

122 GHz Transverter – VK3CV/WQ1S
version with an external REF 10MHz for CPU and PLL
design by SP1CNV, SP4ELF, SQ1GQC and DD1US
ver. 1.1, November 29th 2020

You can find information about this device in the project folders of the 122GHz group (<https://groups.io/g/The122GProject>).

Our version includes the following changes:

- added external reference input for 10 MHz signal for CPU (PIC16LF877A) and PLL (ADF4153). Some elements were changed or not mounted – see updated schematic diagram (link below),
- added SMA connector for external 10MHz reference input,
- added additional audio I/Q PCB with 144 MHz IF output at an SMA connector which improves the output signal by about +3dB,
- optimized deviation of FM modulation: resistors R300 and R30x added (based on information from SP7CKH),
- moved some elements and connectors to the opposite side of the main 122GHz IC TRA-120 (see pictures below),
- installed additional switches like PTT, Key and Channel A/B and also Mike connection,
- RS232 signal on a 3,5mm stereo mini-jack, for diagnostic and configuration,
- almost all connections are now available on connector strips with gold plated pins.

With these changes our new version has the following features:

- the PCB side of TRA-120 can be mounted near the front side of the box. Only one hole for an RF-coupler or horn antenna is need at this side of the box,
- all connectors are mounted at the back or bottom side of the box, except the serial (RS232) connection which is on the left side,
- to access the board and all the connectors only the back side of the box has to be removed,
- this version of the device can be mounted in the focus of parabolic antenna, with all control, supply, key and mike jacks on the back side of the feed,
- the use of an external 10MHz reference signal with higher stability and lower phase noise is now foreseen.

Please note: these modifications are no more supporting the transmission of a pseudo CW beacon based on FSK. In the original design this was implemented by shifting the reference frequency of the onboard 10 MHz reference frequency oscillator by about 0.5Hz and thus generate the pseudo CW beacon. As we are now using an external reference signal this no more possible.

An updated schematic diagram can be found in the file section of the 122 GHz group in the folder Mods. The file name is:

122G_003_Ext_Ref_10MHz_Schematic_mod-SP.pdf.

You can find there also some further information about the changes.

Please also read the description of VK3CV/WQ1S 122GHz Transverter Assembly and Operation:

122G_Operation_Construction_notes_1.07.pdf

Subsequently you will find pictures of 2 different constructions of such a 122 GHz transverter. The first example is mounted in an aluminium box, the second example is mounted in a tin-plated enclosure.

