LF Receiver Performance
Part 3: Test of ICOM IC-R75

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ICOM IC-R75 COMMUNICATIONS RECEIVER

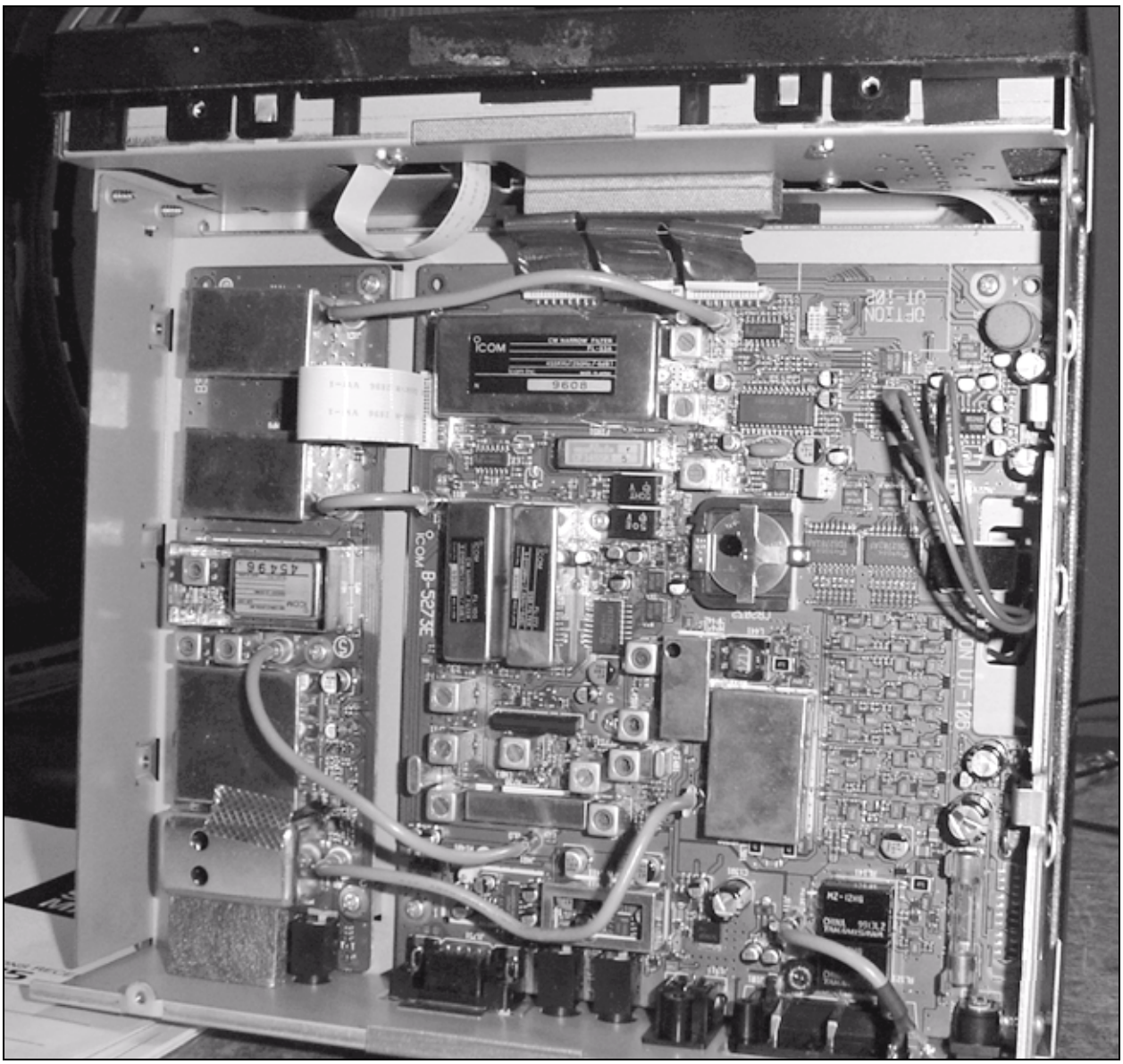
Description

The ICOM IC-R75 is a consumer grade communications receiver. The owner gets a lot of receiver for a reasonable price. This is one of the very few consumer grade communications receivers still being manufactured. The one I am testing is a loaner from Bill Bowers. It has optional narrow crystal filters installed, the FL-53A (250 Hz at 455 KHz IF) and FL-100 (500 Hz at 9 MHz IF), as well as the CR-282 high stability crystal oscillator.

