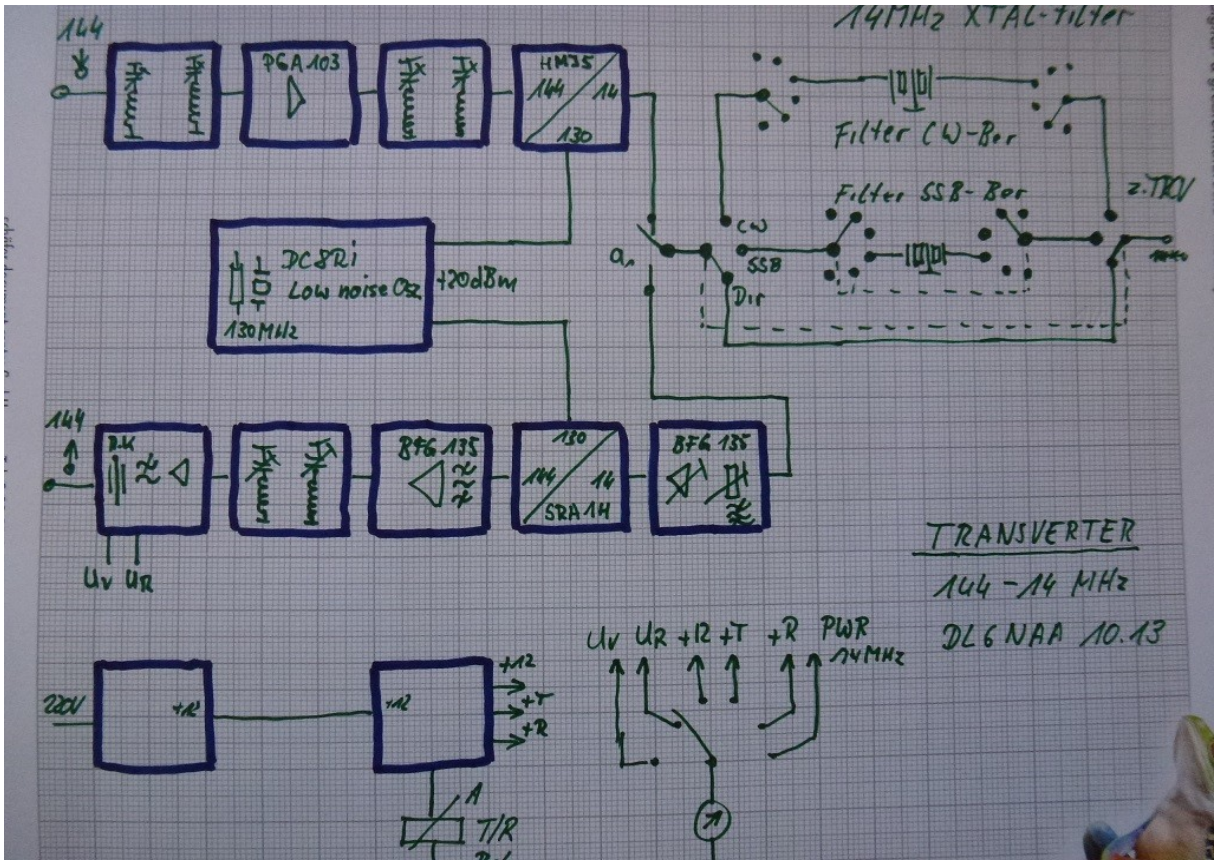
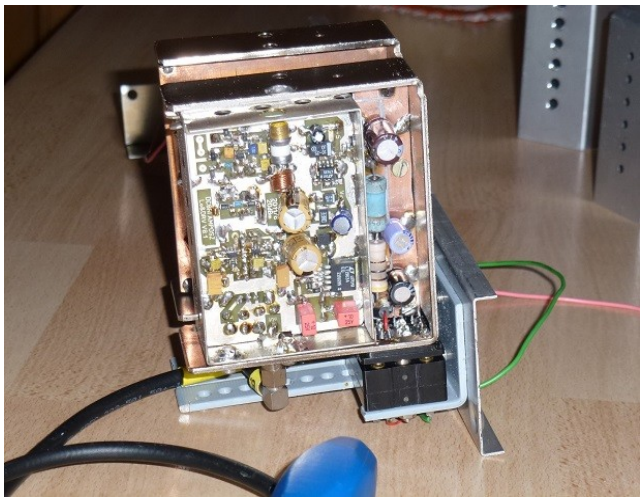
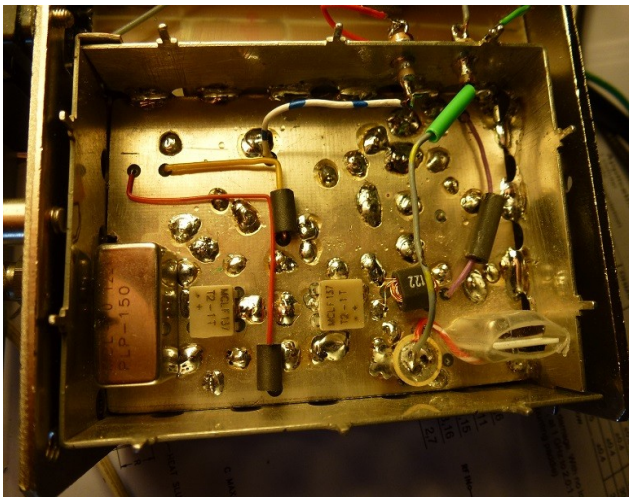
Transverter 14 to 144MHz

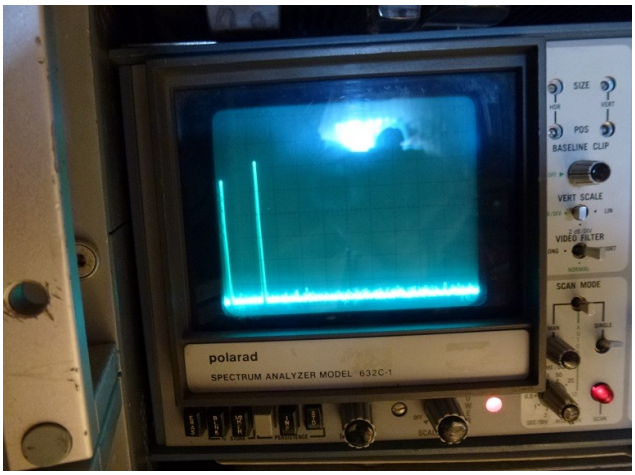
Here a short description from my new Transverter which I build for my VHF- QTH in JO50VF. To keep the costs at a low level, as usual most of the components come from my stock or dismantled equipment.

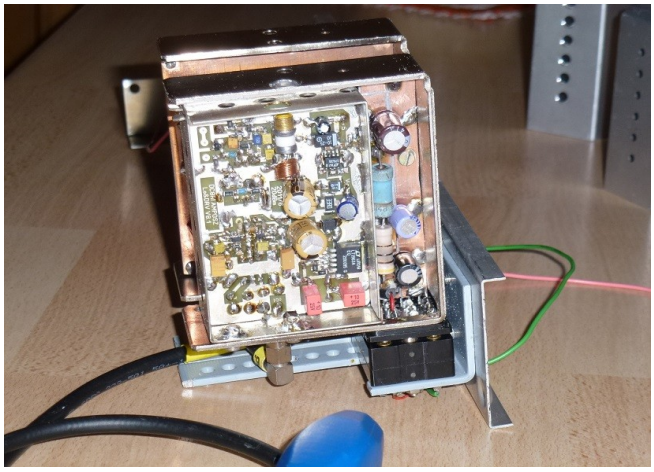


The most importand stage from the TRV is the local oscillator. The honor belongs to DC8RI who descripted an easy to build very high performance l.o. Here some pictures from my construction:



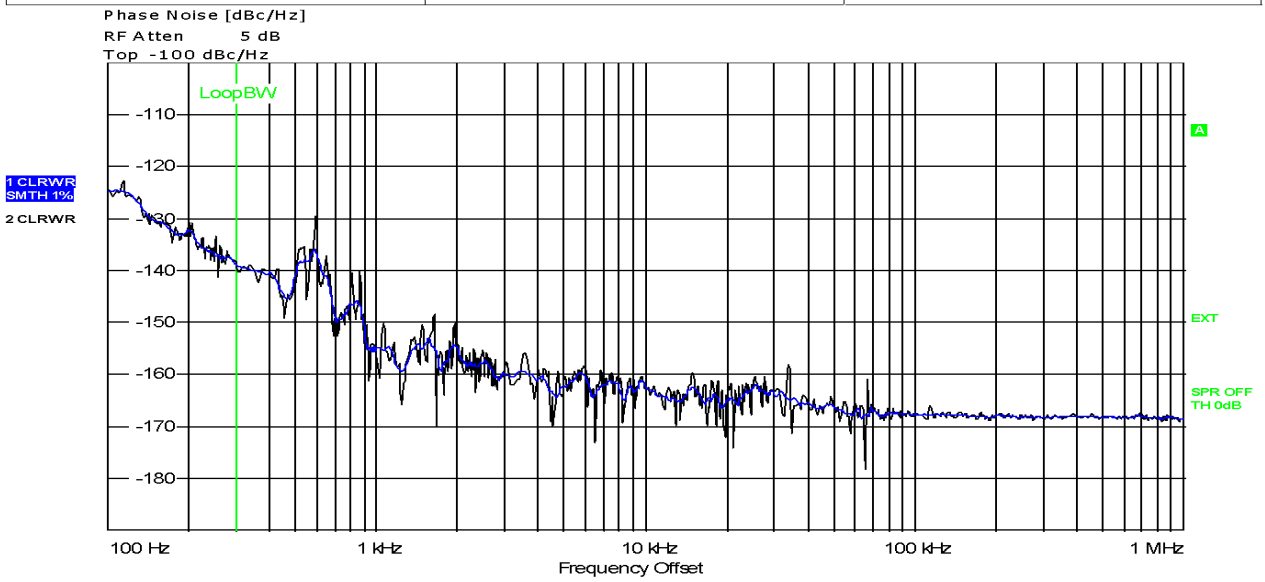






R&S FSUP Signal Source Analyzer — LOCKED

Settings		Residual Noise [T1 w/o spurs]		Spot Noise [T1 w/o spurs]		
Signal Frequency:	130.000815 MHz	Int PHN (100.0 .. 1.0 M)	-104.1 dBc	1.000	kHz	-154.74 dBc/Hz
Signal Level:	18.64 dBm	Residual PM	502.935 µ°	10.000	kHz	-162.44 dBc/Hz
Cross Corr. Mode	Harmonic 5	Residual FM	3.126 Hz	100.000	kHz	-167.86 dBc/Hz
Internal Ref Tuned	Internal Phase Det	RMS Jitter	0.0107 ps	1.000	MHz	-167.88 dBc/Hz



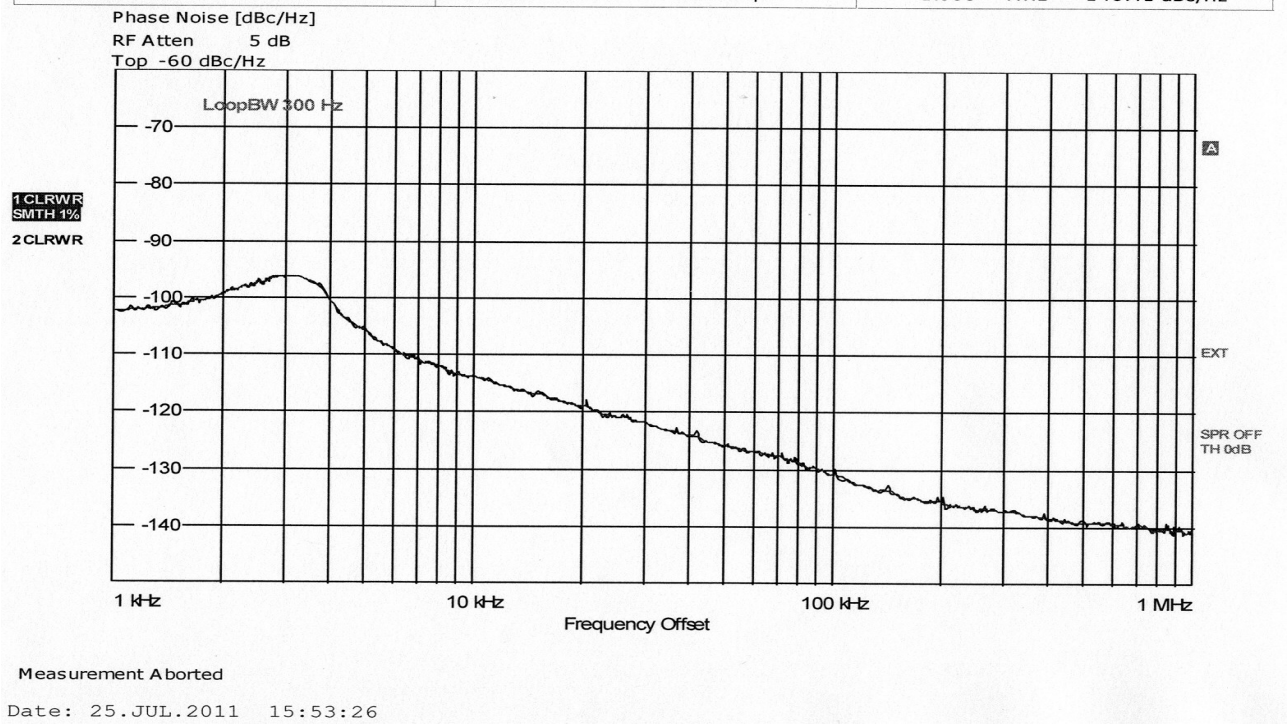
Measurement Aborted

Date: 28.MAY.2013 14:59:56

IC-9100

R&S FSUP Signal Source Analyzer — LOCKED

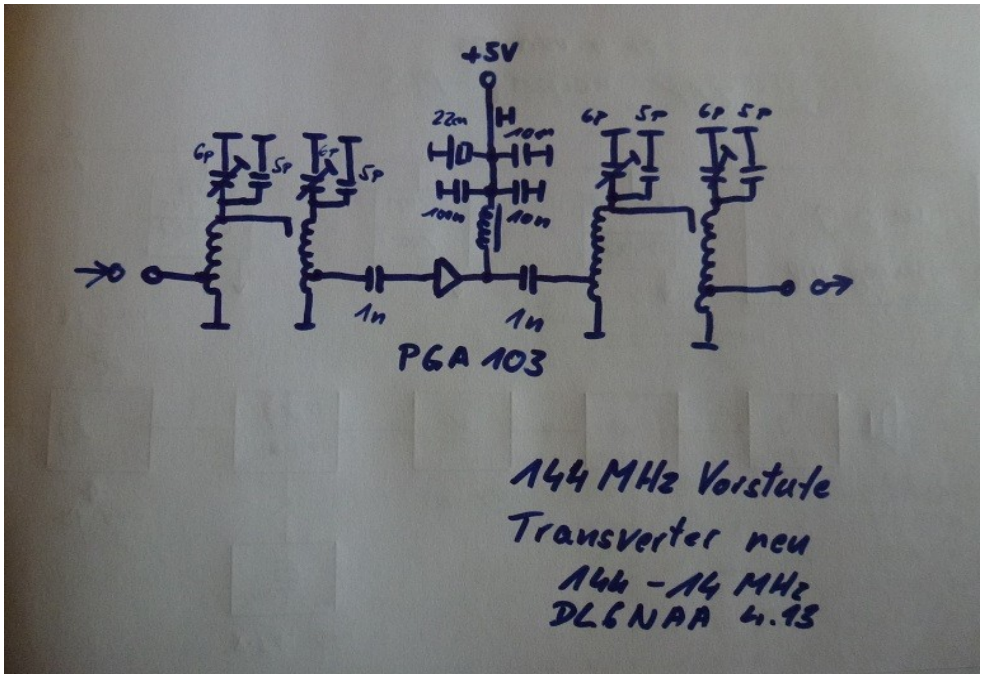
Settings		Residual Noise [T1 w/o spurs]		Spot Noise [T1 w/o spurs]		
Signal Frequency:	144.299921 MHz	Int PHN (1.0 k .. 1.0 M)	-62.2 dBc	1.000	kHz	-102.37 dBc/Hz
Signal Level:	7.95 dBm	Residual PM	62.766 m°	10.000	kHz	-113.84 dBc/Hz
Cross Corr. Mode	Harmonic 3	Residual FM	84.492 Hz	100.000	kHz	-131.04 dBc/Hz
Internal Ref Tuned	Internal Phase Det	RMS Jitter	1.2083 ps	1.000	MHz	-140.41 dBc/Hz

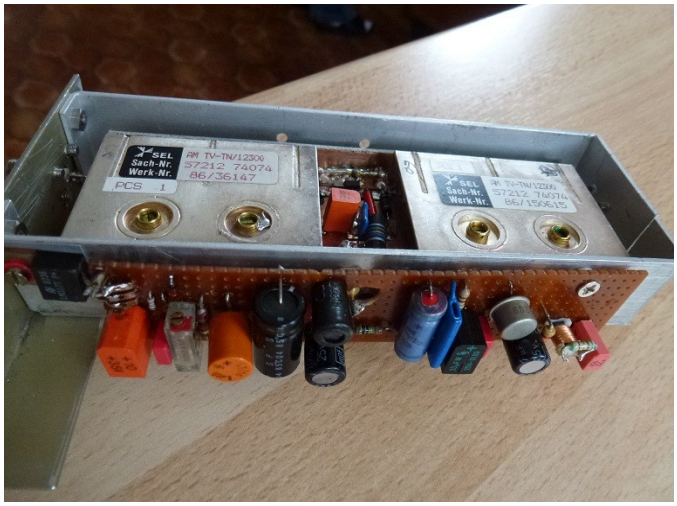


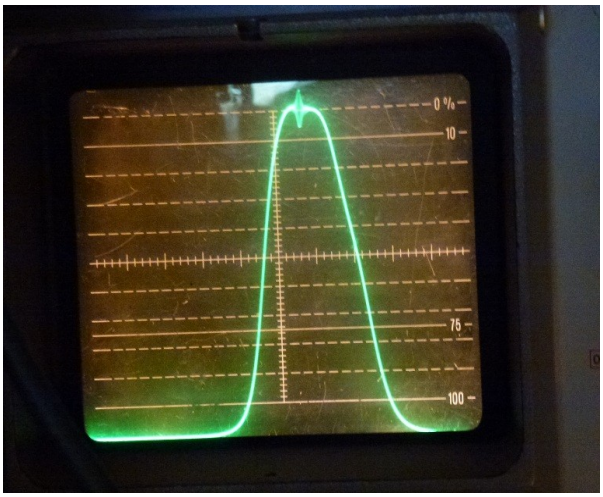
I had the possibility to measure the sideband noise from this oscillator in comparison to an IC9100 (Ic910 e.t.c..) at the company from DB6NT (thanks Michael). Note that the DC8RI- oscillator has about 50! dB reduced level by an offset of 10KHz!