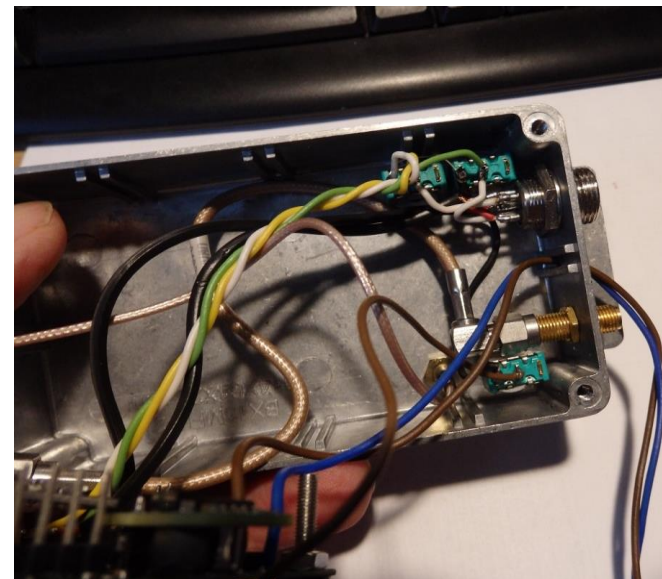
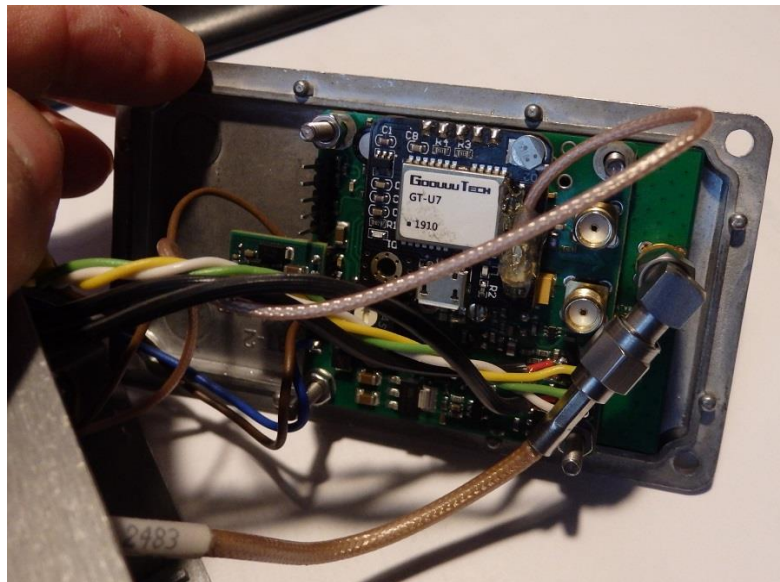
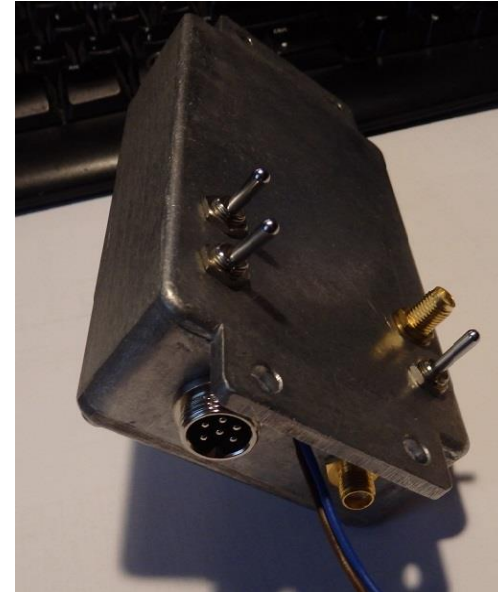
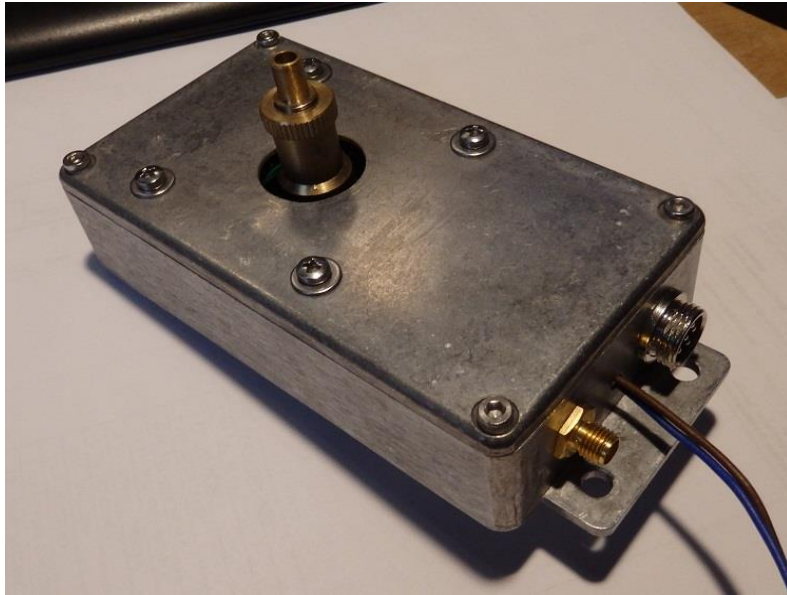


Figure 1a-d Transverter in aluminium box – original setup with internal 10MHz Reference and GPS

