Part III

Photo 37

The RF tuning assembly is ready for re-mounting. The two empty holes 'AL' left and right of the tuning assembly (most down at this photo), were used in previous versions like type a and a1, as to link (synchronize) receiver tuning with the tuning of the HF/DF adapter. This facility was omitted(abandoned) later in the war

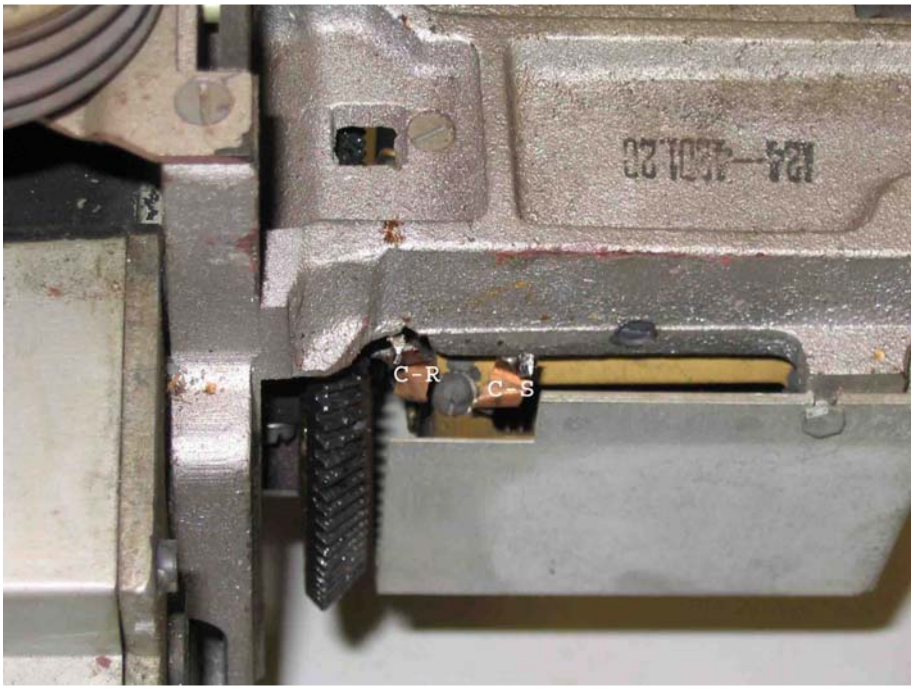


Photo 38

C-R is the flat copper-lead of the tuning capacitor rotor and, C-S is connected with its stator. The leads provide some freedom of movement, and by its nature does have a very low (self)inductance, combined with minimal tendency to vibration

