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Recapping the Hammarlund SP-600

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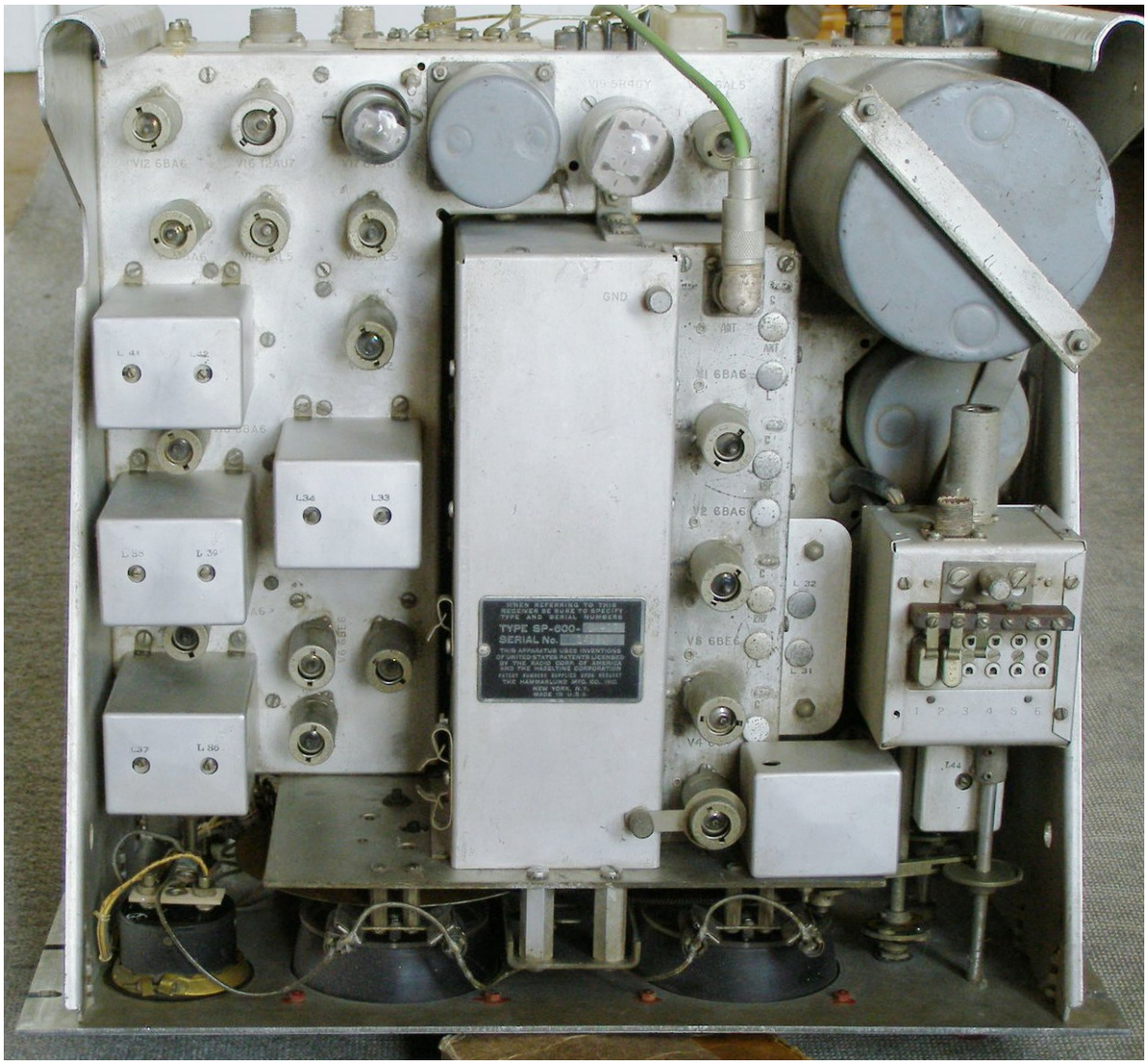
The Hammarlund SP-600 JX-17 is an example of a laboratory-grade HF receiver dating from the early 1950's. Indeed a "boat anchor", the SP-600 line was built to the R274 military specification, which also included the receiver that became the Hallicrafters SX-73.

This is a dual-conversion receiver above 7 MHz, with the first IF at 3955 kHz, the second at 455 kHz. The JX-17 variant is easily recognized by its three red knobs, which allow the HFO, the first conversion oscillator at 3.5 MHz and the 455 kHz BFO to be substituted with external sources. For the ARRL Frequency Measurement Test contests, I derived these frequencies, and a fourth 456 kHz from an array of synthesizers locked to a GPS-disciplined frequency standard to get an accurate measurement.