The RX frontend:

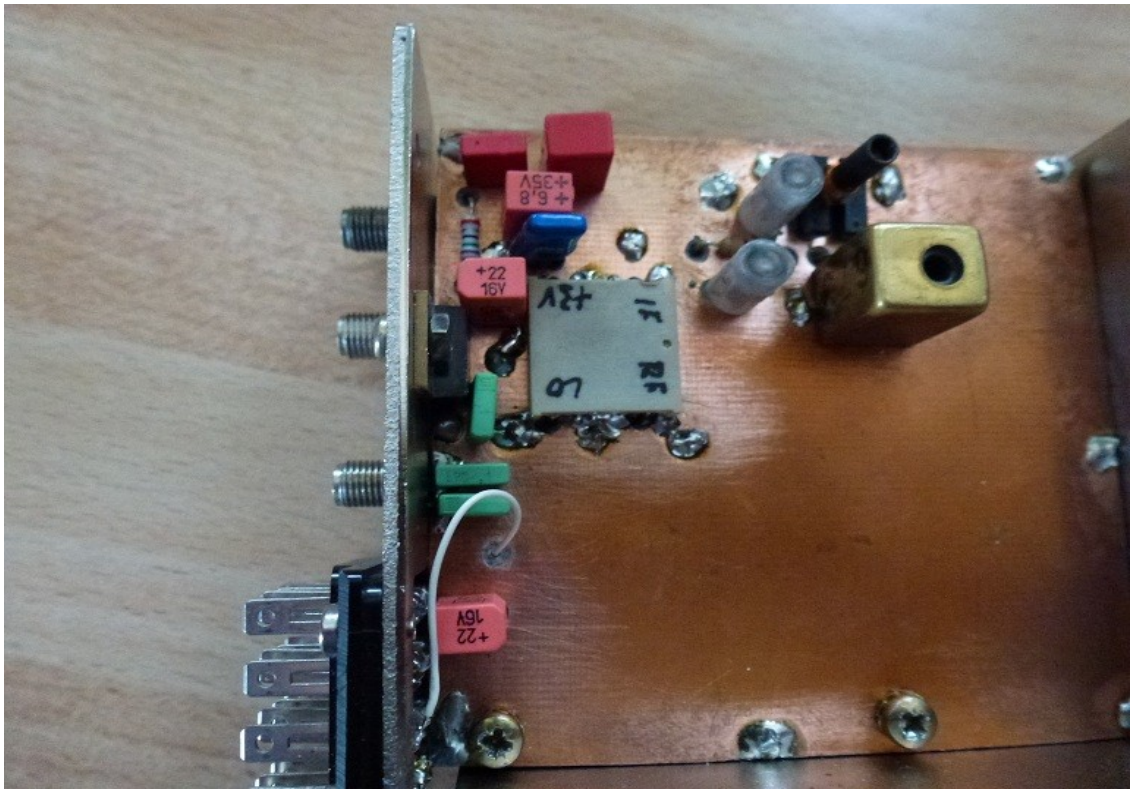
The receiving- signal passes a commercial bandpass which I dismantled from a SEL- AMTV IF- amplifier. The first- and only preamplifier is a MMIC PGA103. Passing a second SEL- filter the RX- signal is injected to the RX- Mixer.





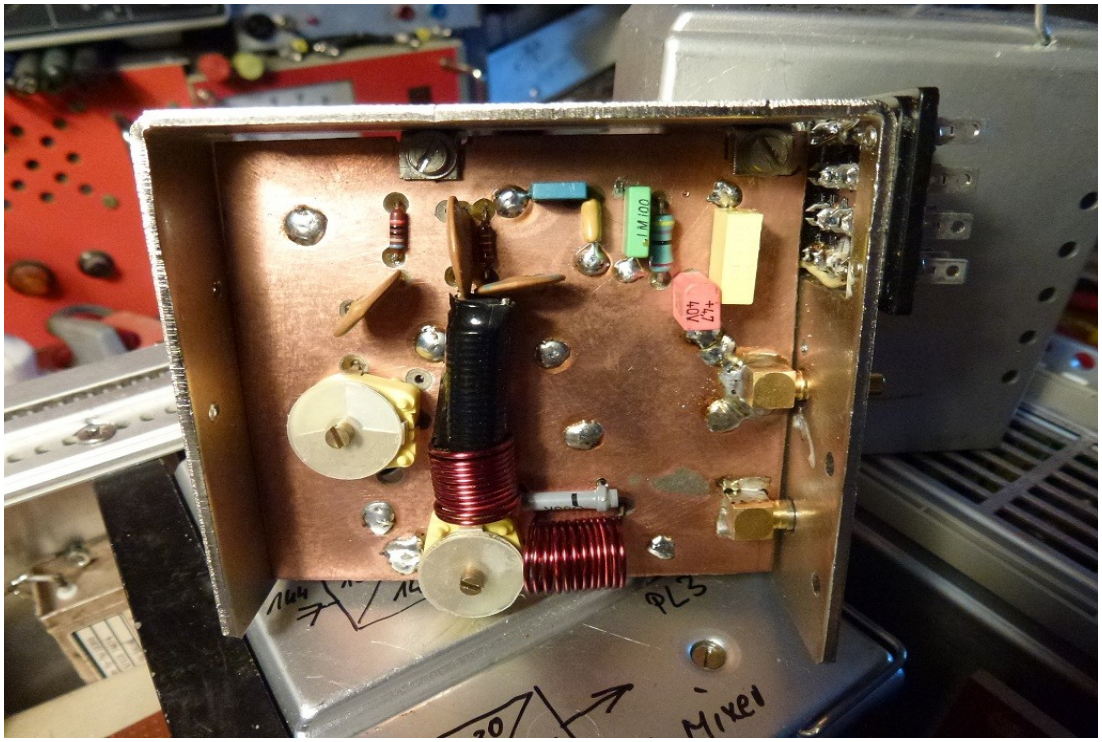


The RX- mixer is a high- performance Mixer HMJ5 followed by a diplexer for 14MHz.

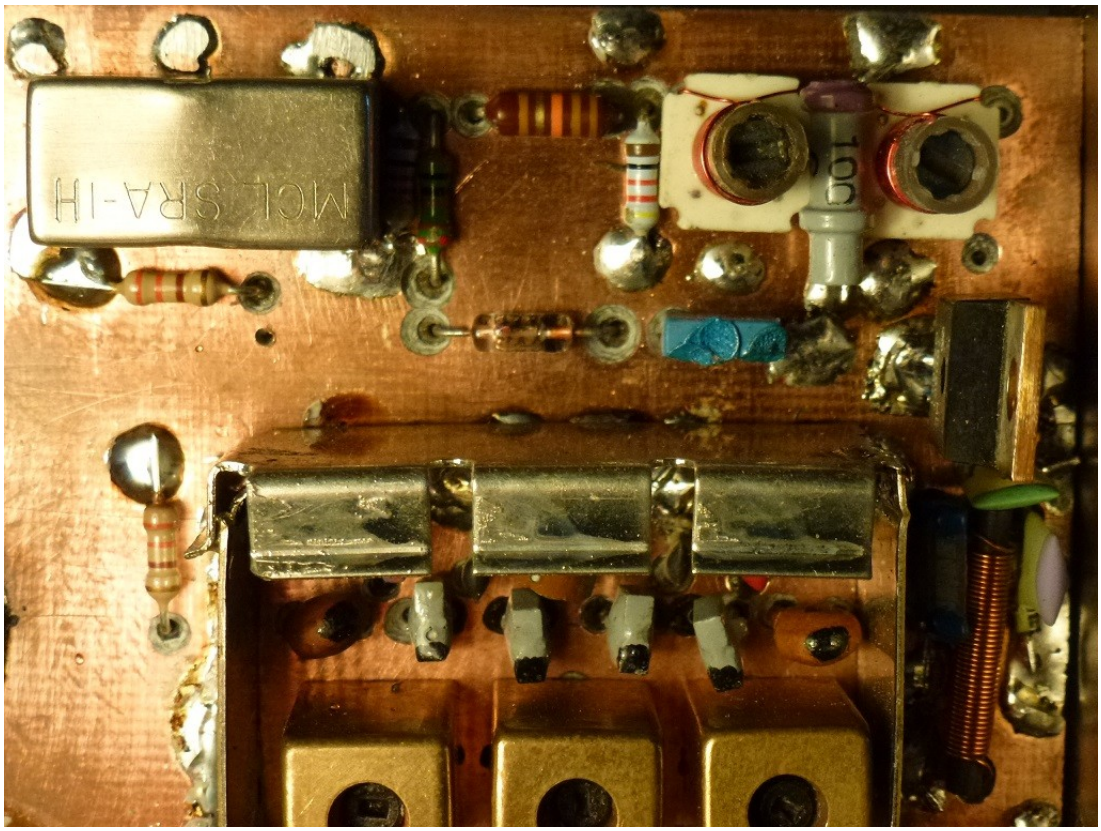


The transmitting- part:

The 14MHz TX- signal passes a BFG 135 preamplifier because the driving level from my IC7700 has not the required level to drive the SRA-1H TX- mixer. A following bandpass and a level- controll are responsible to clean the 14MHz from harmonics and match the signal to the correct level.

