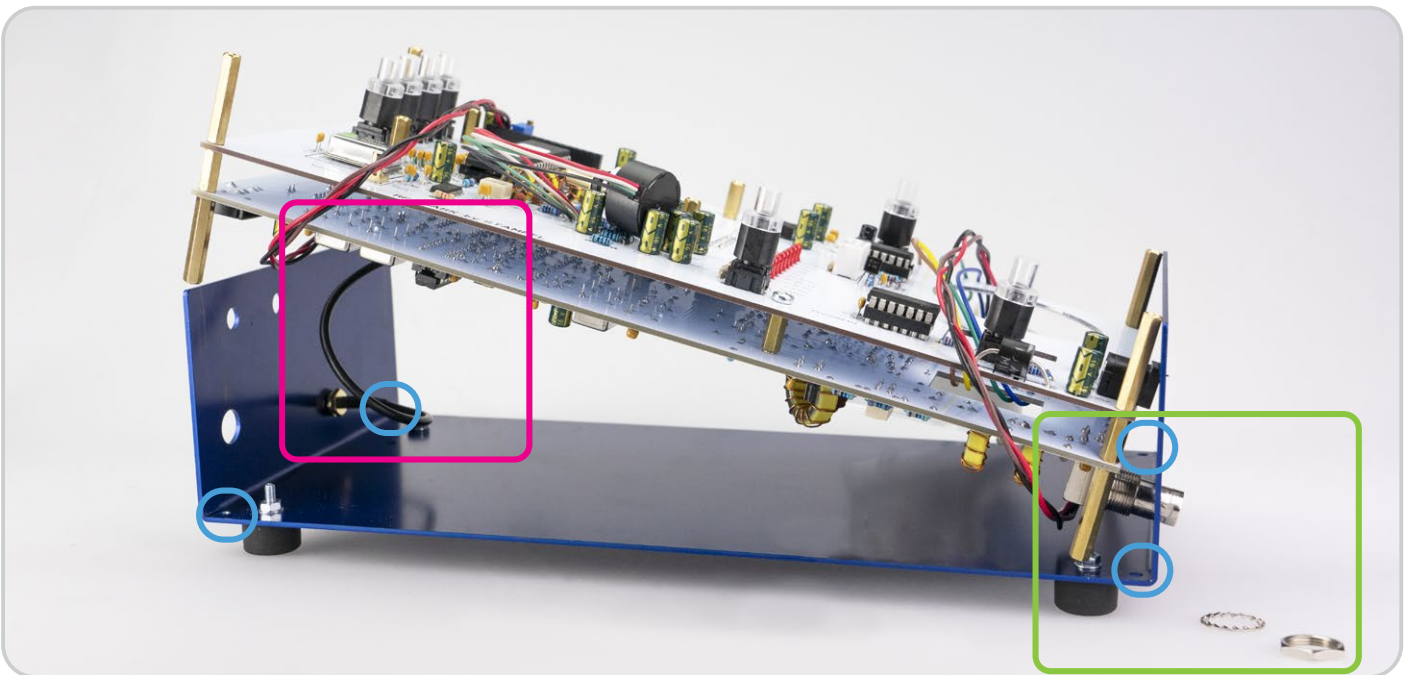
2x



Leveling feet, Phillips screw: **M 4 x 12**, nut: **M 4**,
Spring washer: **M 4**

INSTALLATION : 32

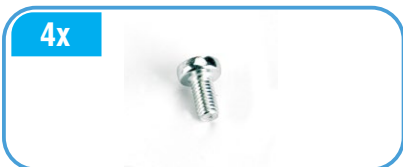
Remove the display.



Connection cable: SMB angled plug to 10.7 MHz out
Insert the socket. SMA socket on housing 10.7 MHz out
screw on.

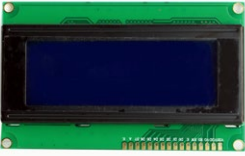


Toothed lock washer and BNC nut: Do not tighten yet!