Instead of giving a detailed item-by-item description of recapping this receiver, as undertaking this is only for the fearless, I will highlight some areas to take care.

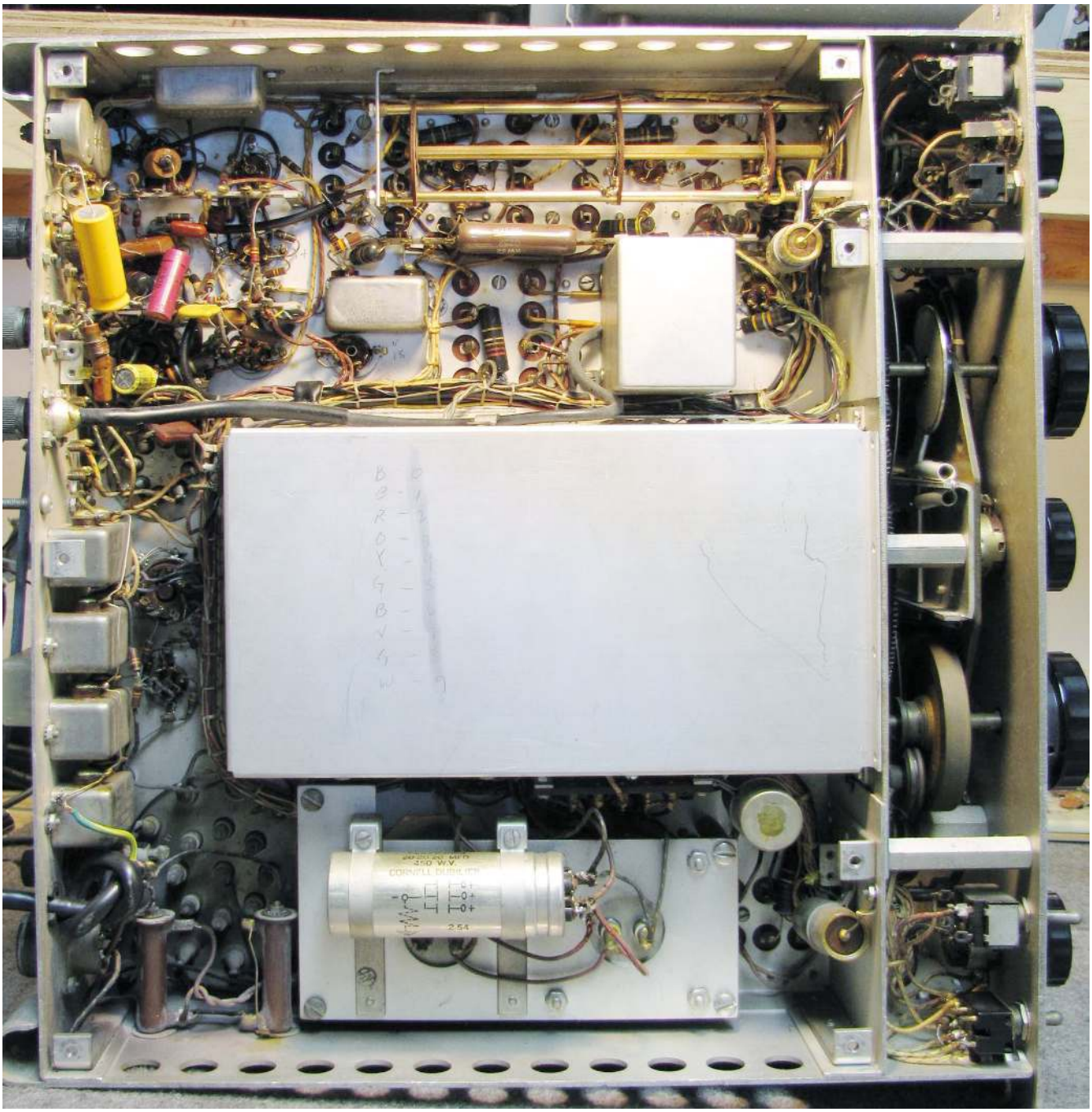
The RF section is completely shielded, which makes access to the components somewhat challenging. The RF and oscillator coils are mounted on a turret rotated by the band switch, so that each coil set is closely connected to the two RF stages, the mixer and the local oscillator.