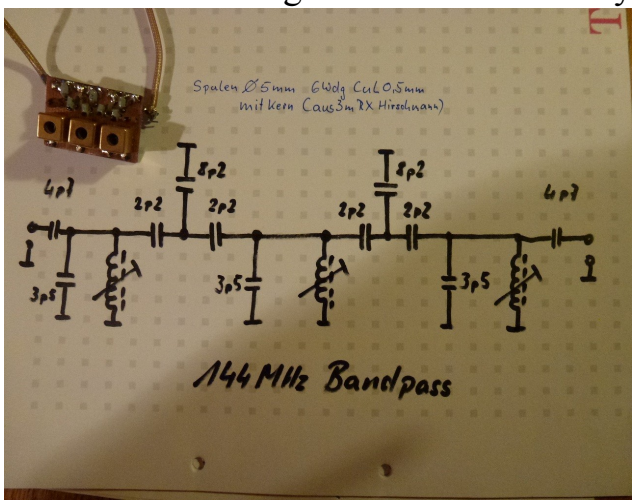


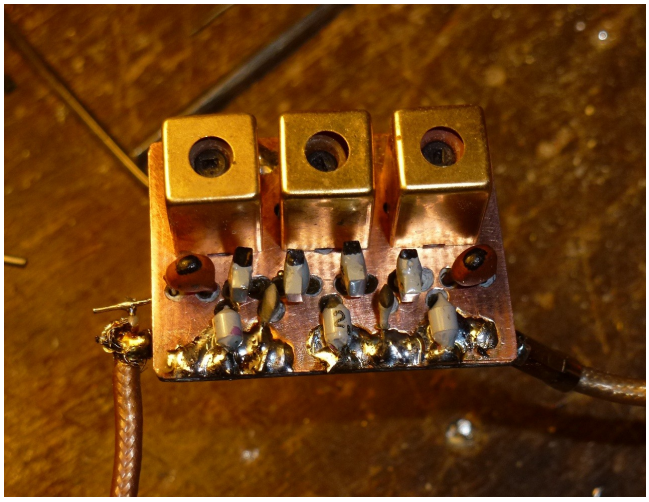
The 14MHz transmitting preamplifier

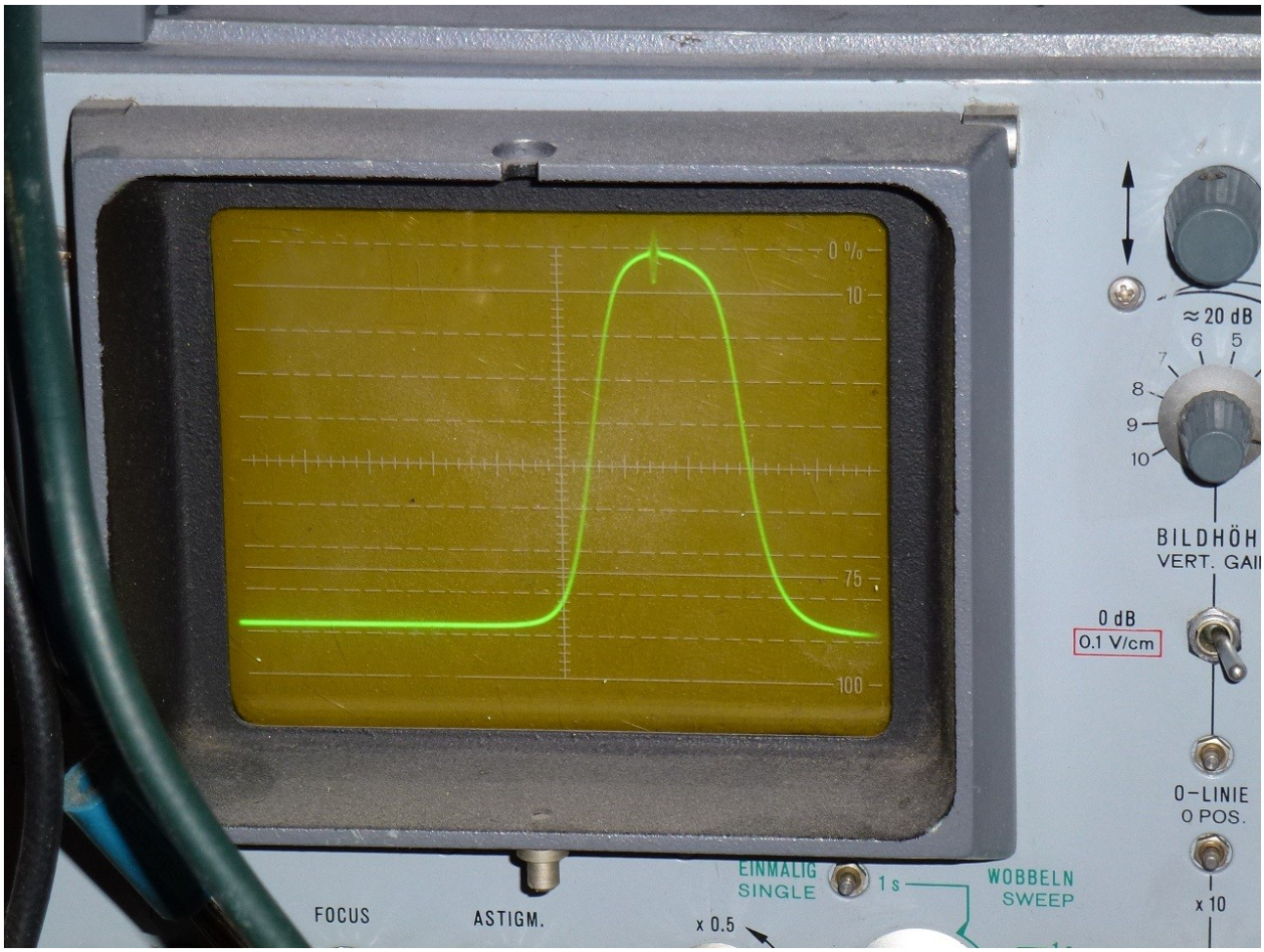


The 14MHz bandfilter, attenuator and SRA-1H mixer.

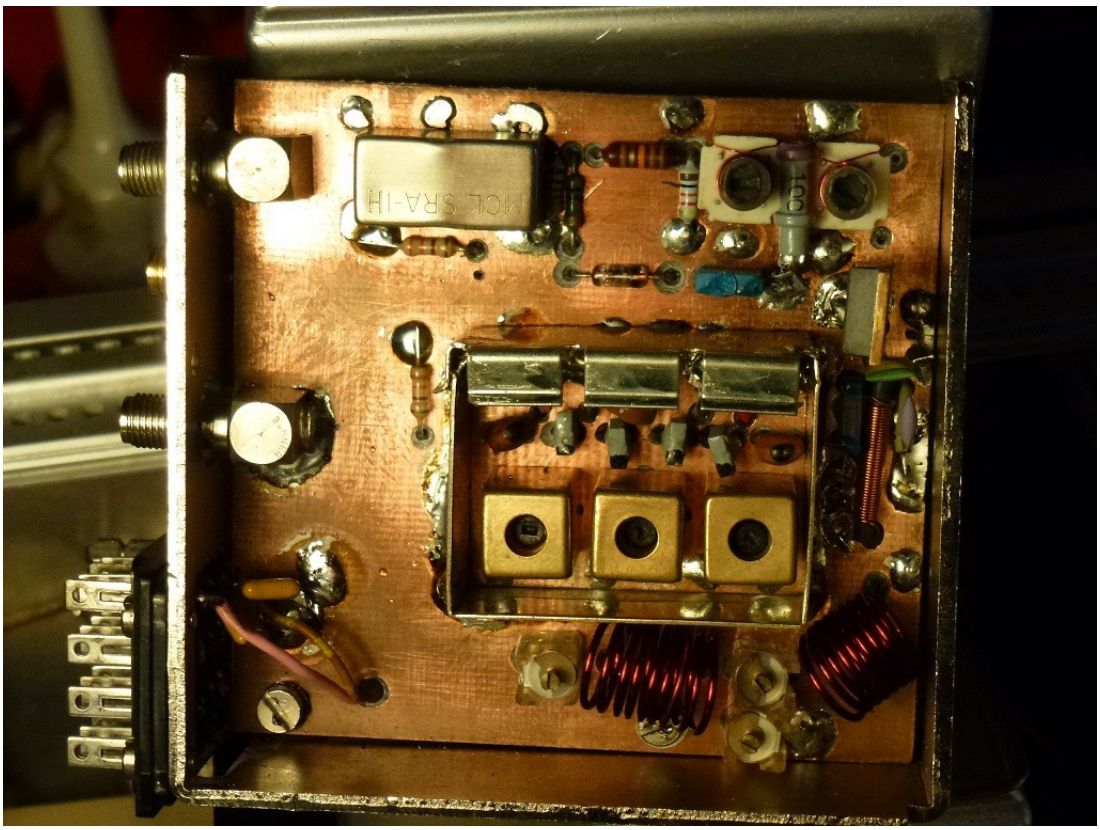
Mixing the l.o. Frequency (130MHz) with the 14MHz IF- signal from the exciter, the wanted 144MHz signal is determinated by a Bandfilter.