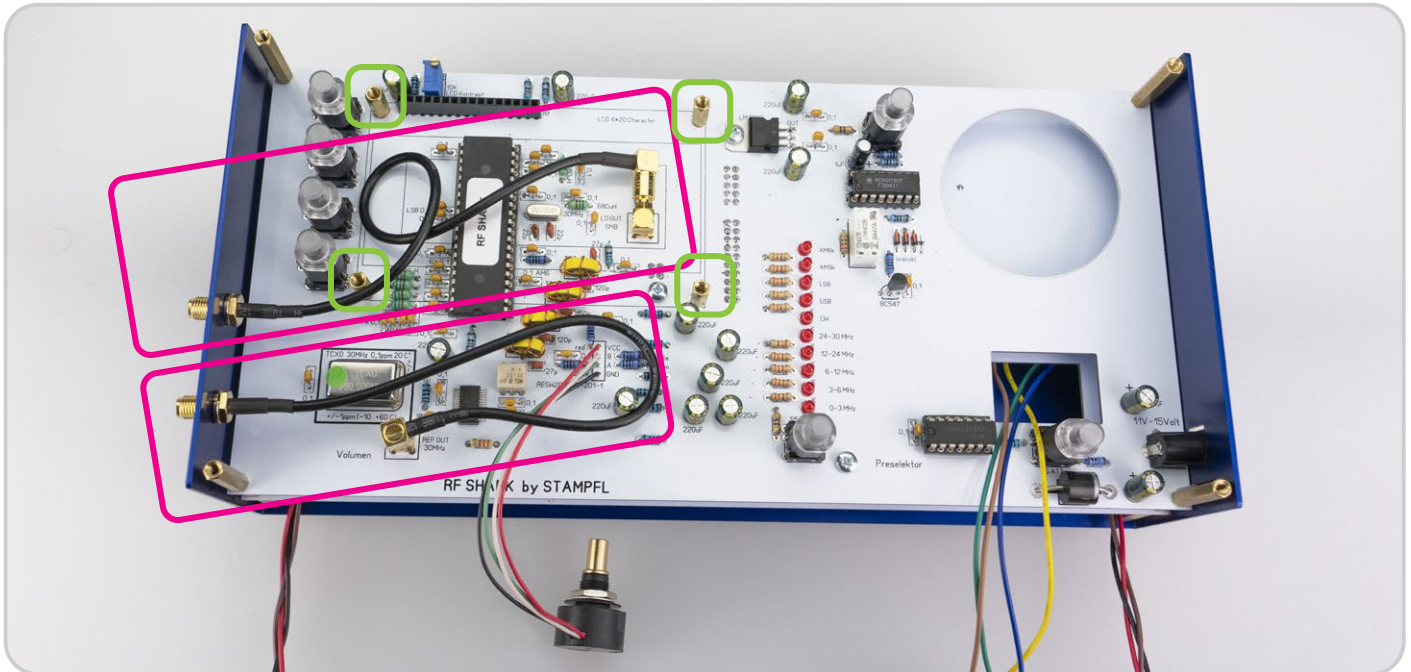


Screw: M 3 x 6
Screw the circuit board to the back of the housing.

INSTALLATION : 33



Reinstall the display.



2x



Connect LO and reference output to the housing.