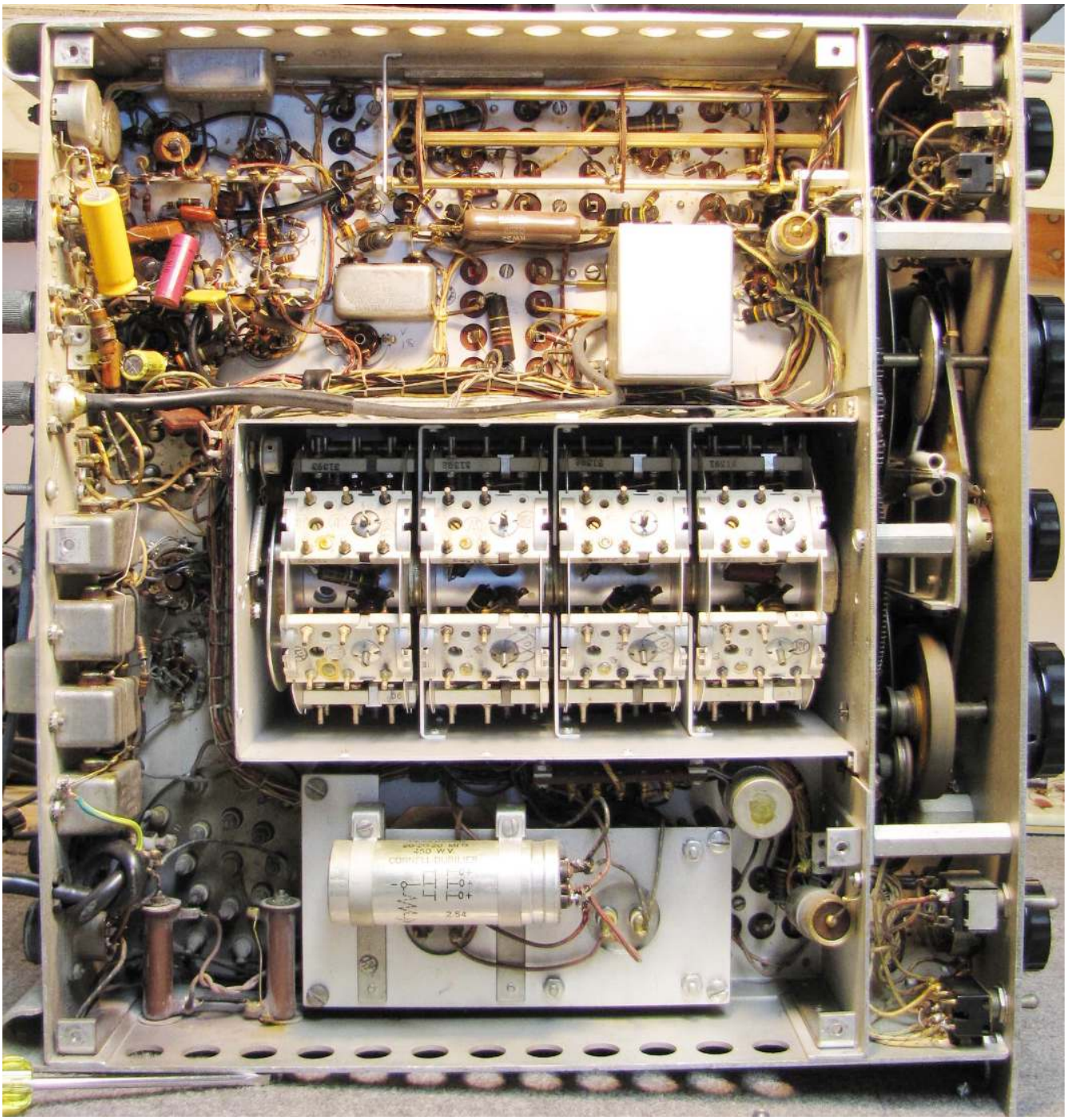
Many of the coupling and bypass capacitors in this receiver are the so-called “Black Beauties” (BBs) that over the last 60 years have seriously deteriorated by becoming electrically leaky with significant changes in capacitance.

These capacitors are found in the RF and oscillator modules in the bandswitch turret, in the RF, mixer and oscillator subassembly, in the IF transformer cans, and distributed over the rest of the circuitry. All must be replaced. In addition, all the “bathtub” capacitors and the electrolytics were also replaced.