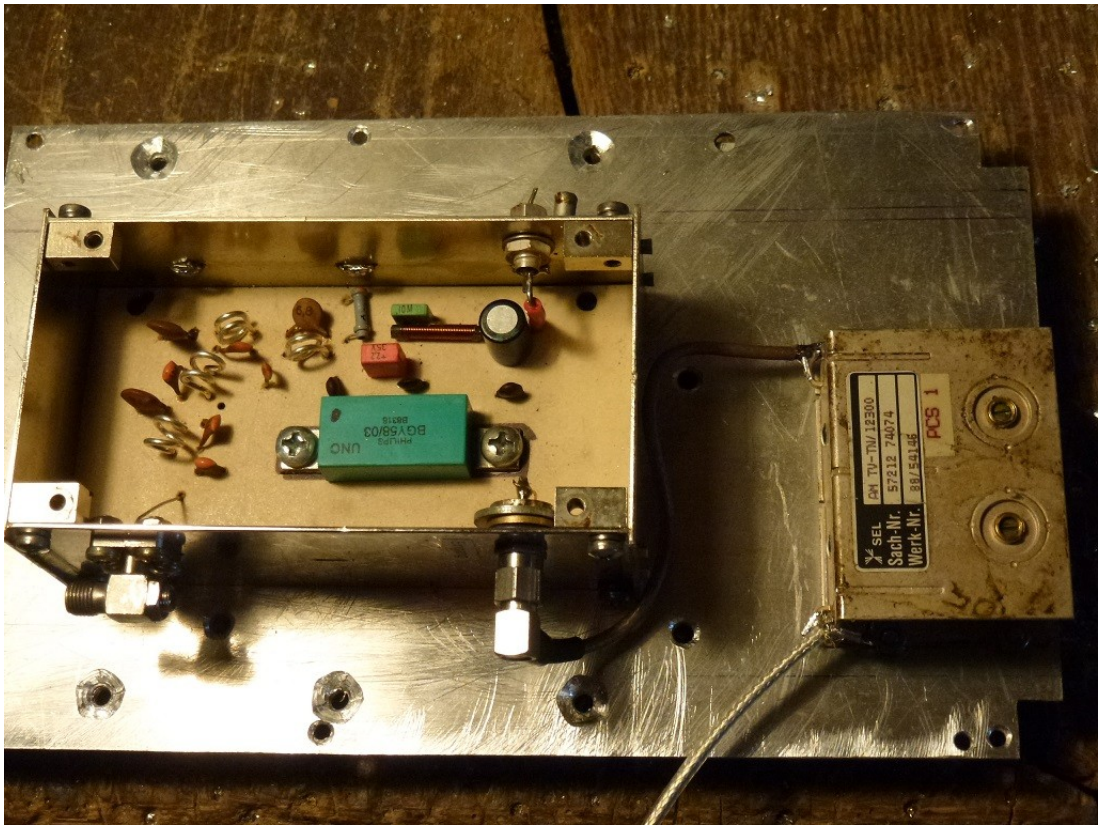




The generated 144MHz signal is amplified by an BFG 135. This circuit was describted from Drago YU1AW and some others on their web- sites.

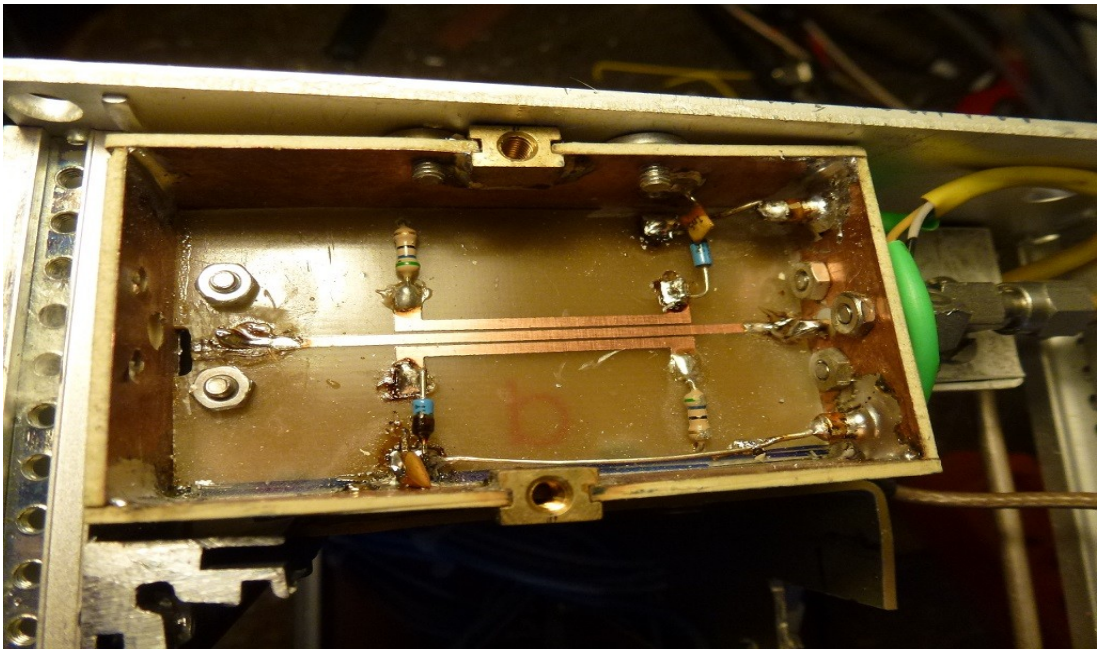


The complete mixer- module. Passing another SEL- Bandpass the TX- signal is feed to the final amplifier.

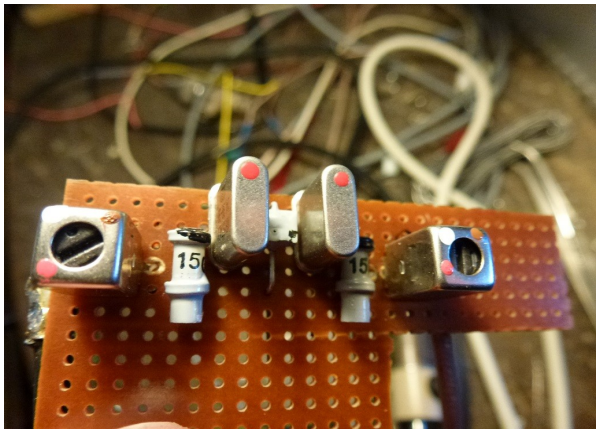


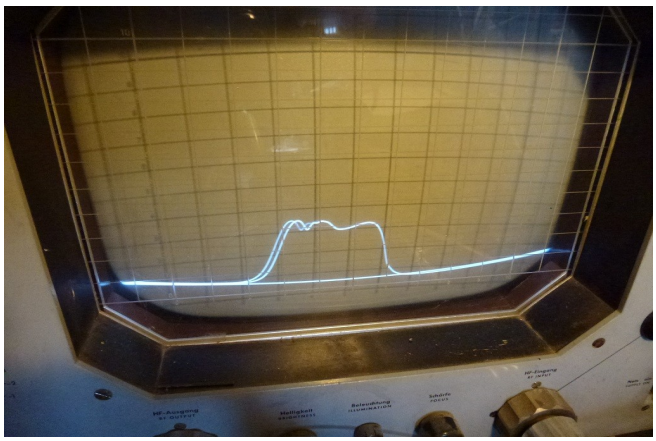
The bandpass at the right side, the pa- pwr- module and the output low- pass- filter..

A directional coupler is responsible for indicating the correct power and matching to the extern final power- amplifier. The output is abt. + 26dBm.