You can find a review of this receiver in *Passport to World Band Radio*. There are also many descriptions of it on the Internet. In this review, as in other reviews in this series, you will find tests of how this receiver performs in the LF and VLF frequency bands. Other reviewers don't normally cover these frequencies.

Construction Quality

This receiver is an example of modern automated electronic construction as used by many computer manufacturers. If you look inside a computer, you will see similar construction. This type of construction usually avoids metal box shielding, since that would require assembly by hand. What shields there are clip onto the printed circuit board. The effect of that construction will be seen below in the sensitivity plot.



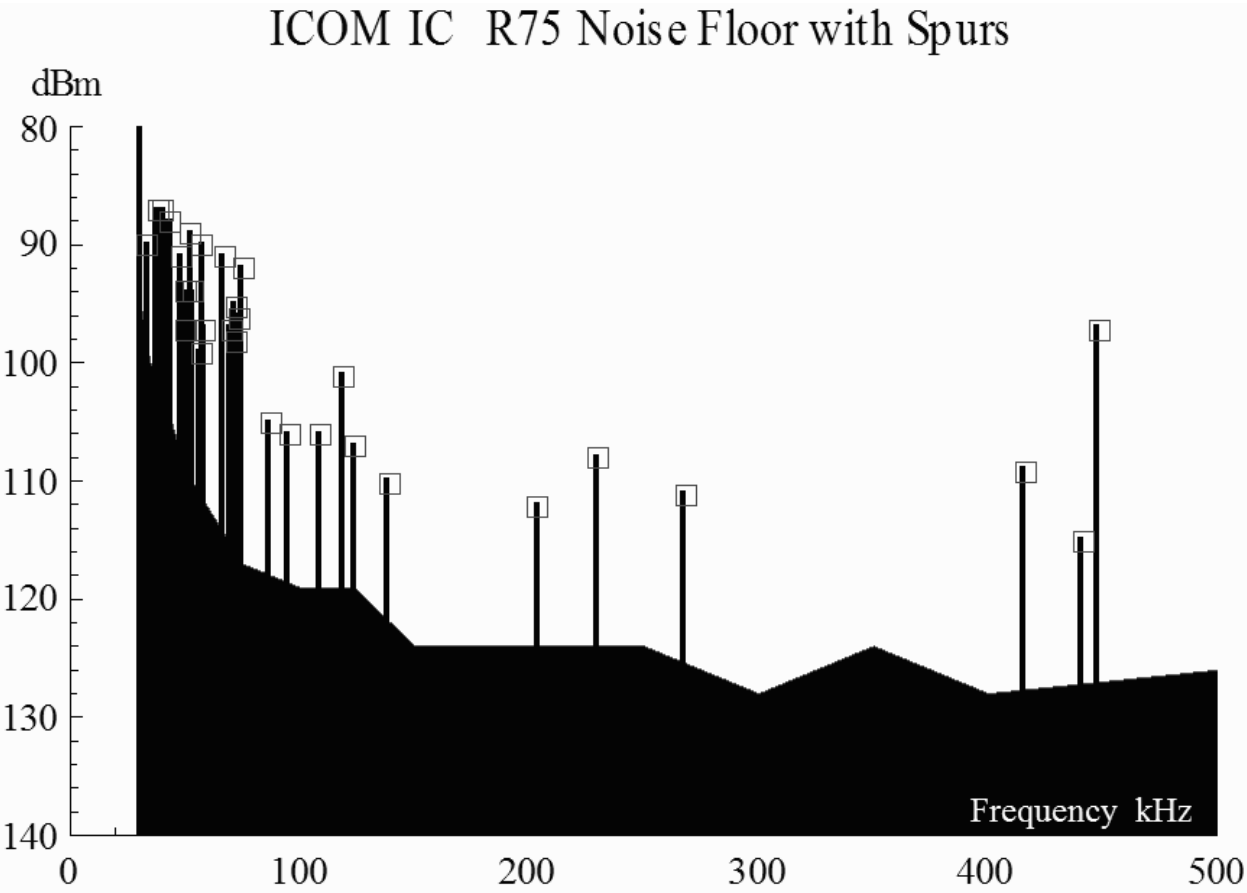
Another feature of this newer assembly is the use of miniature surface mounted devices (SMD). If you have any thoughts of receiver modifications, unless you are experienced at replacing these components, it would be best that you have someone else with experience do it. I have modified some receivers with standard size SMDs (the JRC NRD series), but those in the R75 are much smaller than those. I would not attempt it.