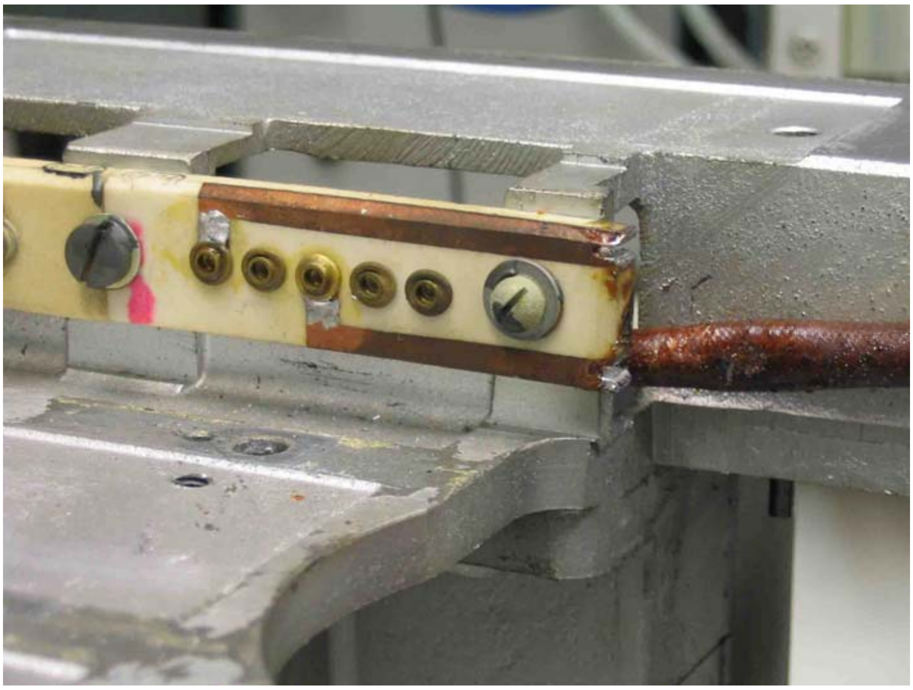
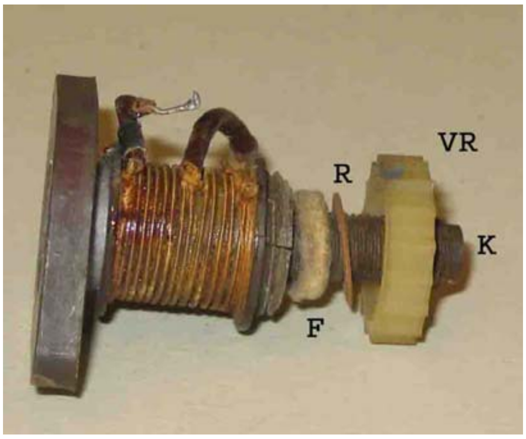
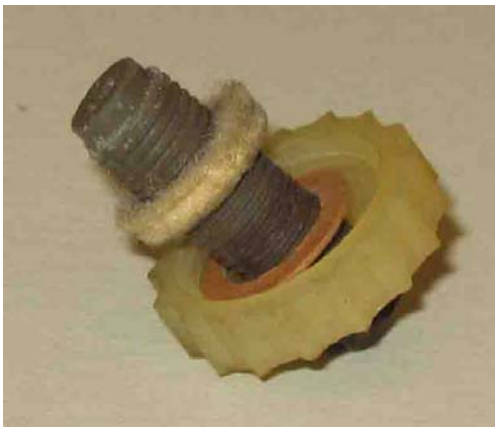


Photo 39

It has proved, that, for whatever reason, the ceramic contact strip sometimes is broken (may be due to too much force put at it). This is a serious defect, as it, inevitably, will inflict its (line)inductance. Because the frequency reading of Köln receivers is very accurate, it will deviate inevitably the accuracy of frequency readings. However, I think regarding stability, no other company in the world took so much care for frequency stability (meant series production) as did Telefunken! Regard also the solidity of the die-cast chassis frame (6 mm)!





Photos 40 and 40a

It should be pointed, that no one should ever try to re-adjust the Köln's RF stages (bands III – V), before having noticed the following information! Let us consider, that after say late 1943 or early 1944 some concept details of the RF coils changed. Until then, like in Main and Wupper (predecessor) receivers, RF dust-cores were built like 3 mm screws (without bold-head). This might have caused problems. And, a new solid coil-assembly, shown above, was introduced. The felt ring F is sensible to moisture and will, by its nature, absorb some of it. This will result in oxidation of the dust-core K. Over the years, Fe-oxide will defundate (move) into the felt ring and creating a semi-solid clotting substance. By means of nut VR the assembly of F - R and K is being locked. The best solution is, to dismantle each coil-set individually and then detach VR – R and F, by means of finger force; the felt ring and the dust-core can be freed from clotting together. Dust-core at photo 40a shows: on the right (just about ring R) what kind of (dust-core) deformation the moisture content of the felt ring will cause. Sometimes a tiny drip of oil may help to prevent clotting in the future again. Now the assembly can be re-assembled. When this prophylactic procedure is omitted (neglected) the result inevitably will be: that dust-cores will be damaged (of course, only when one tries to re-adjust them)! Most Köln's found, suffer, in some respect, from this problem, owing to un-qualified handling in the past.

Photo 41

Shown is, the front-end coil assembly of Köln. Again, 2977 might well have been designated to future Köln serial (scale) 2977 number

Photo 42

The second RF band-filter tuning block. The various texts, might provide some state of affairs