4x



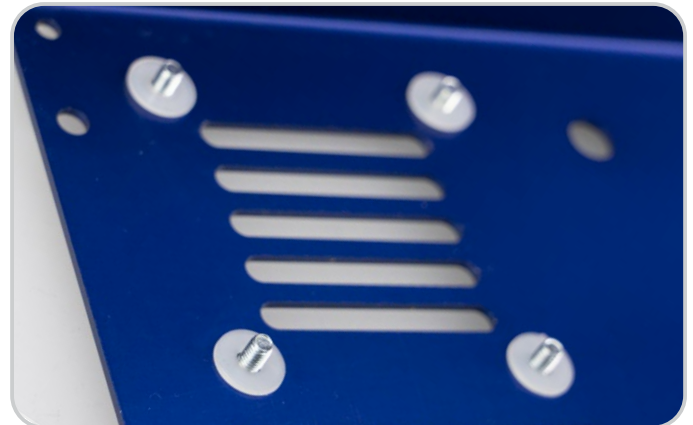
Screw: M 3 x 6
PCB mounting

INSTALLATION : 34



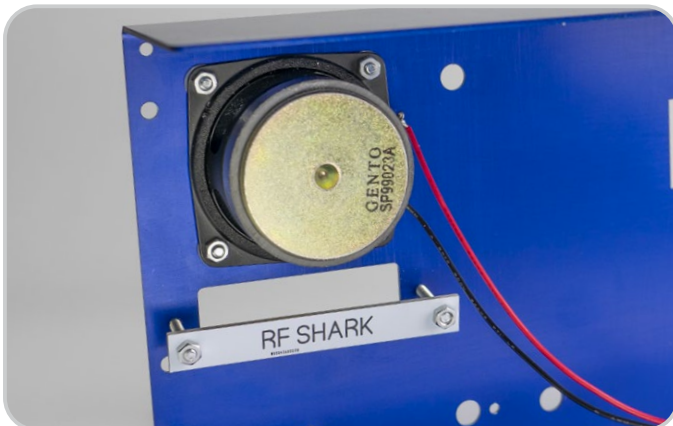
1

S-meter holder:
1x PCB holder
2x screw M 3 x 20
2x nuts: M 3



2

Installation loudspeaker:
4x screws: M 3 x 6
4x nylon washers



3

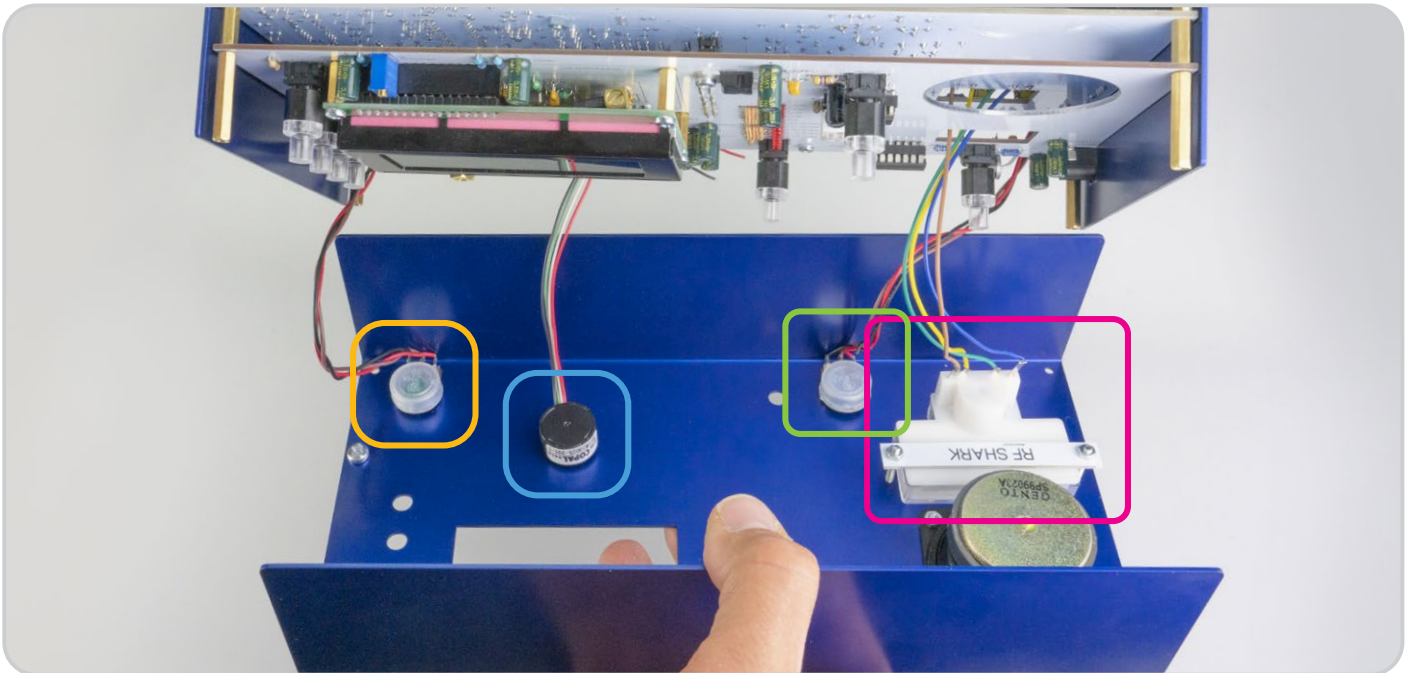
Attach speaker:
4x nuts: M 3



4

Handle assembly:
Attach right-side top only, with a screw
due to S-meter installation.

INSTALLATION : 35



1

Install the S-meter
Then finish mount the handle (P34)

2

Install the preselector potentiometer

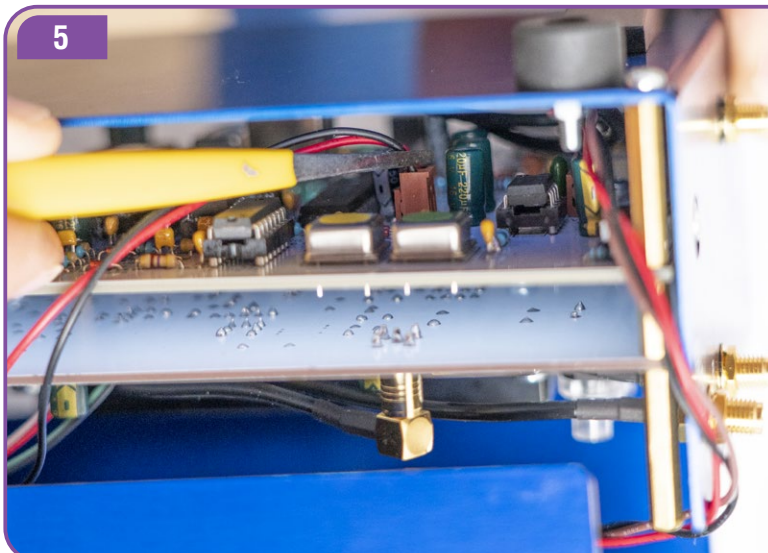
3

Install encoder

4

Install Volume potentiometer

5



Connect the loudspeaker
to the circuit board.

INSTALLATION : 36



1

Tighten the front housing screws only slightly for the time being.

2

Release push buttons. Do not use sharp and hard tools. Risk of scratching!



3

Tighten the housing front screws.

4



Tighten the BNC connector.