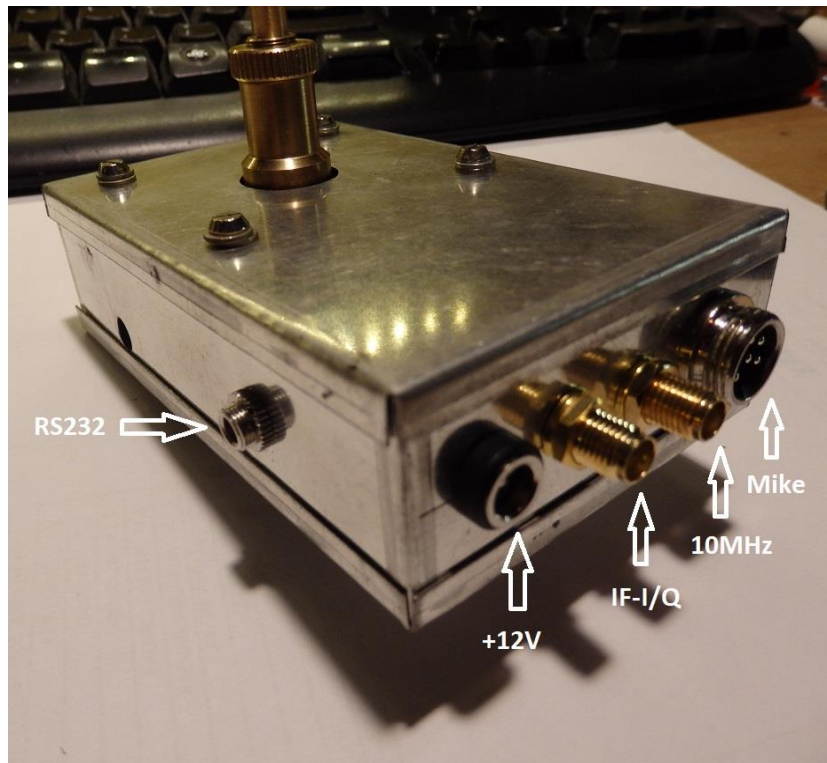


Figure 2a Transverter in tin-plated enclosure



Figure 2b All connectors are on back side of PCB

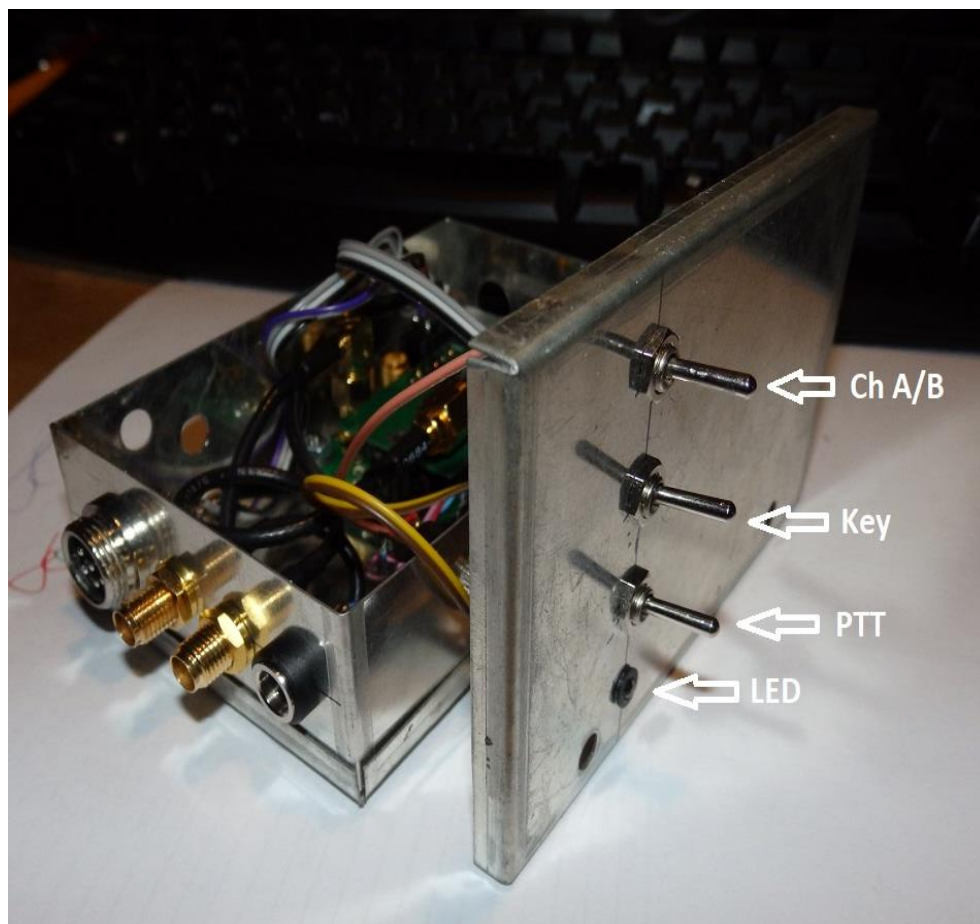


Figure 2c All switches (channel A/B, key, PTT) are on the back side of enclosure

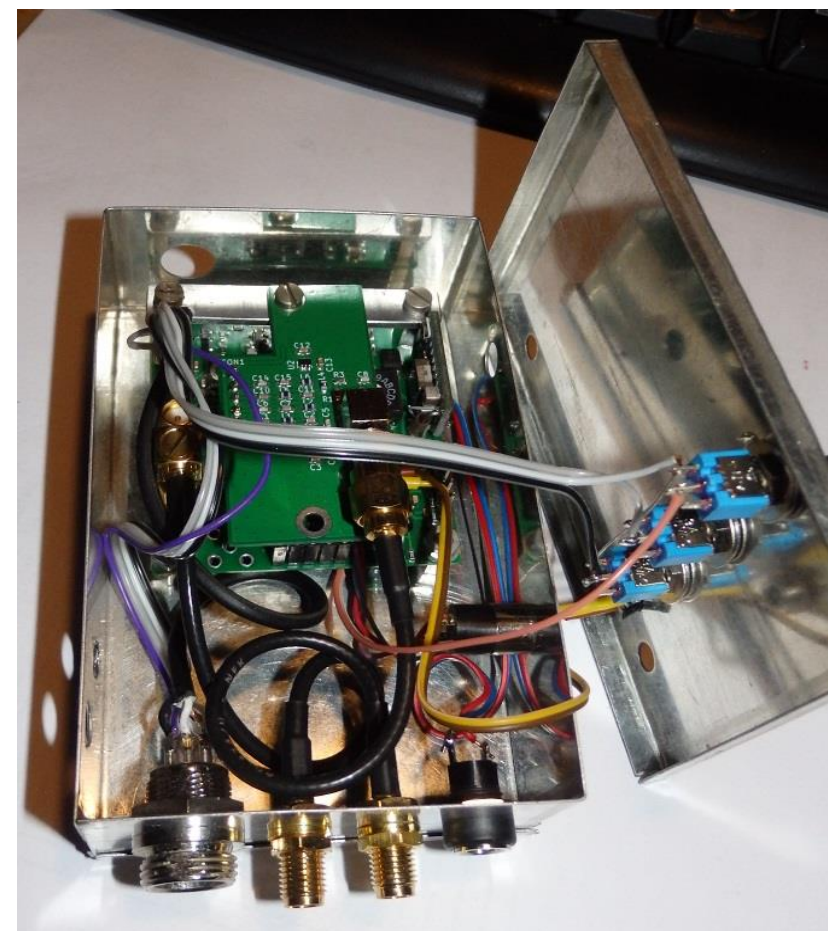


Figure 2d Microphone input, reference input, IP output and DC supply input are on the side of the enclosure