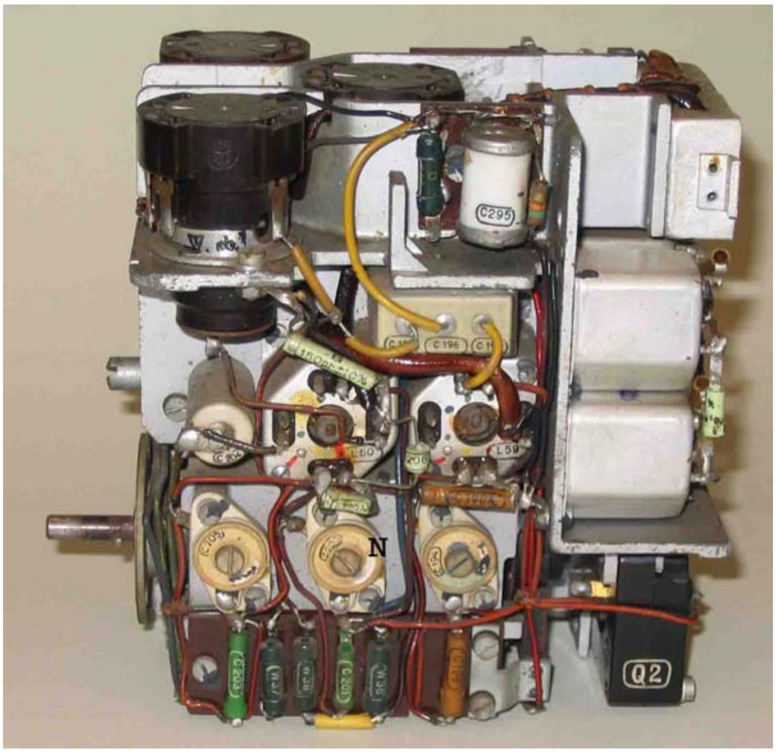


Photo 43

Shown is, one side of the IF-module. Q 2 is quartz 2 of variable band-filter 2. (see also my paper: **aspects of German electronic engineering in the 1930s**). N is the neutralizing trimmer, which nullifies (compensates) the capacitance of quartz 2 and its wiring

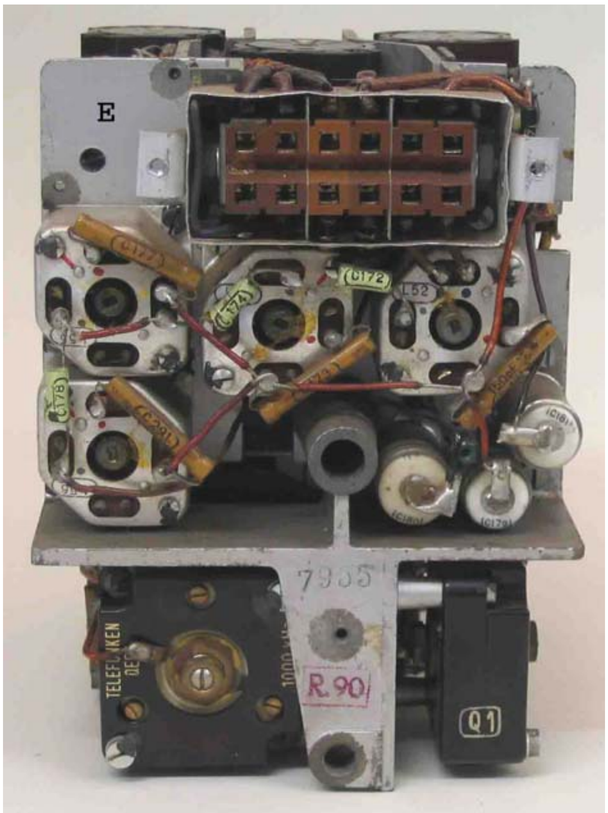


Photo 44

We see the rear side of the IF-module, with 12 pins connector and Q 1.

In the final stages of the war some components had been left out. "E" is the empty place of band-filter 6 (remember, that band-filter 1 sits in the mixer module). The IF is exactly 1000 kHz. The Q of these kinds of quartz is rather high, and vary between 50,000 and 100,000!