INSTALLATION : 37

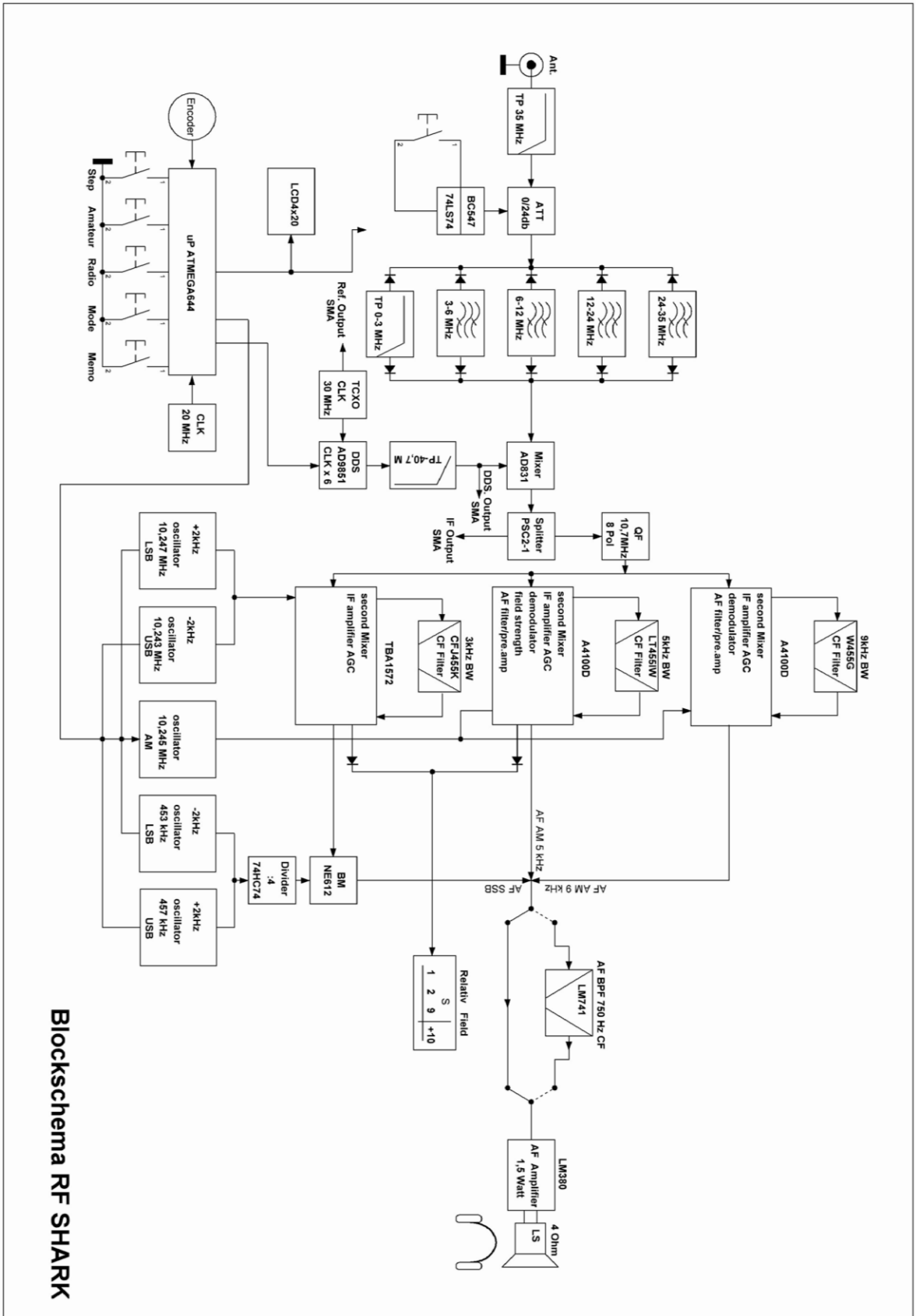


1