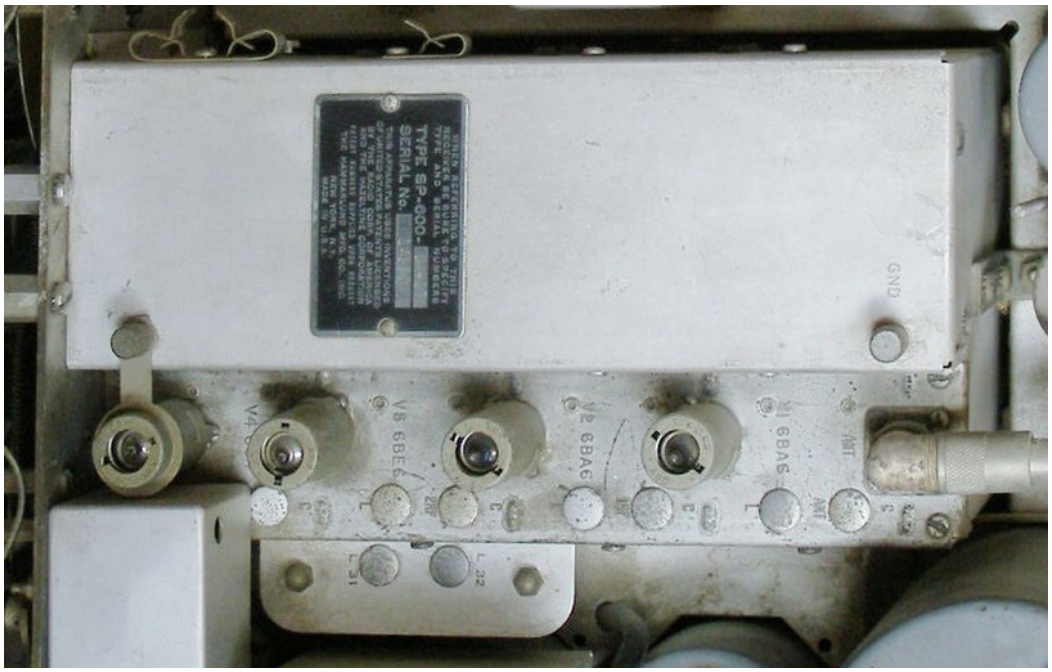
The bottom of the receiver shows the shield under the bandswitch turret, the IF strip at the top, the power supply and audio circuits along the bottom, and a number of “bathtub” capacitors across the rear apron.

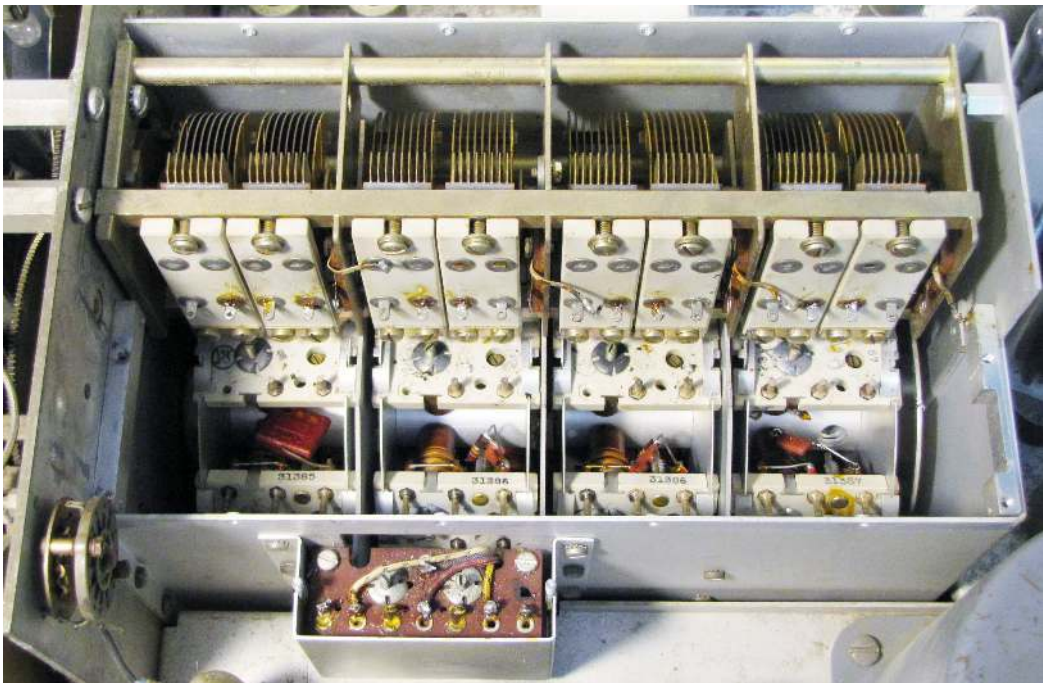


With the bottom shield removed, the turret is visible.