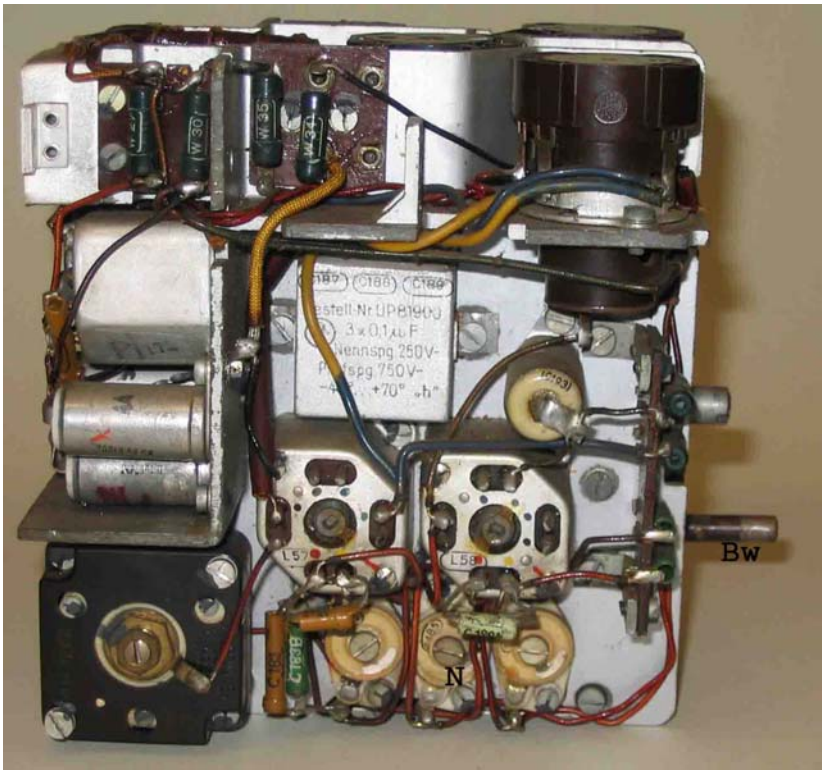


Photo 45

Bw is the bandwidth tuning between 200 and 10,000 Hz. Its curves stays symmetrical. This type of quartz-filter-tuning tends, however, to unwanted side-lobes. I believe, that the six filters (in this case only 5) situated between mixer output and grid 1 of the first IF stage (see schematic at page 4), had to nullify (minimize) this side effect. These lobes can only occur when the band-filter-tuning is being set about middle of the bandwidth response. However, tuned at very narrow or wide band-pass response, no (unwanted) side lobes can be noticed. Please consider next the IF band-filter response, which was very kindly measured(plotted) about 1990 at the Philips Quartz factory, in Doetinchem* (NL), by Donald Prins (thus is not originating from Köln 2871). Impressing is its very large dynamic range, which might well compete with today's quartz filters. Especially when we realize, that it used only two filter quartz. One of their secrets is, that the Germans knew how to produce good, low loss, dust-cores coils. These IF coils necessitate a **loaded Q** of > 100. Regarding its actual size (L57 – L 58), a very good achievement. This quartz filter type was invented by Kautter, be it on behalf of Telefunken (see also our: **Patent DE dBase**) (consider also page 4) and **Aspects of German electronic engineering in the 1930s** (Synopsis) *Factory changed hands to "Saronix" and then it went bankrupt about 2002/2003