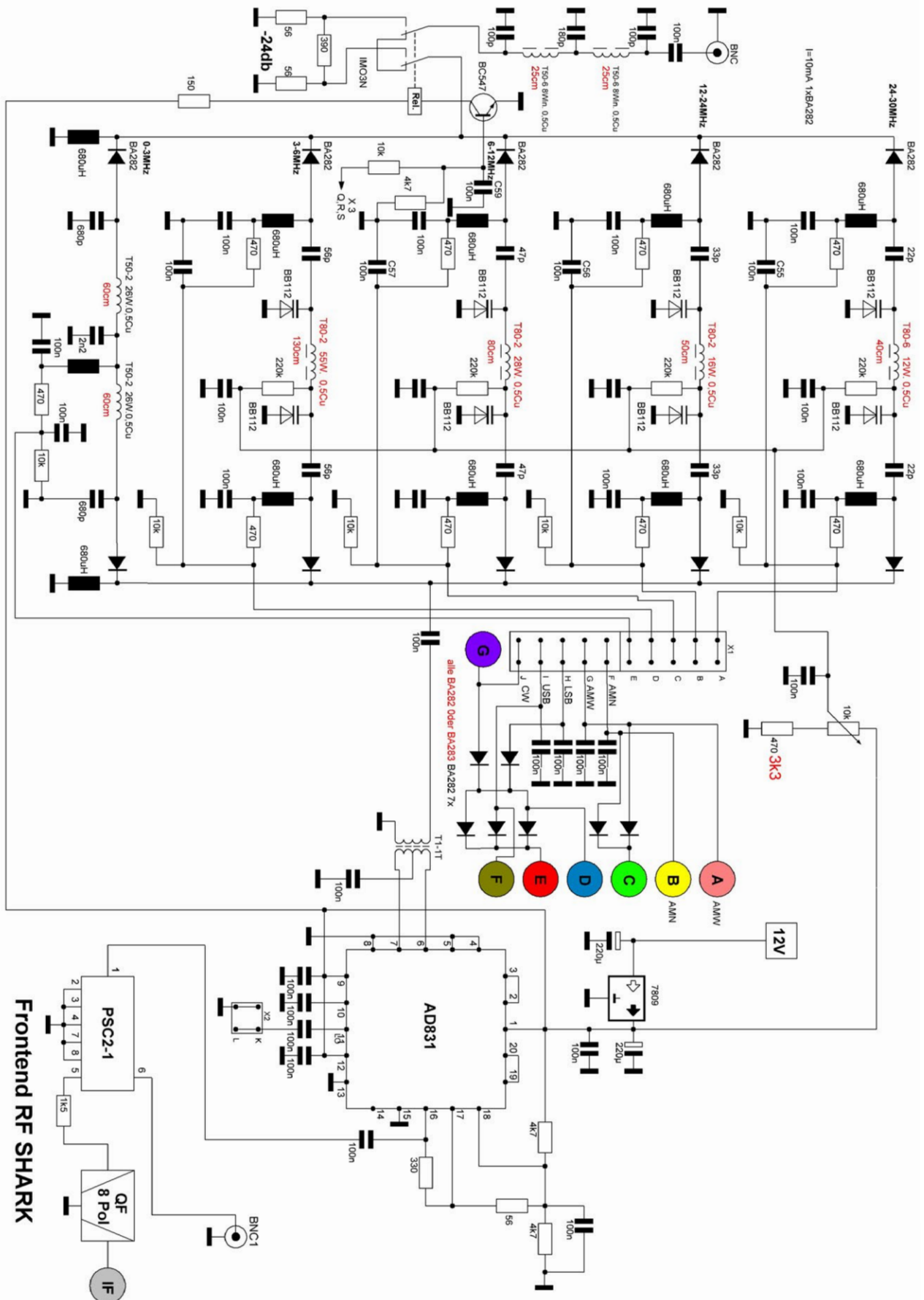


Rotary knob assembly:
set screw and hexagon wrench
included.