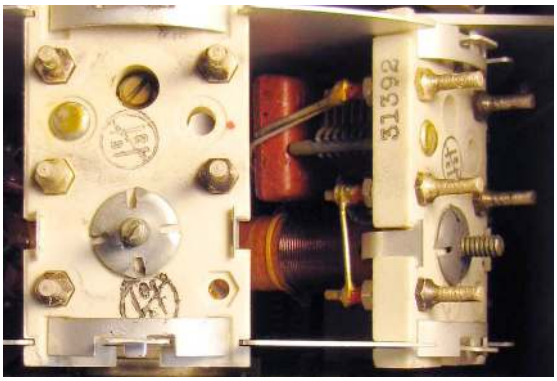
The most challenging part of the upgrade is the replacement of the capacitors in the RF section, which must be detached from the chassis. This requires unsoldering all wiring connected from the circuit module to the tuning capacitor sections and also the power connections.

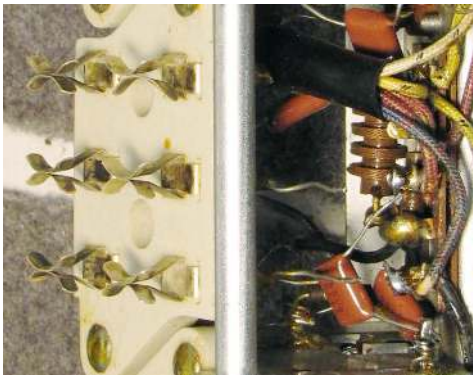




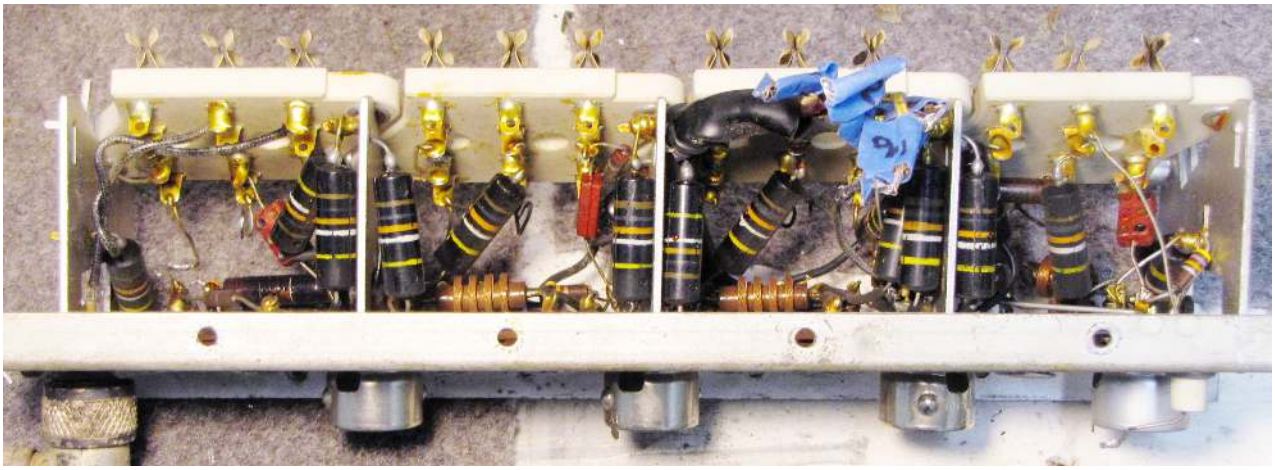
Here, the module containing the two RF stages, the mixer and oscillator has been removed from the RF deck, showing the top of the bandswitch turret. The multi-gang tuning capacitor is at the top, and the power supply tie points are in the small shielded compartment at the bottom.

The individual coil section have contacts that engage with spring-loaded stationary contacts on the RF modules. It is a good idea to empty the coil assemblies for at least one frequency range from the turret so that the contacts would be protected from damage when the RF module is replaced.