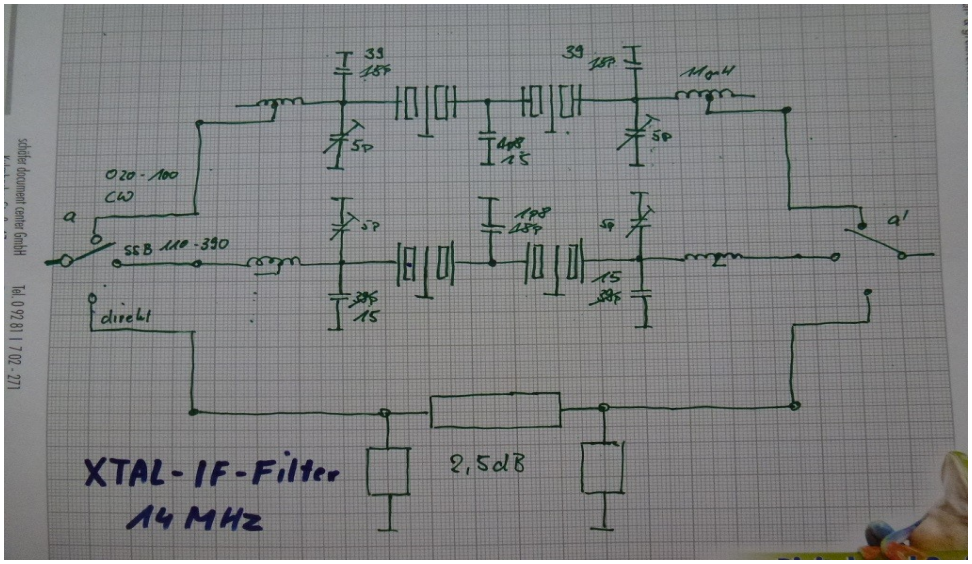


The IF XTAL filter:

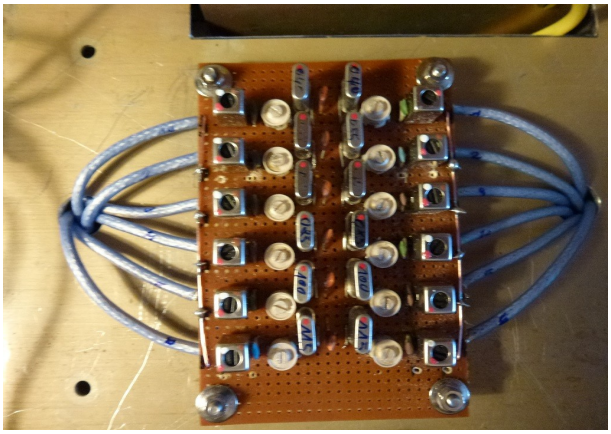


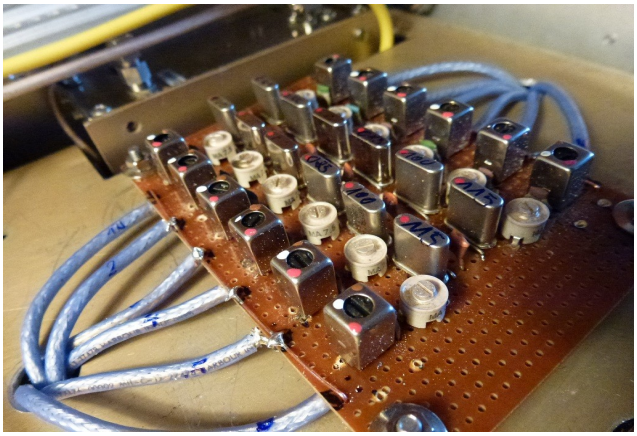


I think the honour belongs to Vlada, OK1VPZ, who was the first one, who discripted such kind of IF- filters which reduce sidebandnoise on the TX- side and witch improve the selection from the IF- receiver.

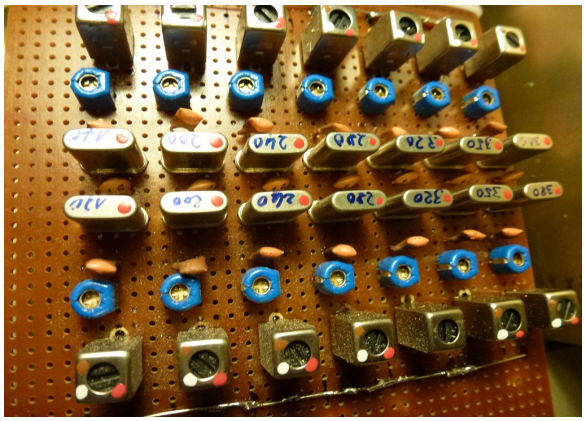


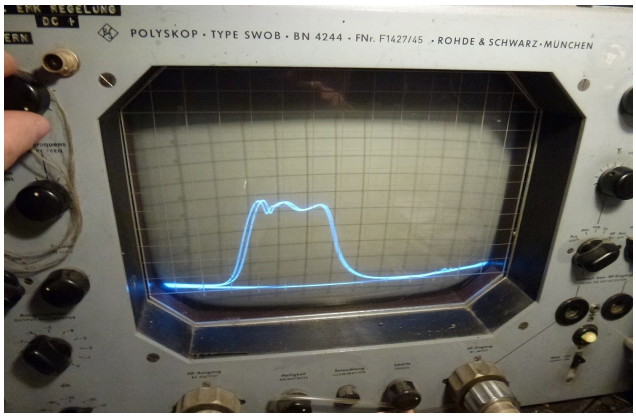
Theory and experience are discribted also from Slovenian HAMs.





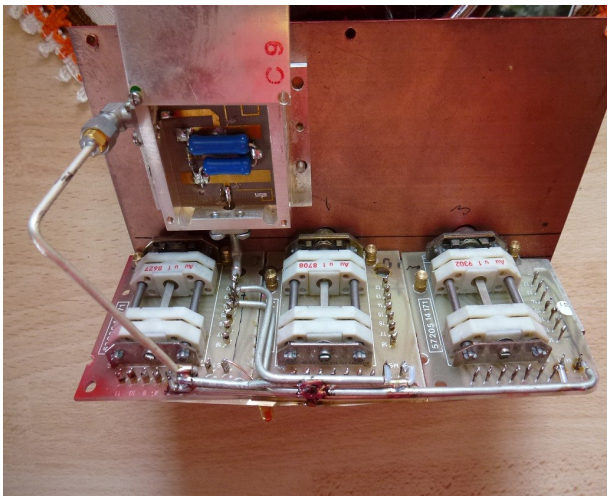
Complete filters for the cw- range

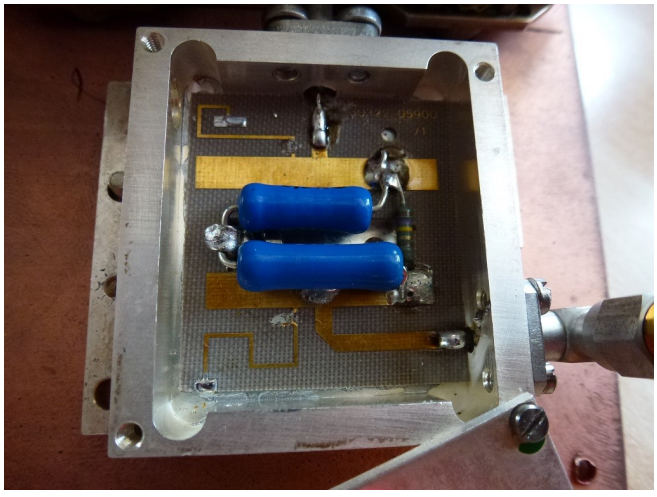




and for the higher SSB- range

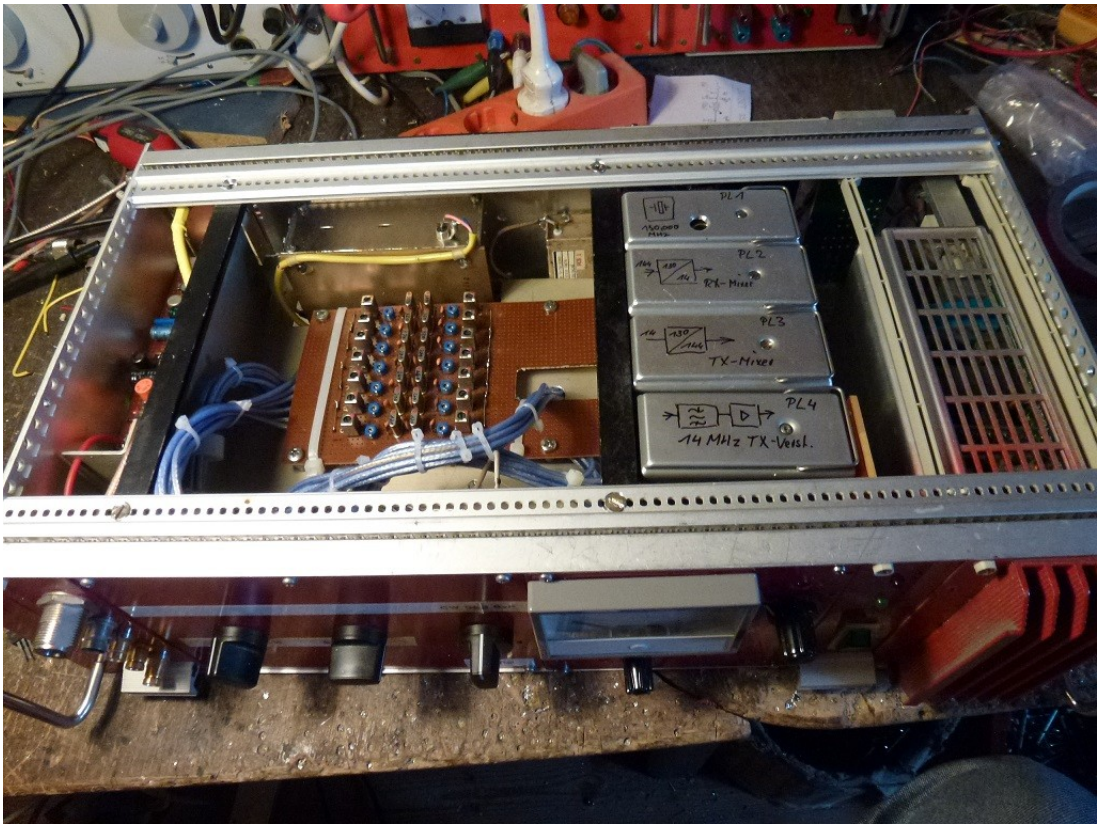
Checking the CW- filter during the WAE- CW- Contest in front of my IC7700 I could realize, that even on Shortwave it does a great job.