BLOCK DIAGRAM : 38

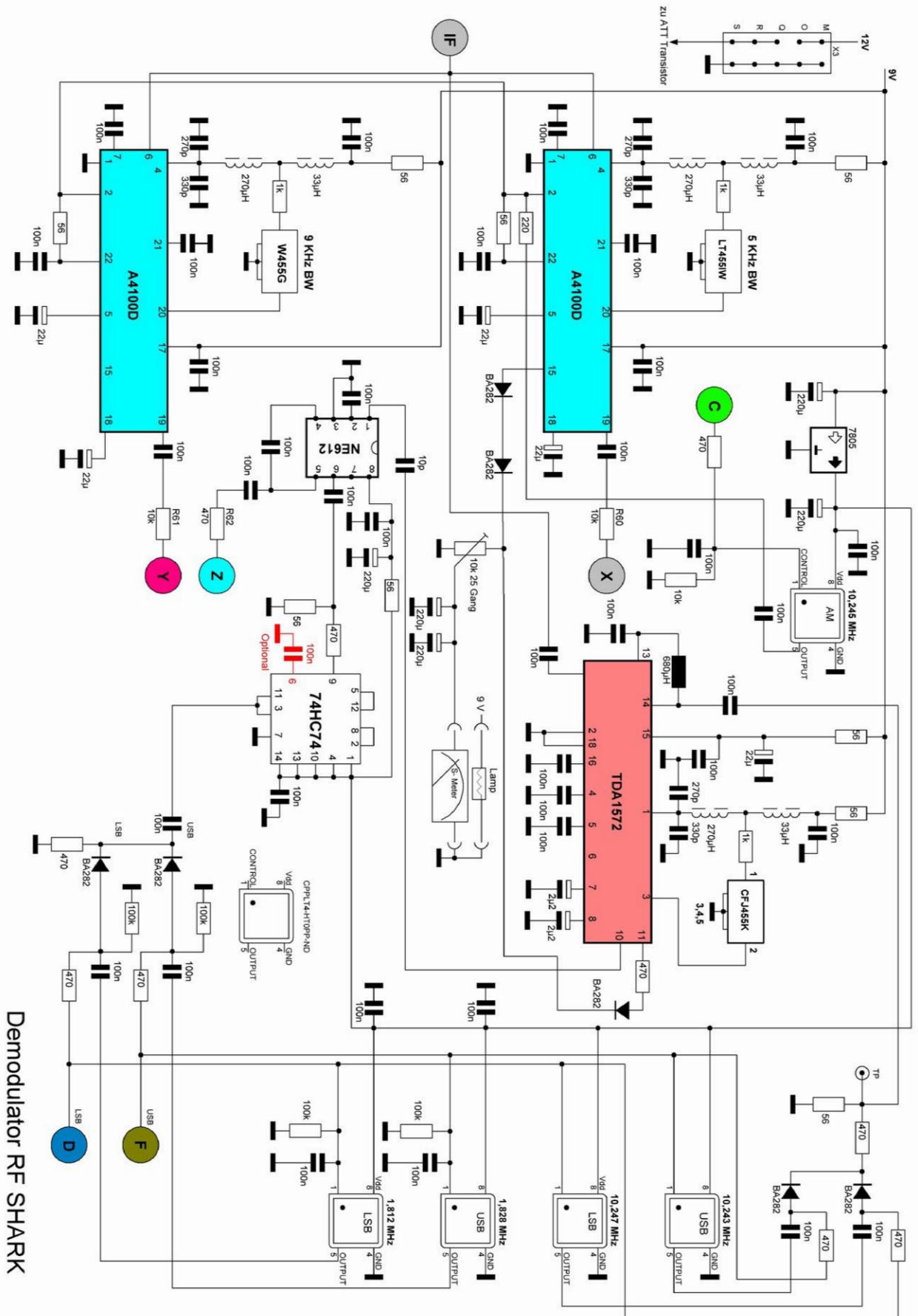


FRONTEND : 39



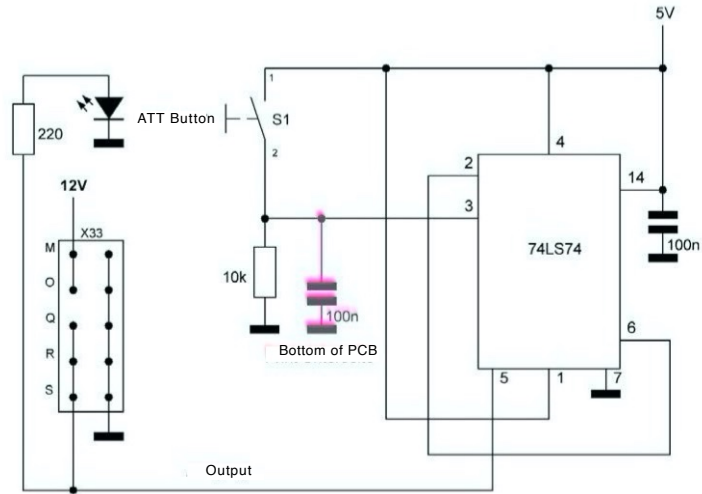
Frontend RF SHARK

DEMODULATOR : 40