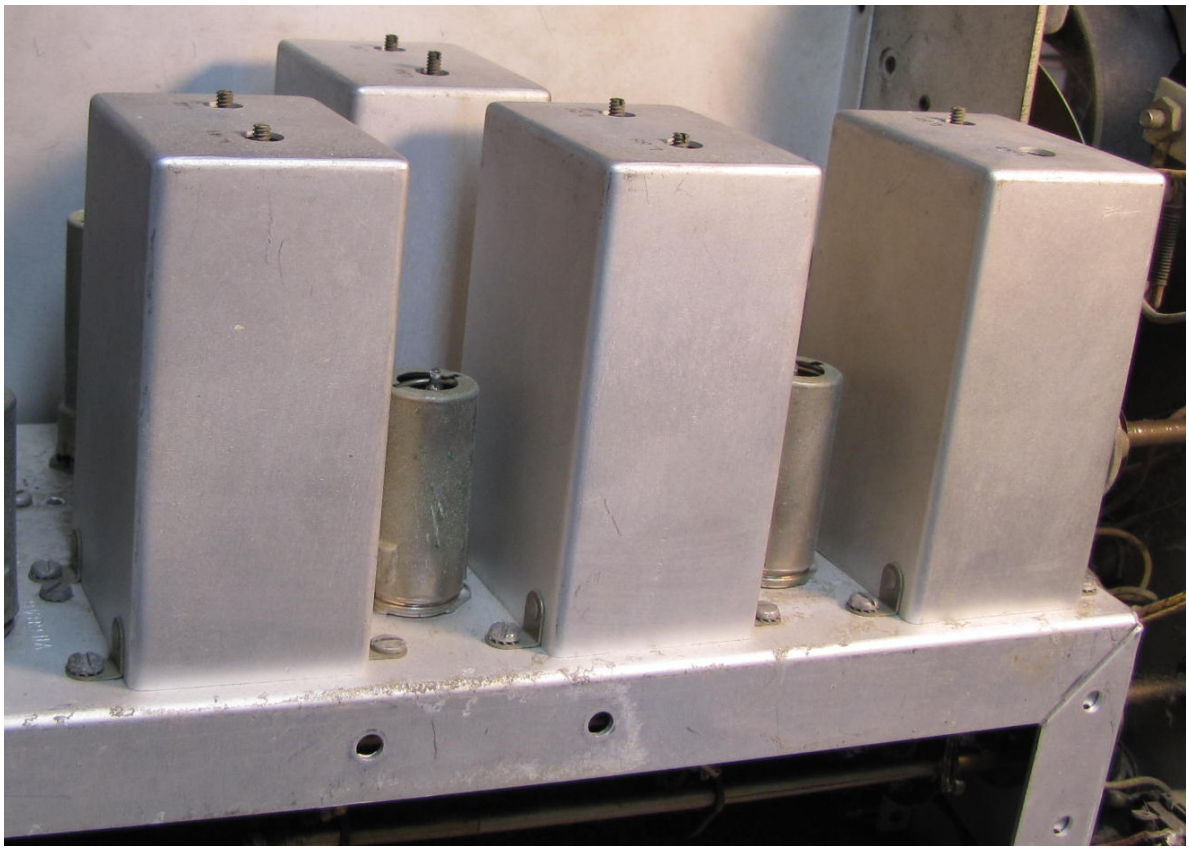


The Black Beauty capacitors are visible in the RF module. The first RF stage is at left, and the oscillator is at right. The disconnected power wires are identified with the blue tags.

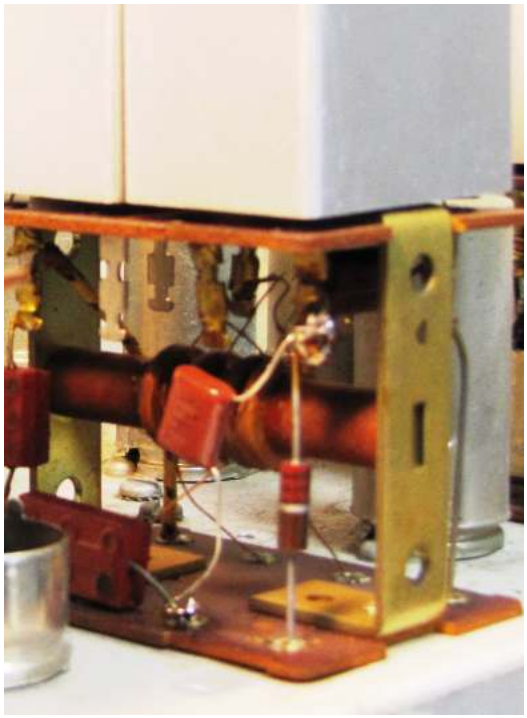


Here, the BBs have been replaced with “orange drop” capacitors of the same value.