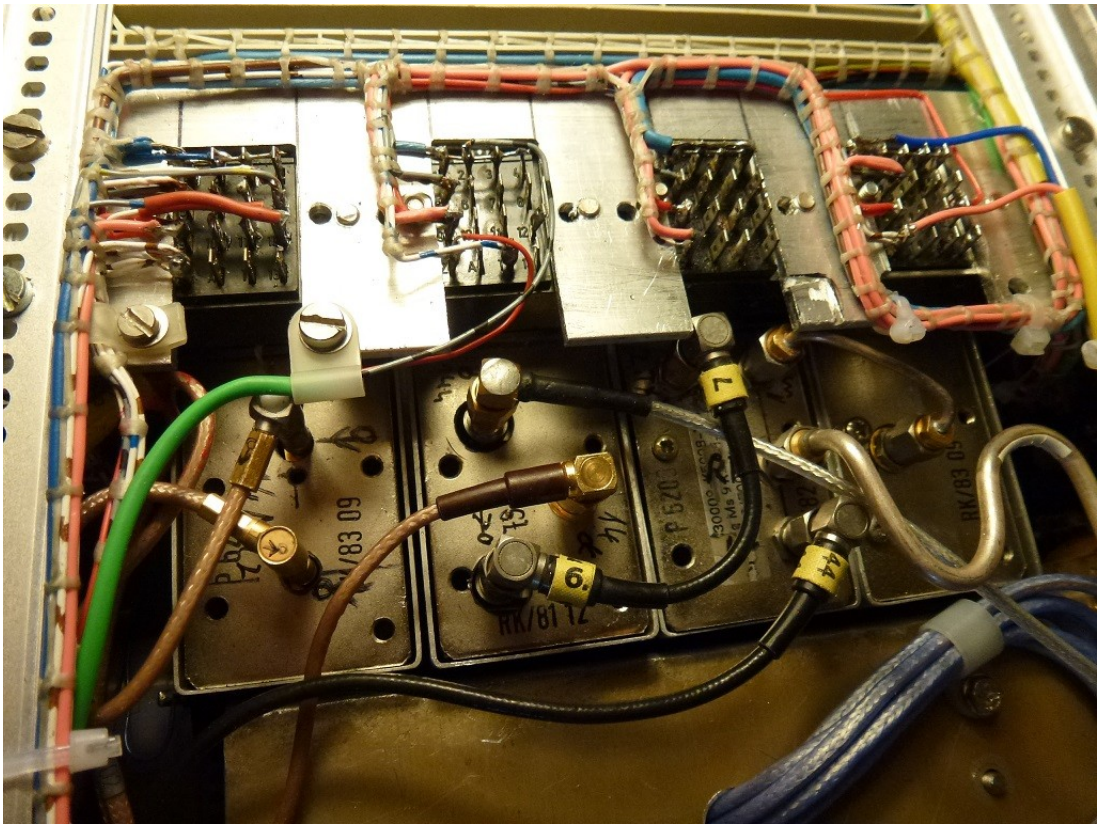


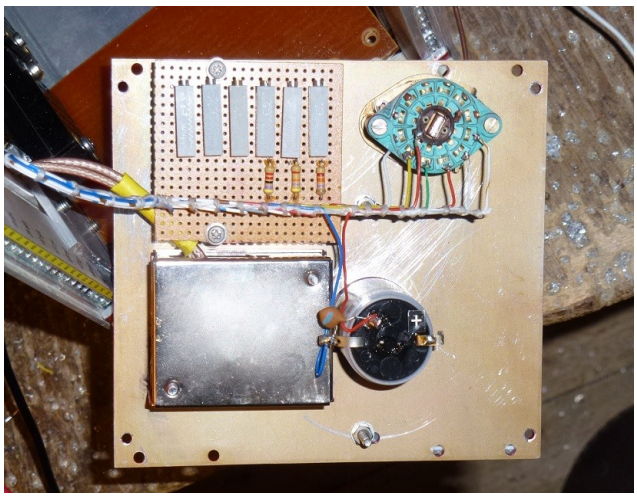
If the X-tal filter is switched off, the 14MHz RX – TX- signal is bypassed by a 2,5dB fixed attenuator to compensate the insertion loss from the filters.

The frame:

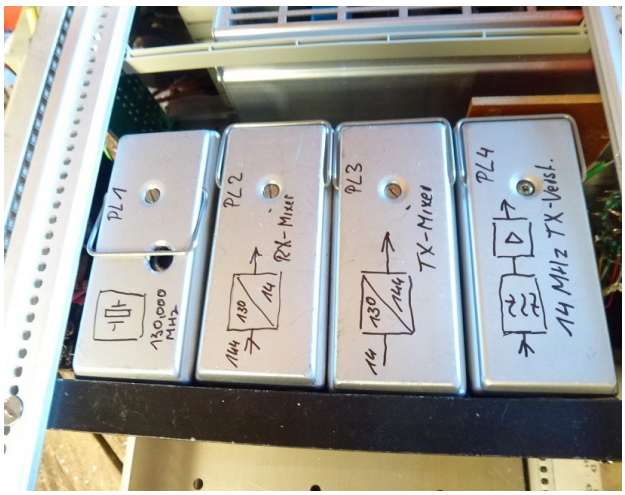


All components are mounted in a surplus 19 inch rack. Many modules allow it to check and if necessary to improve each stage very easy. Here some impressions about my “ugly construction”