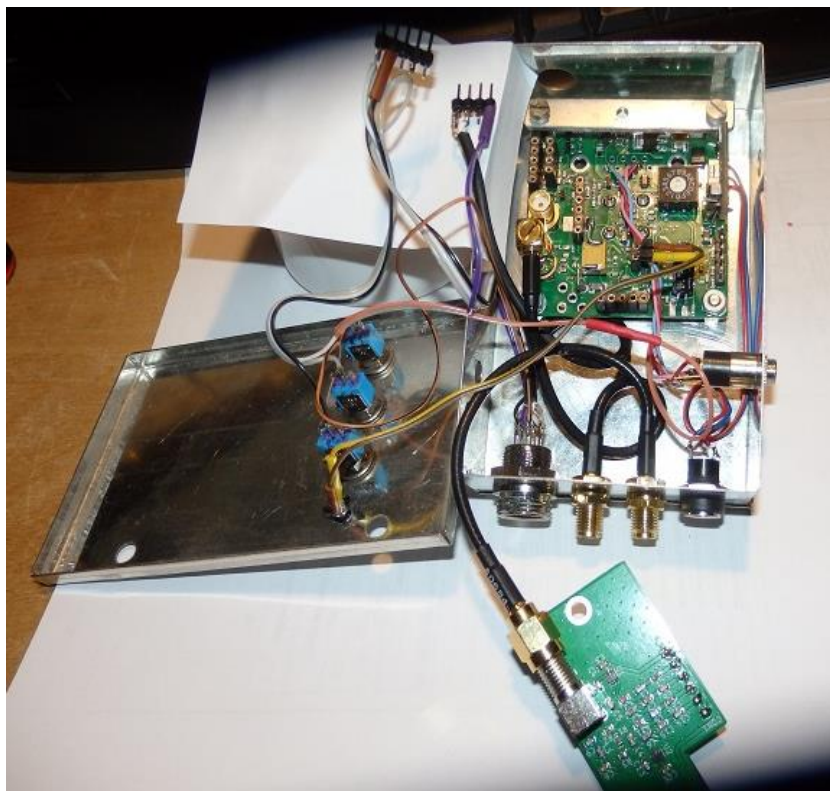


Figure 2e I/Q board unplugged

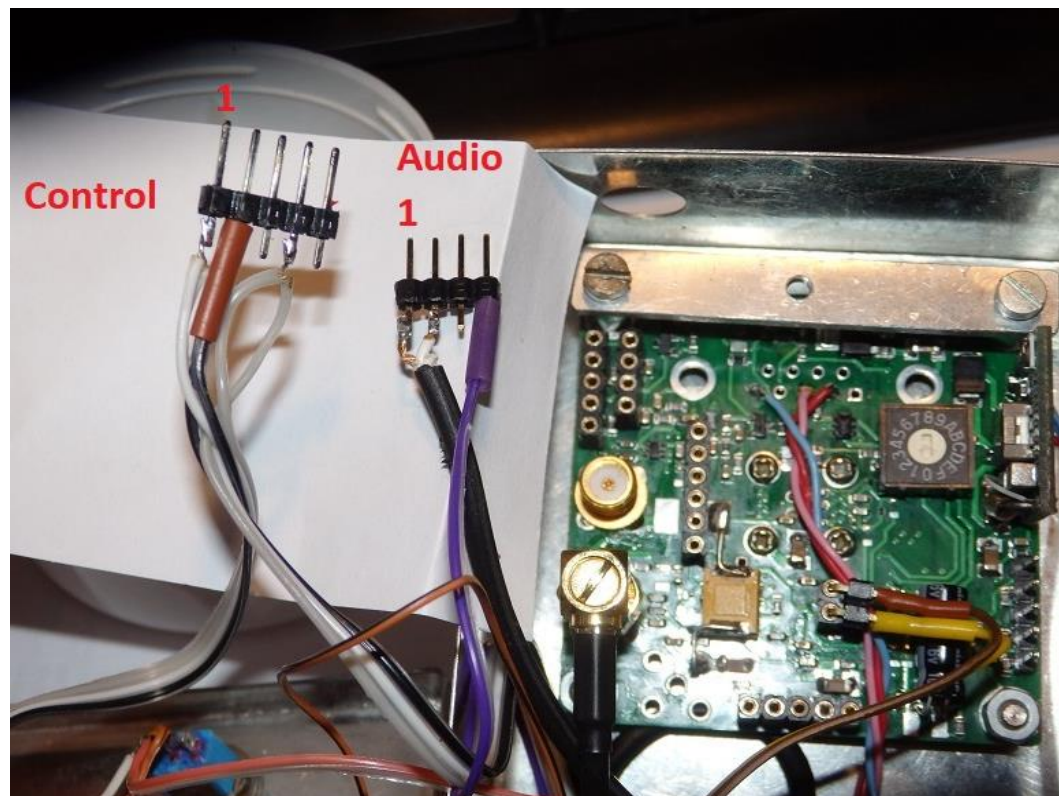


Figure 2f Connectors for control and audio

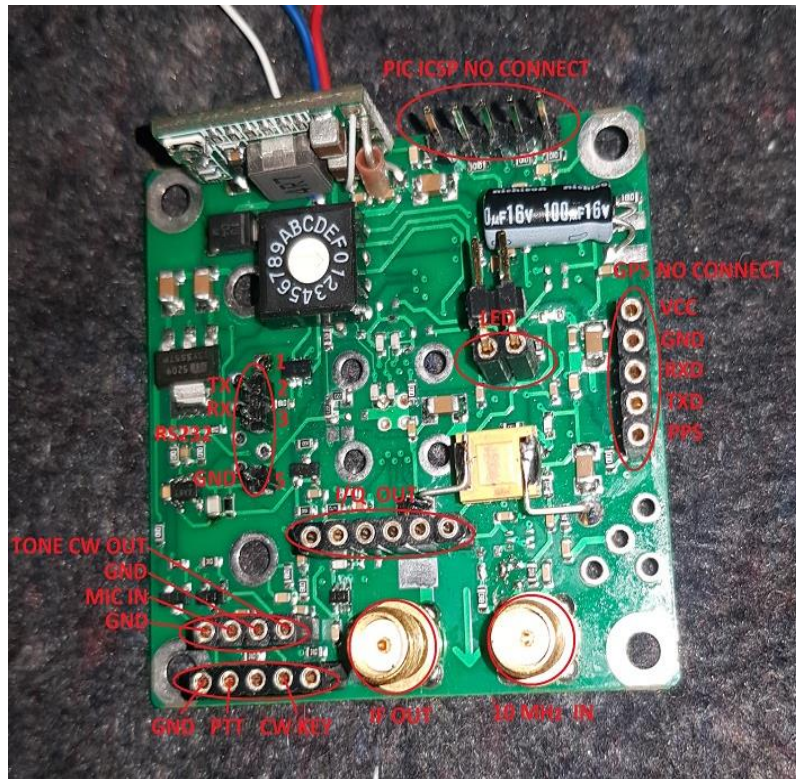