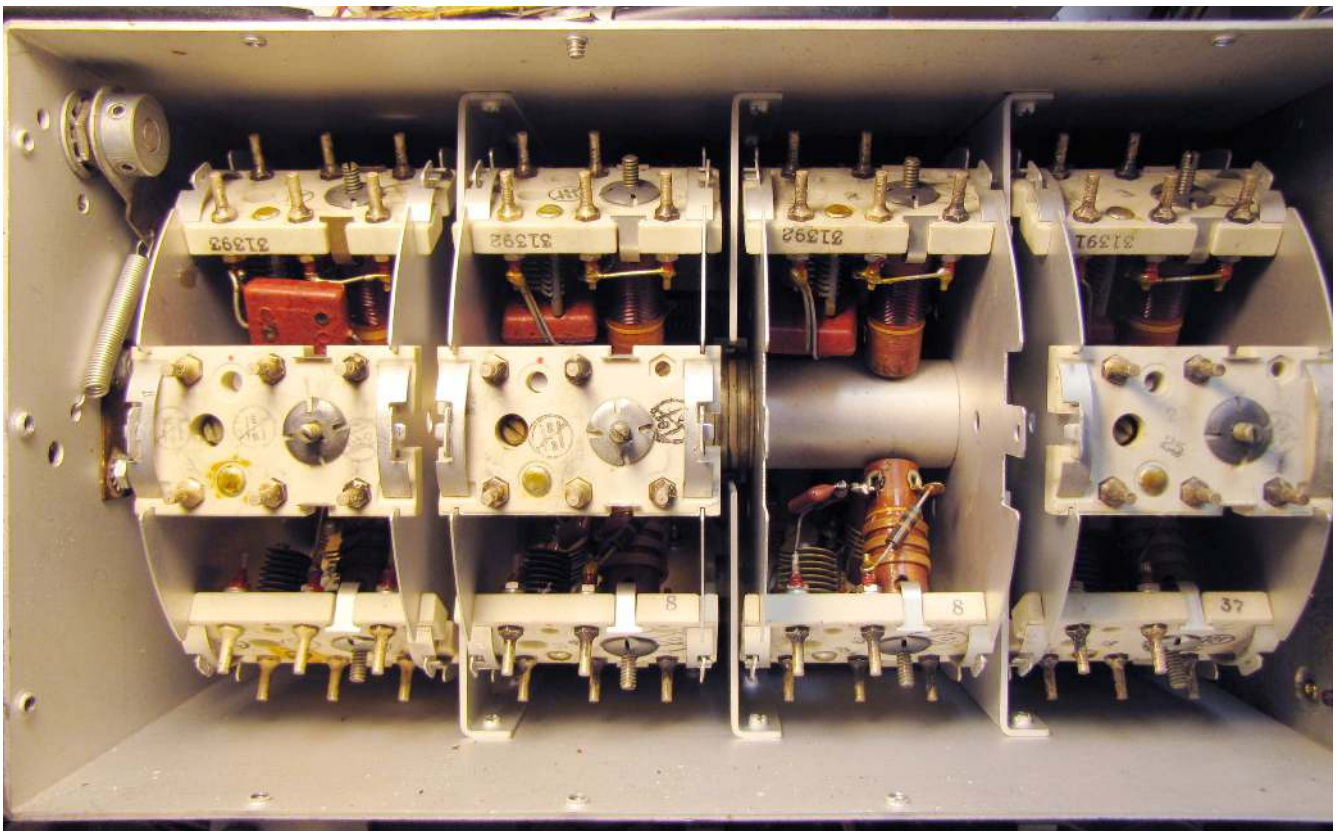
The IF cans contain BBs that must be replaced.

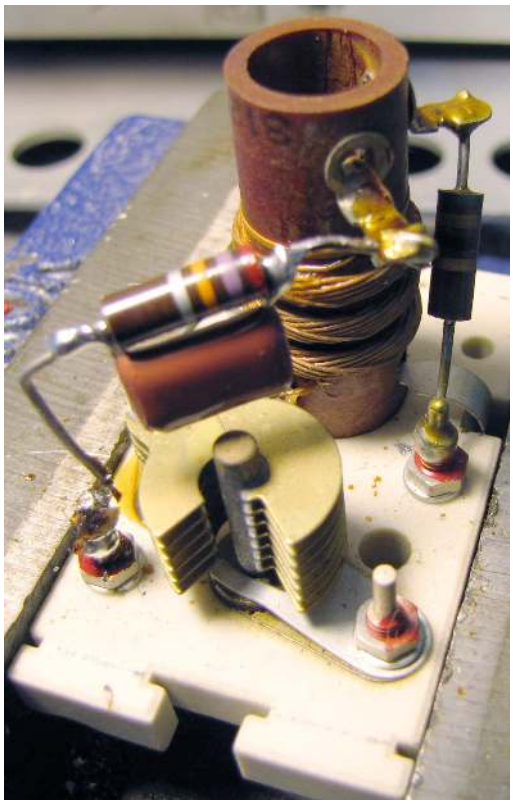


The covers come off easily upward, exposing the coil sets and the BBs beneath them.



The ceramic-based RF modules for the lowest band(s) contain BBs.