Sensitivity

Sensitivity was measured by tuning through the range from the receiver's lowest tunable frequency (30 KHz) to 500 KHz and measuring the signal input needed from the HP 3335A level generator to give a signal 10 dB over the receiver noise as seen on the HP 3561A analyzer. This is about the strength of the weakest signal that is clearly readable.

The preamplifiers were used when possible. Preamp 1 helped from 100 KHz to 500 KHz. Preamp 2 was only a marginal improvement from 100 to 300 KHz. It was not used for this test.

The spurs were found by placing a shielded 50Ω ballast resistor on the antenna input terminal, then tuning the receiver from its lowest tunable frequency up to 500 KHz. Each spur was measured to determine its strength over the noise floor, and results were plotted along with the noise floor data (below).

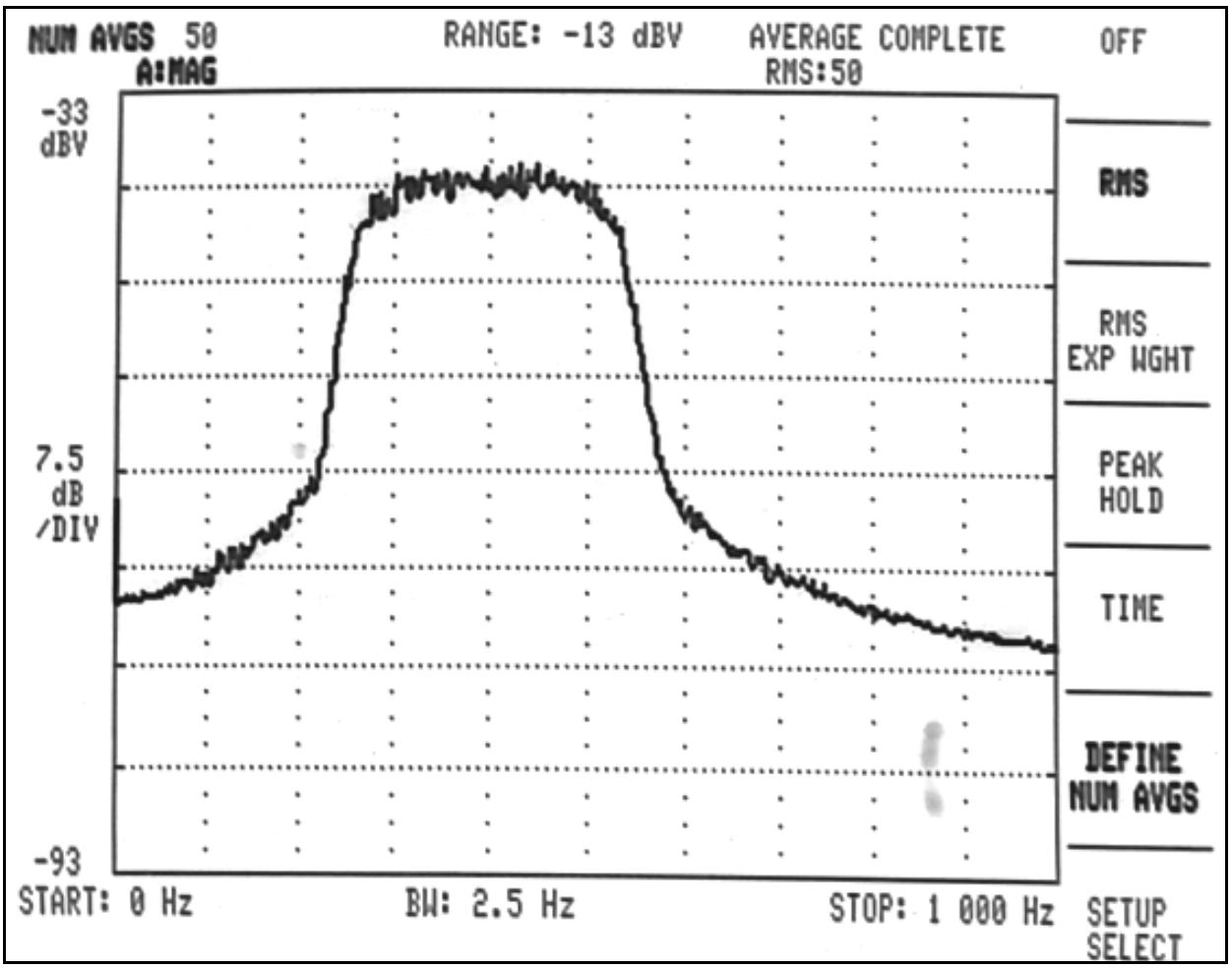


For the IC-R75, 34 spurs were found, which is a poor result. This is probably due to the lack of shields noted above. Most of the spurs fall below 200 KHz and won't affect beacon DXing at LF. However, in the event you want to DX **VLF** beacons, this receiver won't perform well.

Filters

Below is a photo of the HP 3561A spectrum analyzer output of the receiver when tuned to a random noise source. Vertical divisions are 7.5 dB; horizontal divisions are 100 Hz.

The filter pictured has a bandwidth of 250 Hz, and is the optional narrow band CW filter, FL-53A. This plot indicates that there is little filter leakage and adjacent signals outside the passband will seldom be heard.