Figure 2g Main PCB - connectors

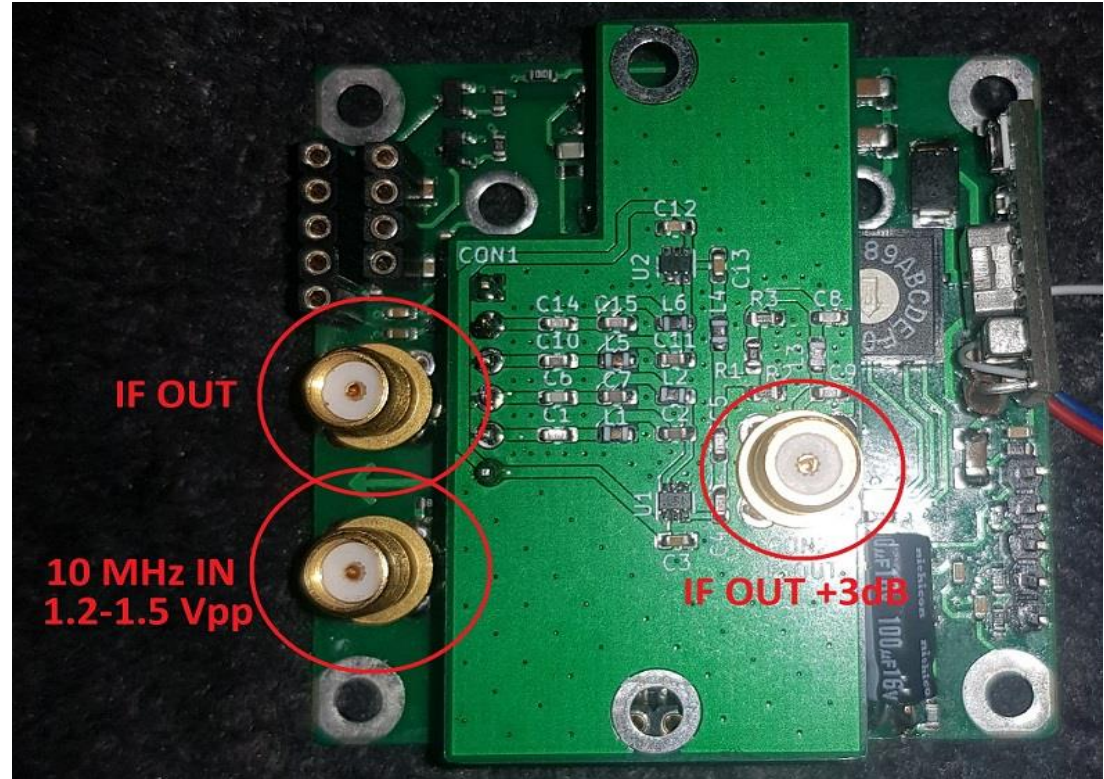


Figure 2h Main PCB with I/Q-board – connectors

The following pictures show the locations of some important components on the PCB:

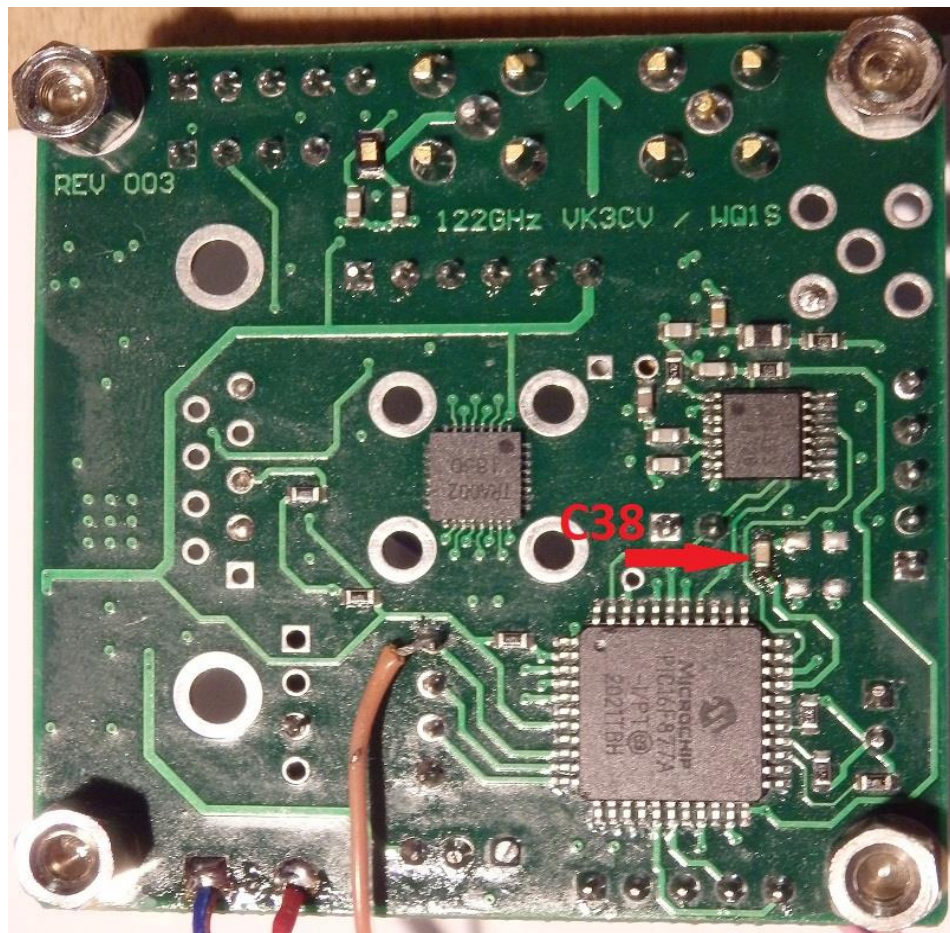


Figure 3 Capacitor C38 – changed to 1nF
Additional brown wire is for Channel A/B switch