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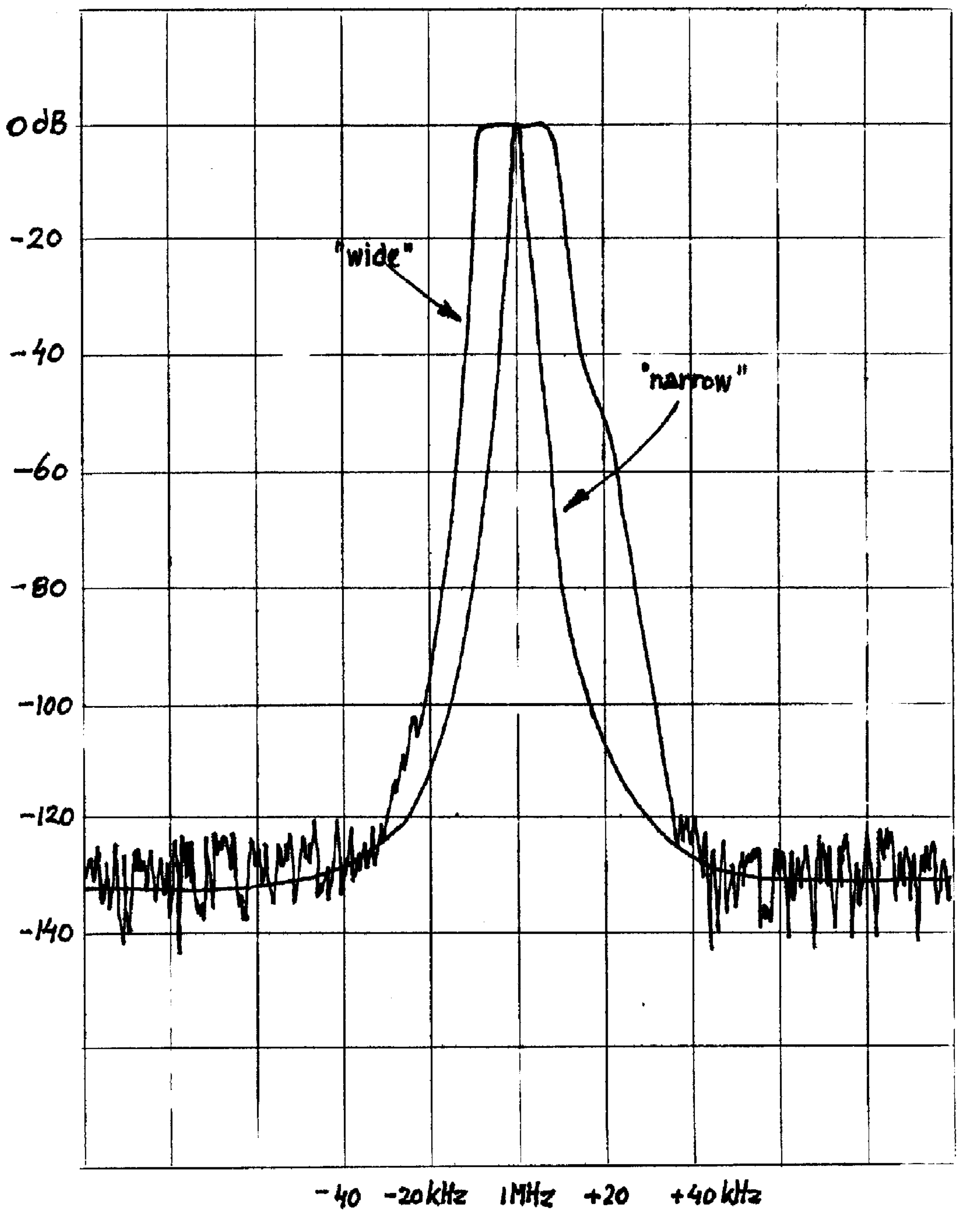

Actually plotted IF over-all response curve of the receiver owned by the Author. The slight assymmetry is probably caused by a detuned roofing filter (the circuit has not been trimmed since almost half a century ago...).