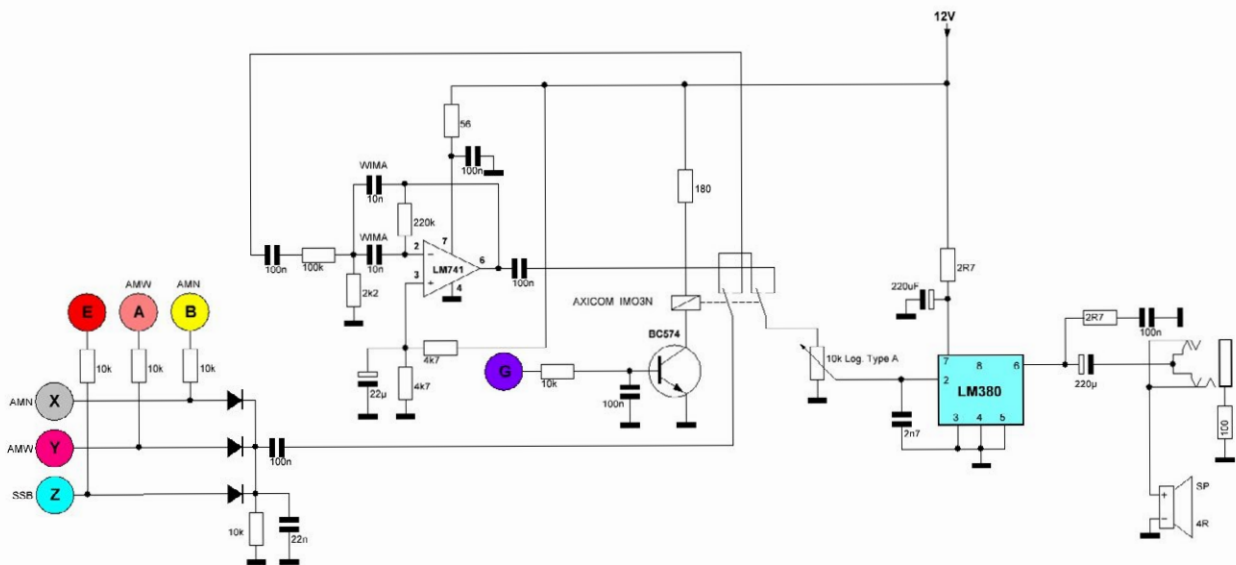


Demodulator RF SHARK

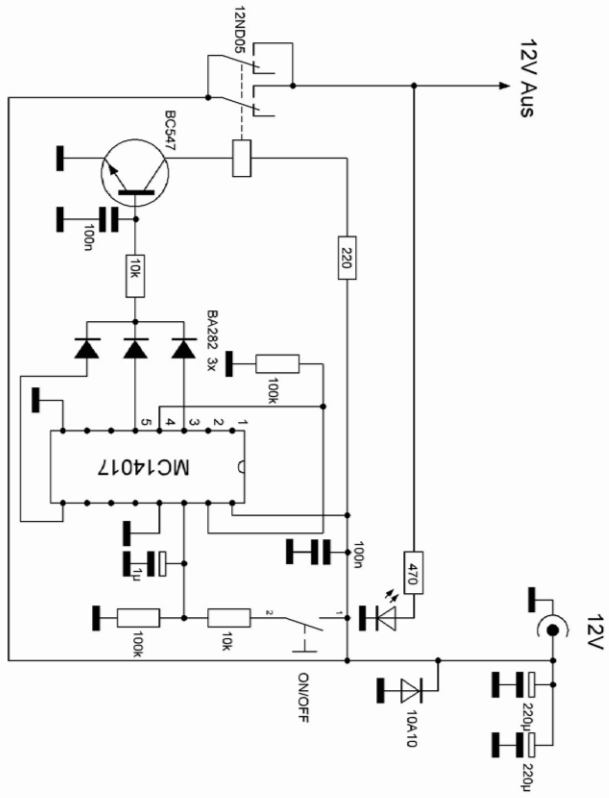
ATT : 41



CW NF-TEIL



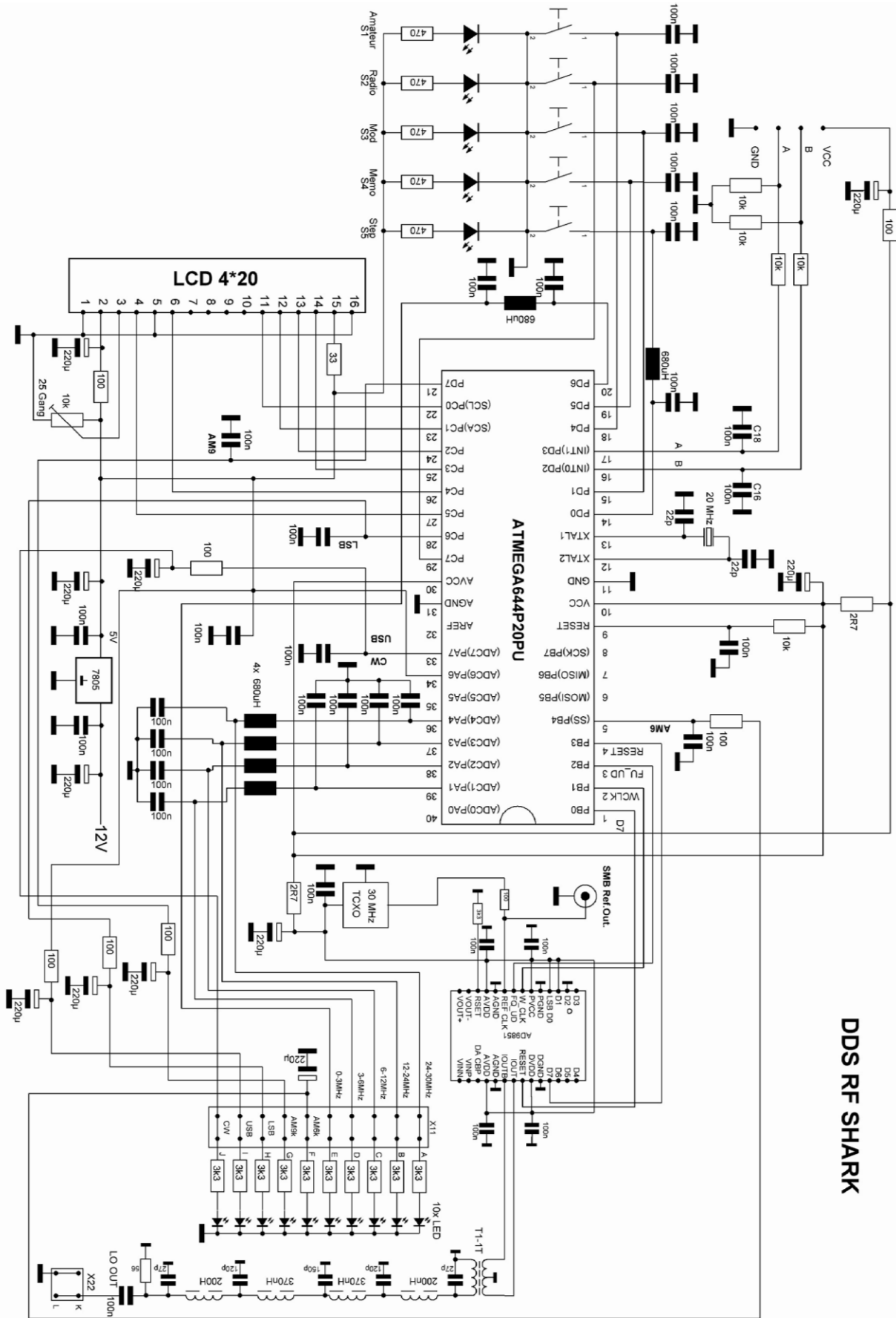