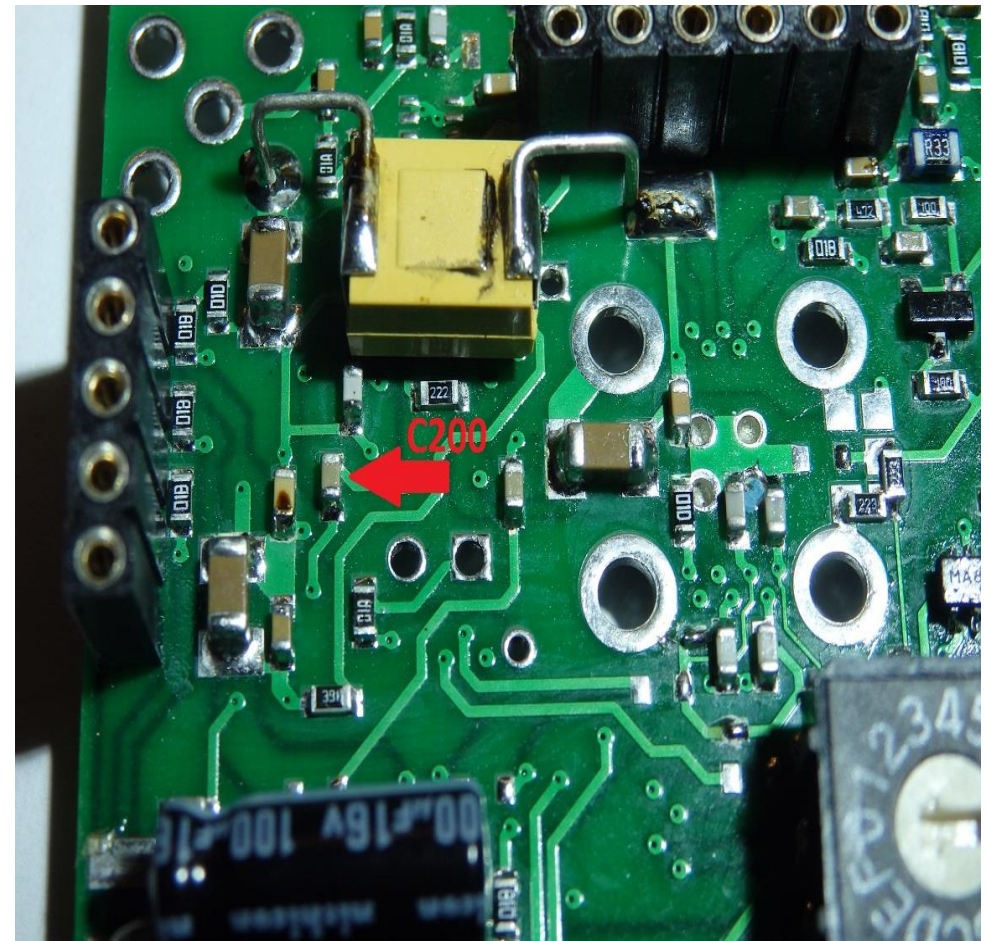


Figure 4 Location of capacitor C200 (10nF)

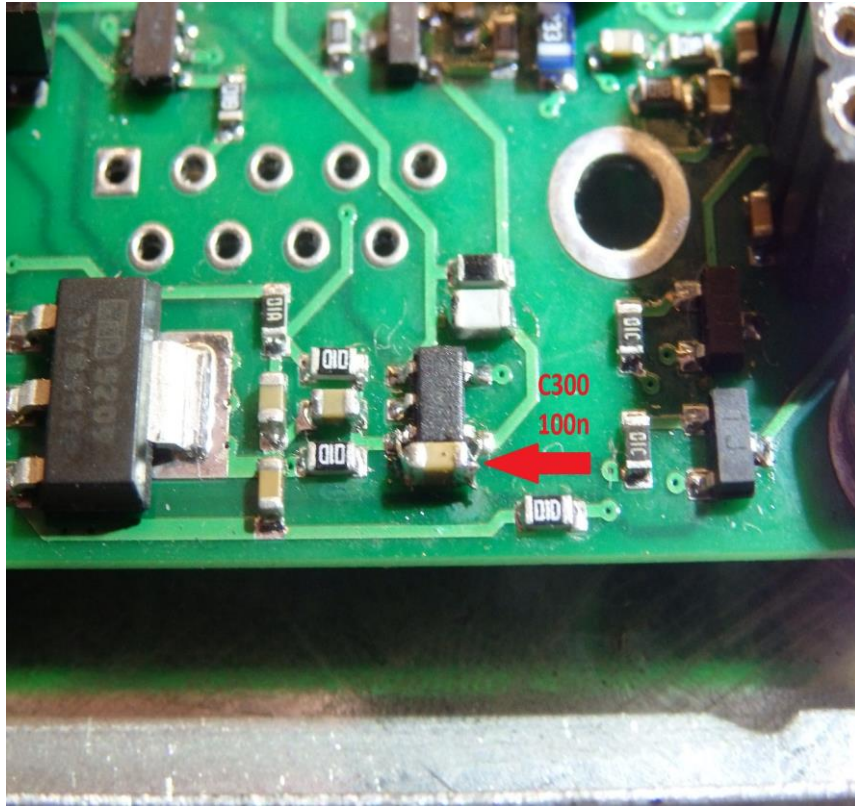


Figure 5 Location of capacitor C300
placed parallel to 2 pins of IC7 (audio amplifier)