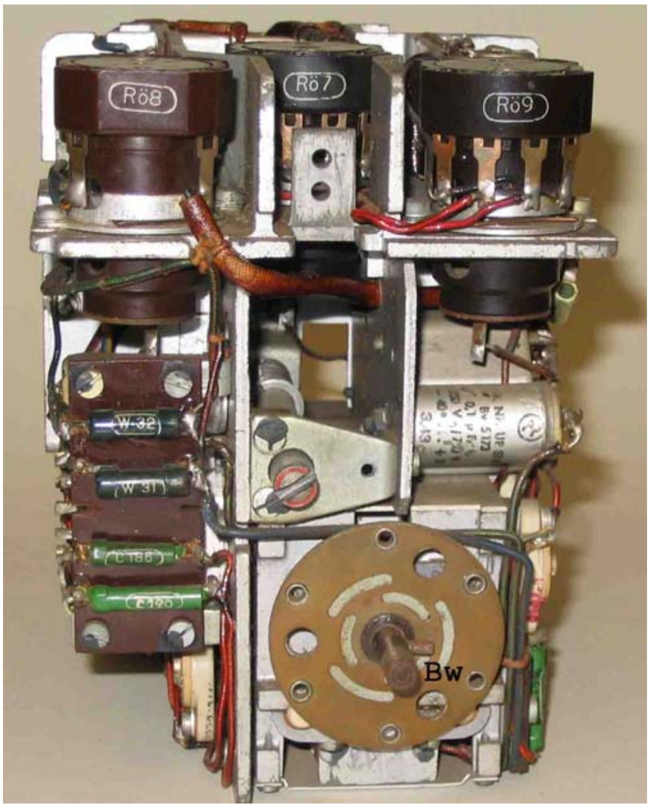

Photo 46

IF-module front section. Valve holders Rö 7 – 9 are clearly visible

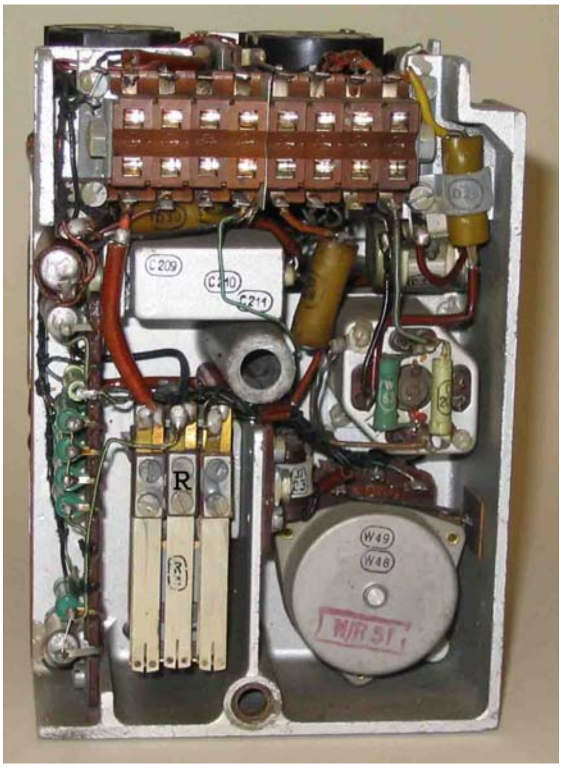

Photo 47

Rear view of the BFO-Detector-LF/pre-amplifier stage. W 48 + 49 is a double potentiometer, whether controlling audio- or RF-amplification. Thus respectively: with or without AGC (automatic gain control). 'R' is a relay, controlling various modes.

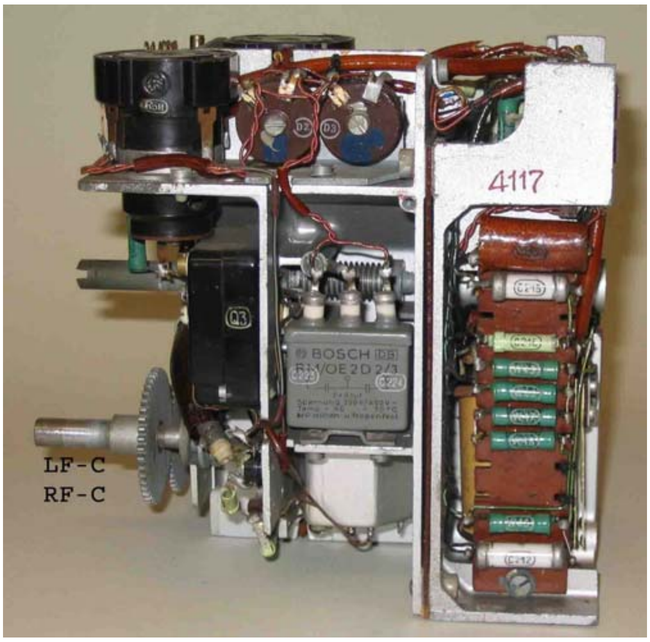

Photo 48

Side view of the previous module. Q 3 is the BFO quartz (1000.9 kHz). Which acts as BFO, though, also as calibration reference, with harmonics up to 25.0225 MHz (all calibration markers being compensated for the 900 Hz BFO off-set!). Köln E 52 a (1942/43) was fit originally with a variable BFO facility as well (thus alternatively: variable or quartz). However, due to the rather high signal gain, the variable BFO-oscillator tended to be phase-locked by strong signals. To counter this downside, a bridged circuit was introduced between final IF amplifier and detector stage. As to eliminate BFO signals into IF signal. This worked, but I believe, not sufficiently enough, and soon tuned BFO was made redundant (abandoned).