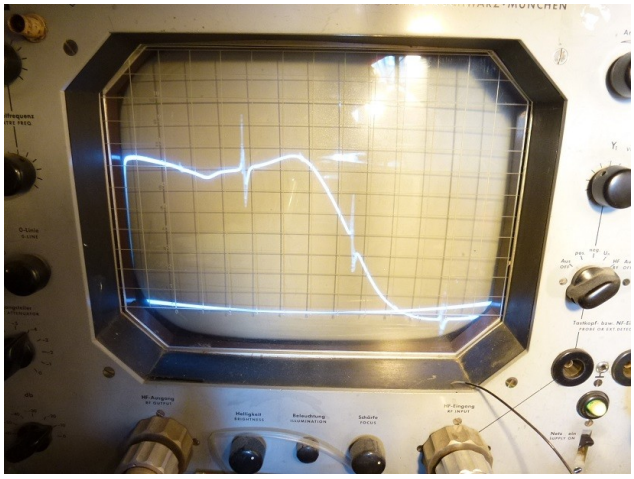




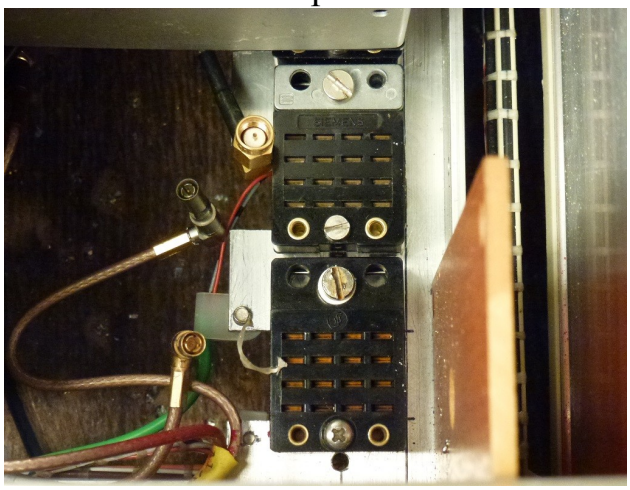
the switch for the controll- meter



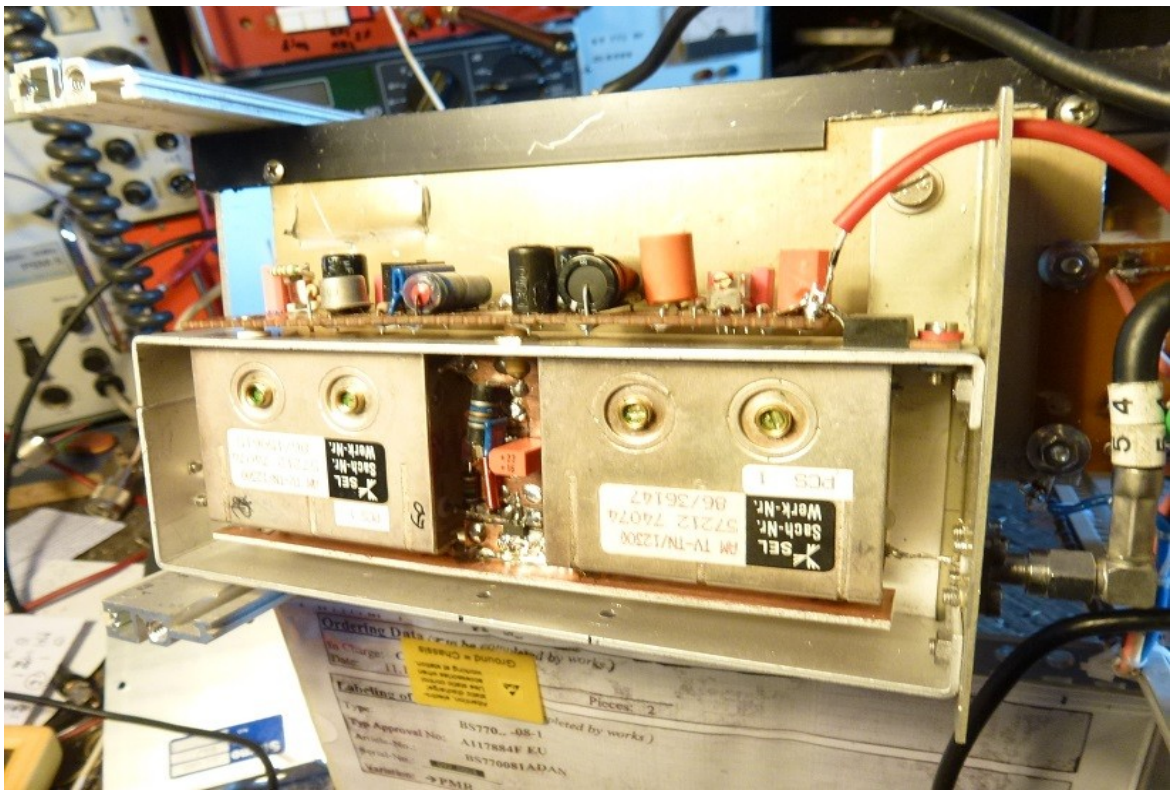
each module in a seperate box



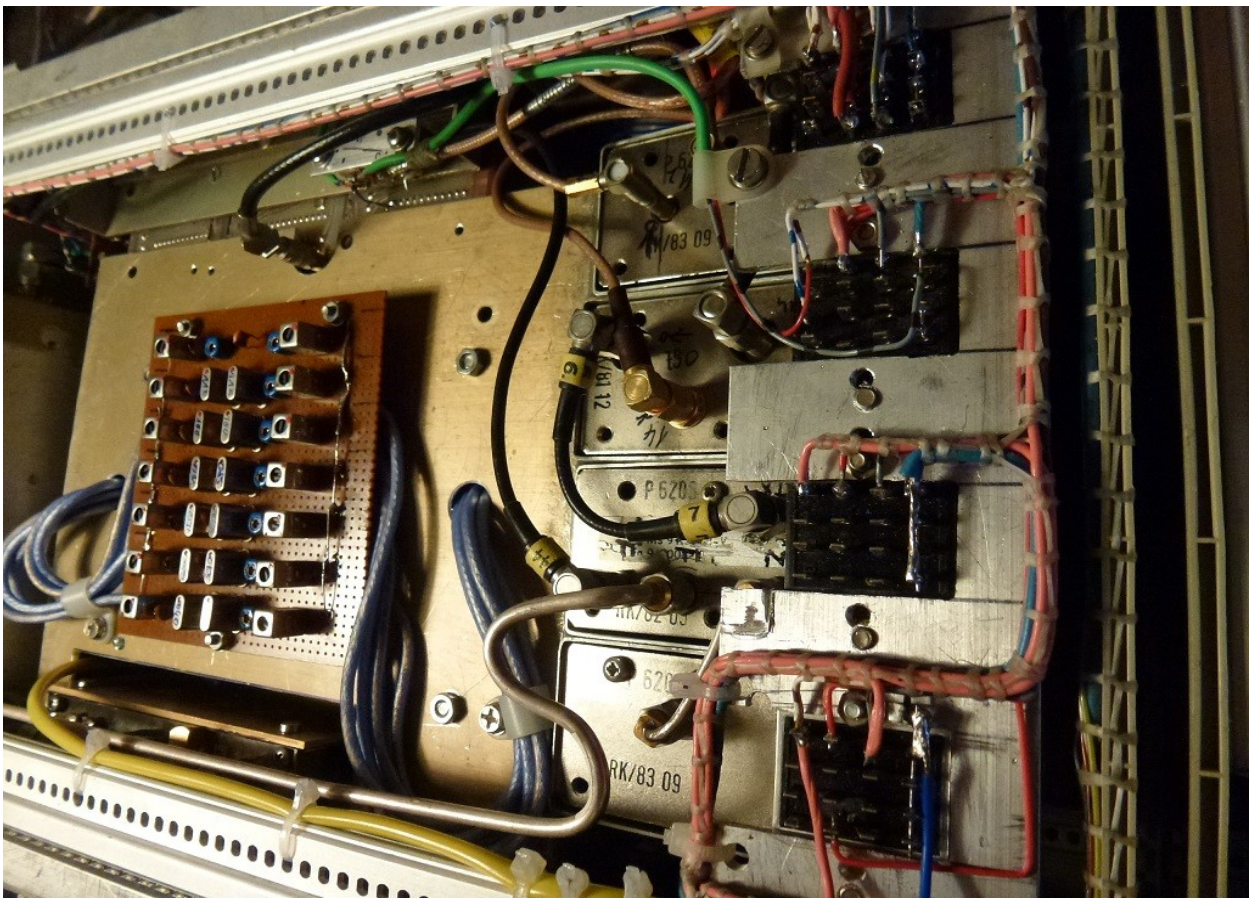
14MHz lowpass



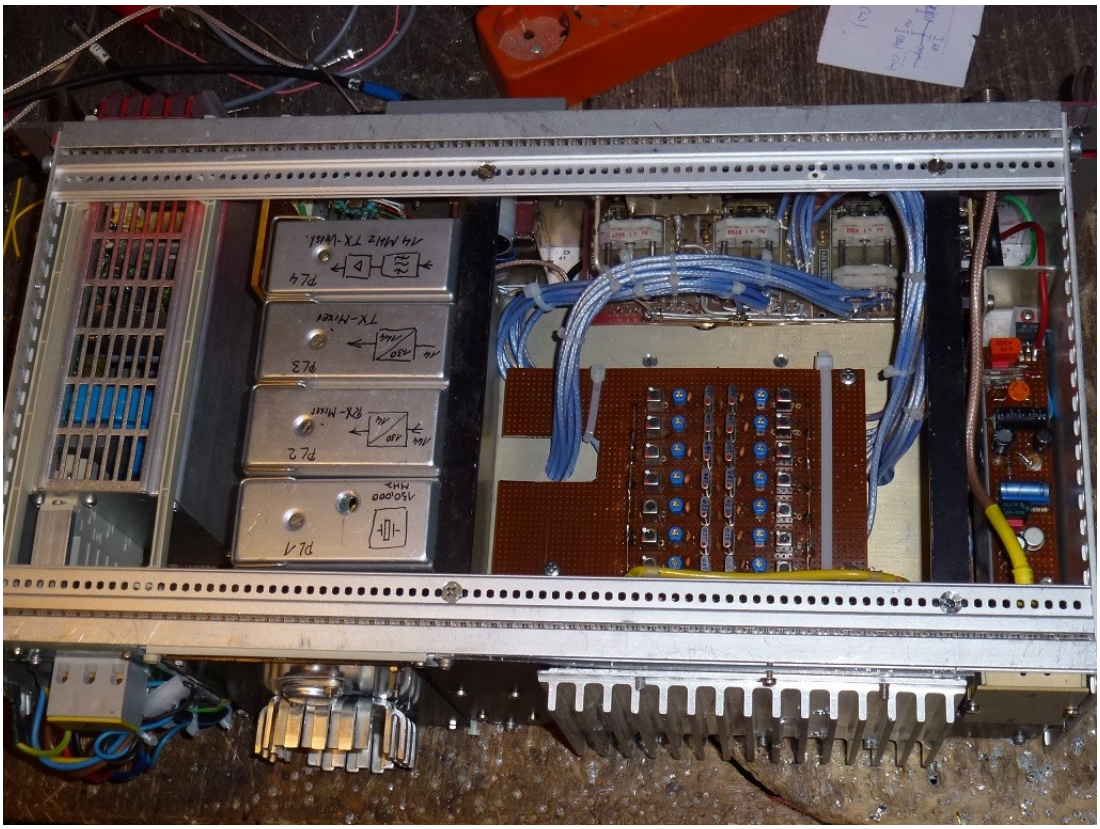
connectors for the modules



Receiver frontend



complete Rack with the CW- range filters



and last- not least the top- view with the filters for the SSB- range.

To keep the costs as low as possible, as usual most of the components I took from my stock. For others, I had to pay for I spend around 300 Euros. 73 Rene DL6NAA