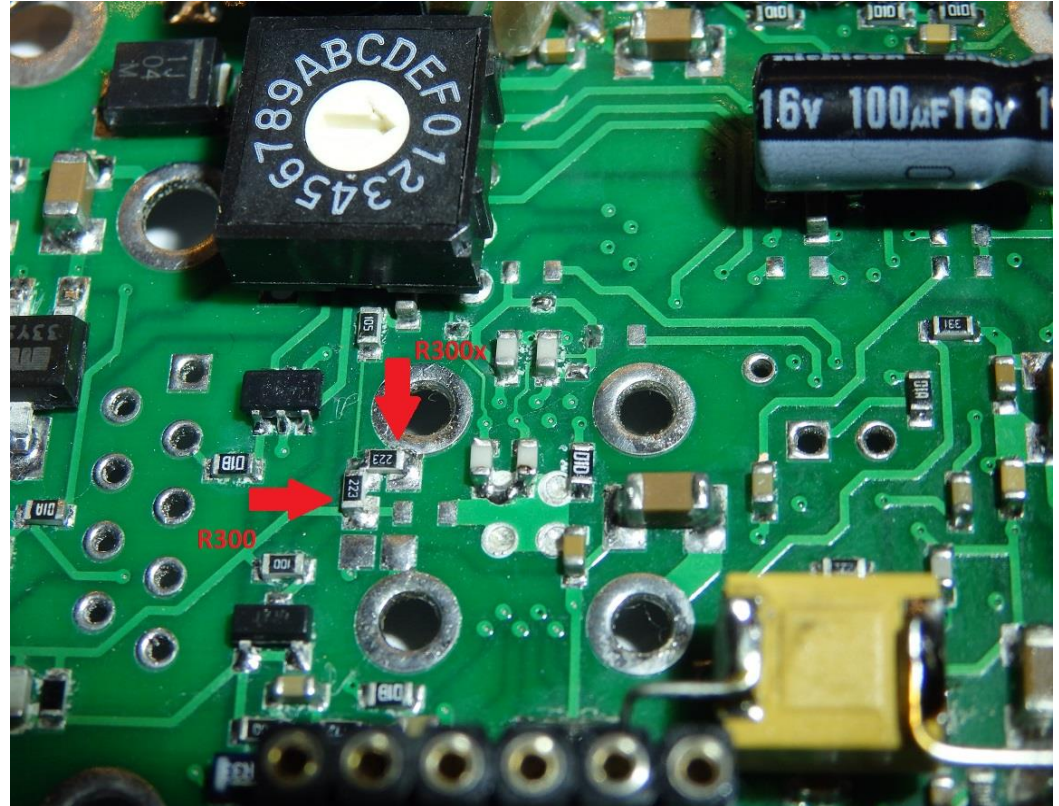


Figure 6 Location of resistors R300 and R300x (2x 22k)
(information kindly provided by SP7CKH)

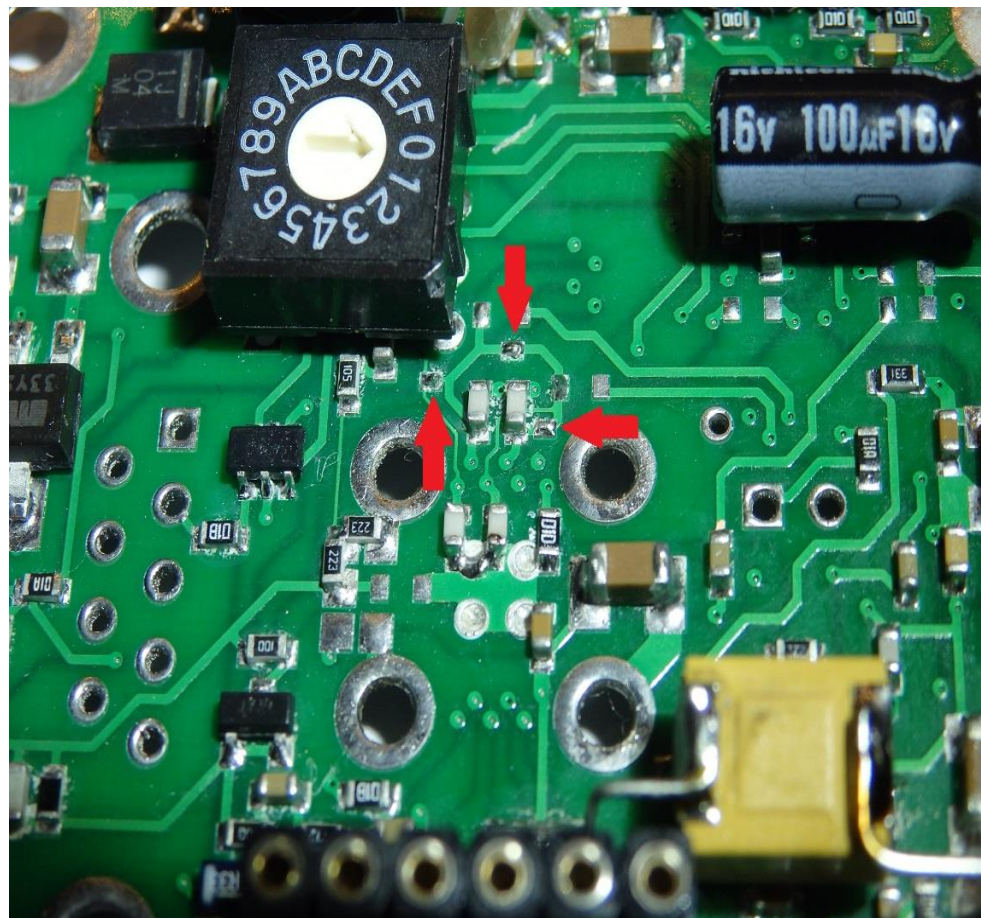


Figure 7 Location of jumpers LK1, LK2 and LK3 (connection closed by solder bridges)

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supported with the English text by Matthias DD1US