FILTER OPTIONS FOR THE ICOM IC-R75	FL-52A CW/RTTY Narrow 500 Hz Filter 455 kHz IF FL-53A CW Narrow 250 Hz Filter 455 kHz IF FL-96 SSB Wide 2.8 kHz Filter 455 kHz IF (Discontinued) FL-257 SSB Wide 3.3 kHz Filter 455 kHz IF FL-222 SSB Narrow 1.8 kHz Filter 455 kHz IF FL-103 SSB Wide 2.8 kHz Filter 9 MHz IF FL-100 CW/RTTY Narrow 500 Hz Filter 9 MHz IF FL-101 CW Narrow 250 Hz Filter 9 MHz IF FL-232 CW/RTTY Narrow 350 Hz Filter 9 MHz IF FL-223 SSB Narrow 1.9 kHz Filter 9 MHz IF

The Bottom Line

Construction quality – Typical consumer grade electronics

LF Sensitivity – Good

LO Noise – Good

Internally generated spurs – Poor below 200 KHz. Fair Above 200 KHz.

Filter selection (with optional filters installed) – Excellent

Tuning resolution – 1 Hz – Excellent

Frequency display – 1 Hz – Excellent

LO stability – Temp compensated XTAL oscillator (optional); Excellent

BFO – Adjustable in 10 Hz steps with the same stability as the LO

Noise blanker – Excellent

Display noise - I had to keep my portable receiver at least 10 inches away from the display to get good LF reception on the portable. This is a fair rating.

Availability

If you are looking for a new low frequency beacon receiver with lots of features, this is an excellent choice. The price is reasonable and new or used ones are easily found. However, if you plan to do any DXing of *VLF* beacons, this won't be a good choice since reception as you go much below 200 KHz is substandard.

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