ON/OFF: 42



On off circuit

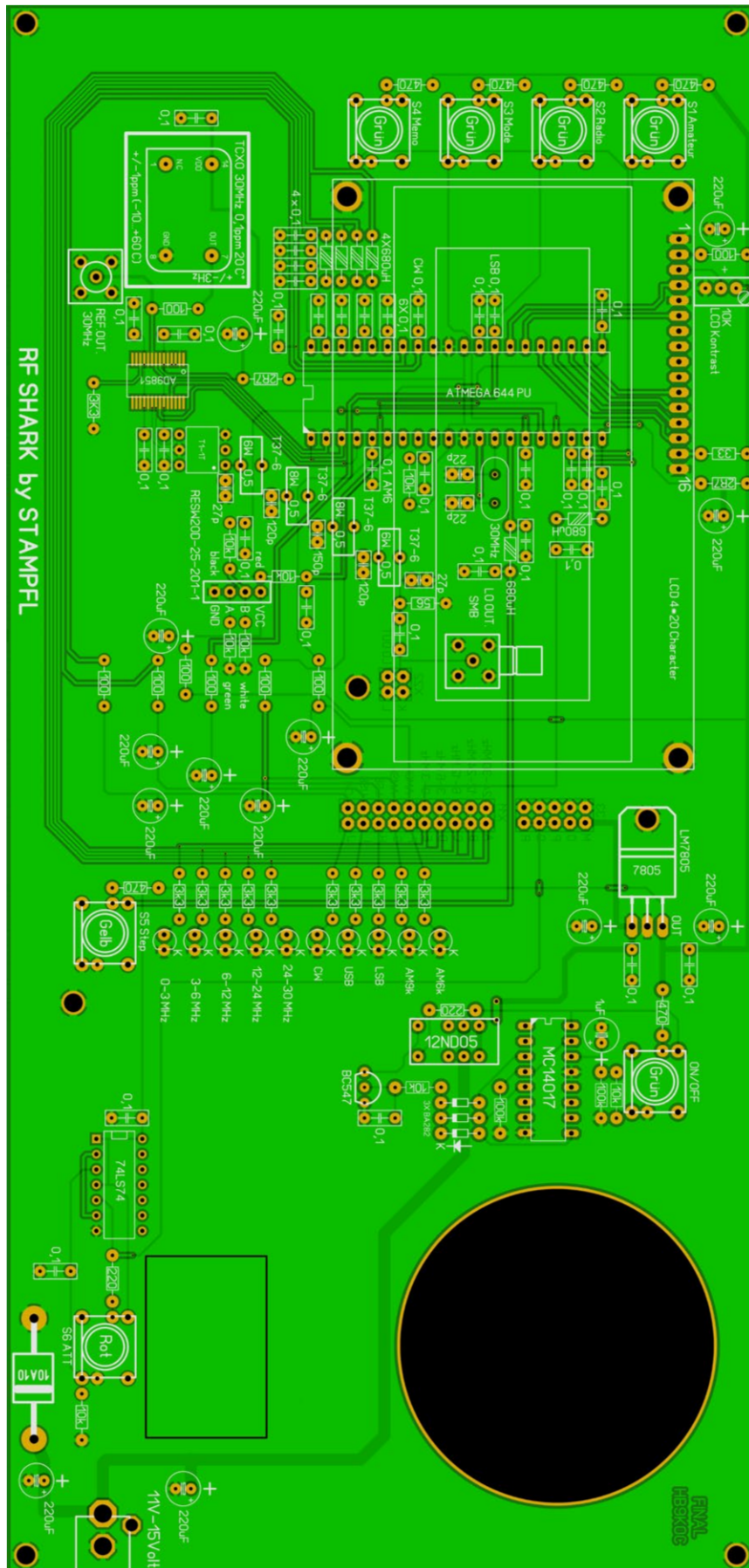
RF SHARK

DDS: 43



DDS RF SHARK

DDS BOARD: 44



RX BOARD: 45