Photo 49

LS = central locking screw. RF-C + LF-C is audio or receiver RF gain. The empty holes, originate from the old (abandoned) variable BFO provisions

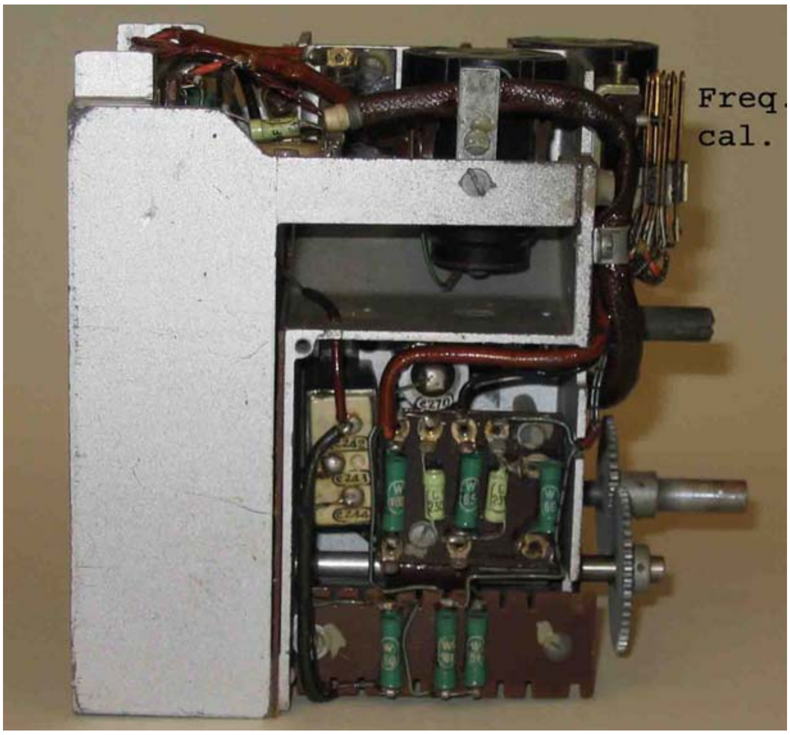

Photo 50

The frequency calibration switch is handled by means of a small push-button from outside the receiver. The anode of the detector valve RV12P2000, gets no positive supply. Consequently, this anode will be charged negatively due to space charge. The anode acts now as diode, which distorts the calibration signal. Resulting in a wider harmonic spectrum (though, also as delayed AGC diode). The P2000 is curiously employed: g2 (screen grid) is acting as an anode for the low frequency signal (LF) amplification (thus as triode)(g3 acts also as a separate IF-diode). This is why g1 has to be supplied from (Urfa 610) a stabilized negative source, as “automatic negative” gained from “cathode drop” would not work well. Regard also **Part IV**

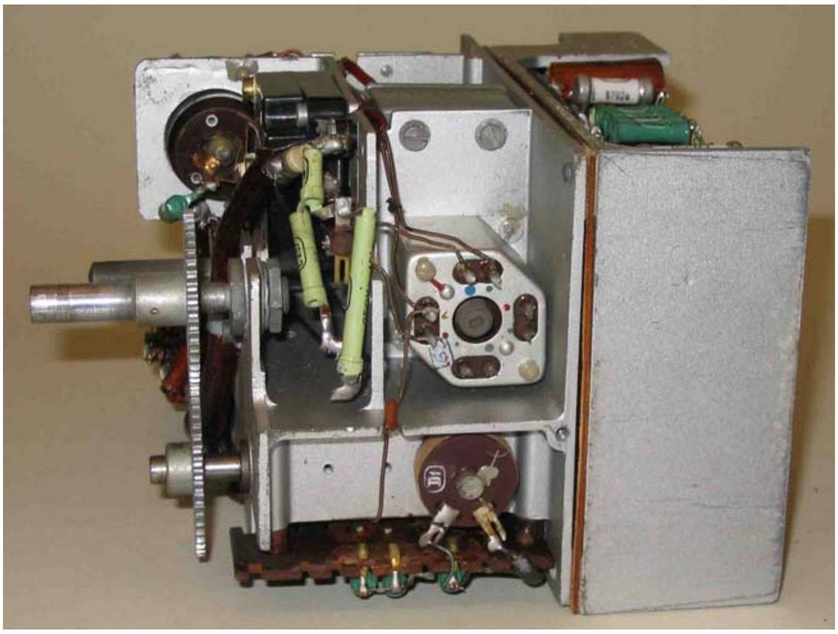

Photo 51

Bottom view of the module (extra screening being removed)