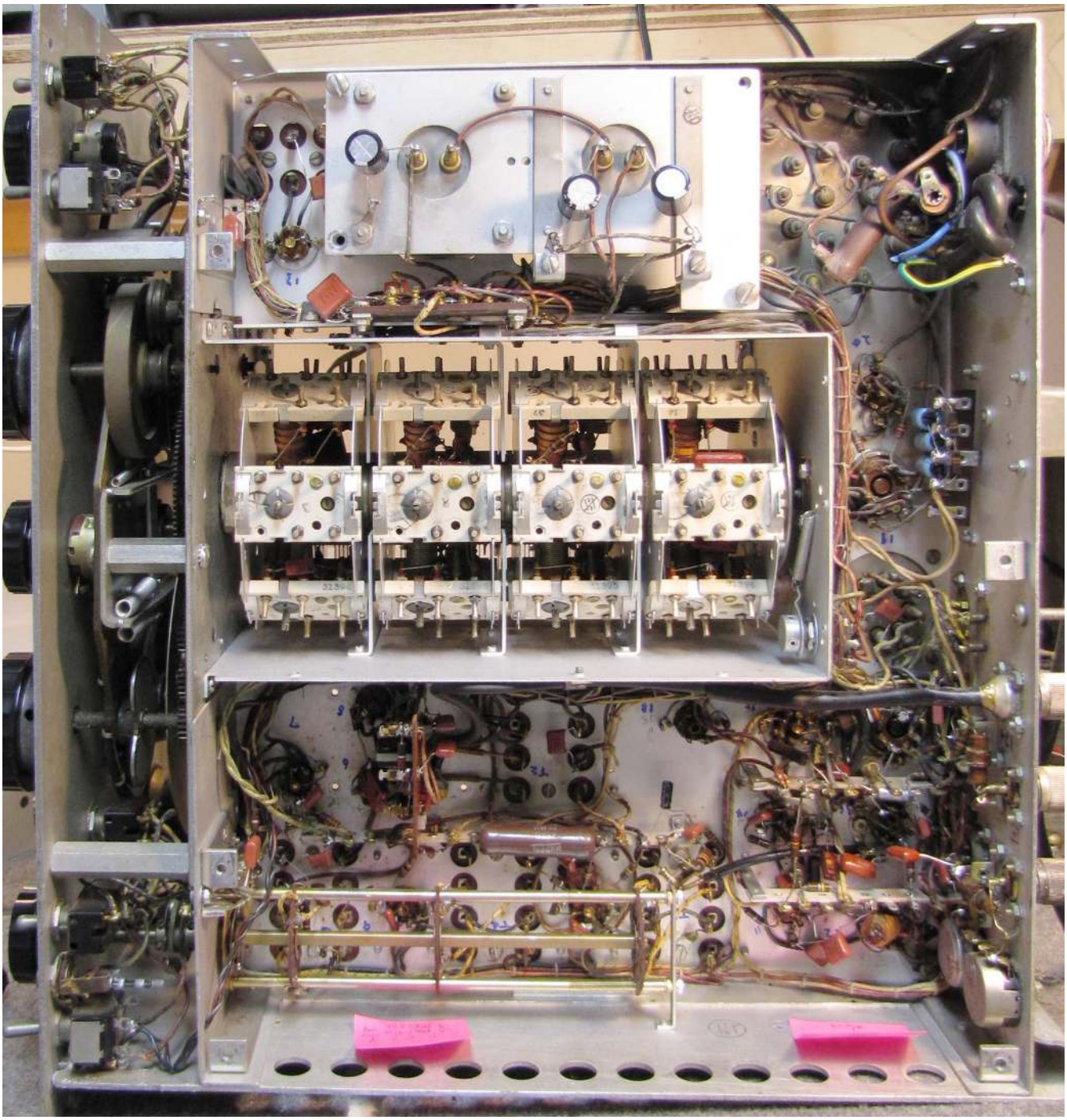




These individual coil modules are held onto the turret with small clips. Don't let these get loose and fly off!

The rest of the BBs are found underneath the chassis and in HF oscillator module on top of the chassis.

Here, the bathtub caps and the electrolytics have also been replaced with high-peak current capable units. The receiver now looks much roomier under the chassis. In appropriate places, terminal strips are installed to anchor new capacitors where old capacitors were used as anchor points for wires.



Here are all the capacitors removed, including a few from previous recapping.

Many of the BBs were split completely open along their axis.

Recapping, of course, is just one step in bringing the receiver back to safe operation and original specifications.

The values of the resistors were checked, and they were found to be well within tolerance and not replaced. The switch contacts were cleaned and “De-O-It’ed”, rotating mechanical parts lubricated, tubes tested and replaced if necessary, line cord checked and, at least at W6BM, modifications removed to restore the receiver to its original performance that the design engineers attained.

Did the receiver work better afterwards? Not noticeably, as the circuit design is robust against component variation, but now has a future of continuing reliable service.