Another Icom Gem: The IC-7000
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Finally. It has been on my wish list since it was released, but I've been holding back. A new receiver (or transceiver in this case) always has its early production run flaws, and there were some issues with the IC-7000 that kept me from buying it. In August I gave in to my basic instincts (not the Sharon Stone kind of thing) and ordered one after I got a good offer from a Norwegian retailer.

It is very small. Well, since I already have an IC-703 I shouldn't be surprised, but fact is: It's even smaller than the IC-703. WHD is 167x58x180mm and the weight is 2.3 kg. I am a metric man so if you want lbs and inches, you do the math. Of course, power is extra. For transmit it will need 22A at 100 watts; for receive it requires 1.6A at full volume.

Specs: AM sensitivity 0.5 - 1.8 MHz is 13 µV with preamp on. For the MW DX-er: Awful. But a friend of mine bought one last winter, and his IC-7000 measured around 1 µV so obviously the Icom specs were overly conservative as usual. So I took the chance and ordered one, hoping that my IC-7000 would not be much different. Excellent bandwidth options. All DSP. One can choose any set of three bandwidths for each mode from a palette ranging up to 10 kHz for AM. A bit like the 746Pro except the latter has fixed AM bandwidths.
It tunes from 30 kHz to 199 MHz and 450 to 470 MHz, including the Broadcast FM band and VHF TV channels.

Display
The display is 2.5". Small, in fact smaller than that of the IC-703. It is razor sharp though. There is a wealth of information in the display but a logical mix of colours and excellent contrast makes it easy to gain information from. Three different colour schemes are available, of which the default appeared to be best suited for me. I had the TV mod done and the TV picture is very sharp, but a 2.5" TV is not very pleasant to look at in the long run.

Controls
The controls are mostly situated on the sides and bottom (function keys) of the display, all are illuminated. The Mode control carousels between the different available modes by short presses; AM/FM and USB/LSB are selected with long presses. Any modes that are not needed can be removed by a menu choice, so if you only need AM and SSB you don't have to toggle through RTTY and CW. The bandwidth is selected by toggling the "FIL" function key below the display. More on that later. The IC-7000 has separate controls to select Noise Reduction, Noise Blanker, Auto-Notch and Manual Notch. There are pot-like controls for Audio Gain and RF Gain/Squelch, and for Twin PBT which double as Memory Selector and RIT. For visually impaired users there is a voice synthesizer button for frequency, mode and S-meter reading (selectable). Like other present Icom radios, it has a Tuning Step (TS) button. Very handy.
And some HAM related controls and functions I haven't paid much attention to.

The tuning knob is well made with adjustable friction. It can also be set to detent according to the selected tuning step.

Sensitivity
While I set up and warmed up the signal generator I compared it with the very sensitive IC-703 and became quite optimistic. I had reason to. On the upper part of MW, sensitivity was around 0.7 µV. On the middle part around 0.9, and the lower part around 1.0 µV down to 1.3 on 510. LW is a joke... around 25 µV on 310. I didn't go deeper. SW sensitivity was close to 0.5 µV. Measured with 6 kHz bandwidth AM, 30% modulation and preamp on. These figures are in fact 3-5dB better than my friend's IC-7000. Since I was expecting no better than 1 µV, I am well content.

But why does it appear to perform worse with decreased frequency? The answer is rather embarrassing for Icom and it was Dallas Lankford who found it. It has a flaky preamp! He found that if the preamp is disengaged, and a Norton push-pull preamp is placed between the antenna and receiver instead, the IC-7000 will remain its excellent sensitivity at least down to 200 kHz. Indeed it is so. The receiver was very quiet when I tuned the LF band with the preamp on. When I switched it off, the signal level increased dramatically! I noticed this down to about 200 kHz, when the difference tended to decrease. Ingøy 153 kHz was about equal level with and without preamp.

I didn't bother to put up the signal generator for exact measurements. Maybe I will one day. Today's Word of Wisdom then: If you want to tune LF with the IC-7000, do NOT engage the preamp.

Selectivity
Each mode has three bandwidth choices but these choices can be determined by the user, up to 3.5 kHz for SSB and up to 10 kHz for AM. Each bandwidth can be narrowed in by using the Twin PBT control, similar to the other Icom DSP receivers/transceivers. I have no way of measuring the ultimate selectivity of the bandwidths, but they appear to be excellent, every bit as good as the IC-746Pro.

Fighting the interference
Apart from excellent selectivity, the IC-7000 is loaded with tools for enhancing a signal's S/N ratio.

The Noise Blanker is as far as I can see a traditional tool that should cope with ignition noise and similar pulse-type noise. It is adjustable. Fights off the occasional Loran C noise well.

The Noise Reduction is adjustable as well, and a modest level of NR (2-4 out of 10) actually increases the S/N ratio of the station by a couple of dB. In some cases the difference between readable and not readable. The function works more or less the same way as in the 746Pro and is a useful tool.

The Auto Notch Function deals effectively with hets, up to three tones at a time, and it tracks the tones when tuning (or if the tones move).

The Manual Notch Function can be set to attenuate a frequency. Actually there are two manual notch filters, each can be tuned to the desired frequency and they can be individually set to Wide, Medium or Narrow filter width. The filter width is pure guesswork since the IC-7000 user manual is rather opaque on the properties of the MNF. But the IC-746Pro's manual notch is 70 Hz wide, and that might fit with "Narrow". So maybe Medium is 200 Hz and Wide is 500 Hz? My guess is as good as anyone's. By trial and error, I found that the tuning range is +/- 5kHz.

I will dwell a little with the MNF because I discovered that it is in fact a wonderful tool. I was

listening to a noise-ridden Radio America, Paraguay on 1480 (LSB to avoid the DRM hiss from 1485, hence subject to splatter from 1476), when I more or less by chance turned on the MNF function. Splatter almost gone!! And I hadn't even tried to tune the MNF filters! Now, what was going on here... I tuned a 746Pro to 1480 and tried to engage its (single) MNF to reproduce the effect. No way... Apparently, the MNF, especially when set to "Wide" filter width, is capable of reducing the effects of splatter with a significant amount, resulting in a noticeable (I was about to use the word "dramatic" but I'll hold my breath) improvement in the signal's readability. I have a couple of recordings which I can email to anyone interested. DRM hiss was also reduced significantly, but I have yet to find out if it means that stations can be dug out of the noise. Effective use of the MNF may require some training, but the function alone makes my IC-7000 the receiver of choice when interference is very tough.

The MNF can work together with the Auto Notch Filter as well.

Keypad missing

Well, not really. A small radio like this can't have a keypad built in. For the IC-703 I bought and built John Hansen's Millenium QSY'er. Its functions are rather basic but it works well as a frequency input device. But the IC-7000 has a microphone which doubles as a remote/keyboard. It

contains most of the functions one needs, including frequency input, mode change, filter change, up and down tuning and memory functions. The keypad has a rubberised feel and need a distinct pressure to make contact. It works OK as a remote keypad but the spiral cord is rather thick (as is usual with this kind of equipment). Also, keying a new frequency is somewhat awkward. First, press a button named "F-inp/Ent" (probably short for "Frequency Input/Enter"), then the frequency including trailing zeros (100's and 10's Hz), then press "F-inp/Ent" again. So, keying 1470 requires eight key presses while the Millenium QSY'er requires only five. The up/down buttons come in very handy though so I will probably use the microphone instead of buying another Millenium QSY'er.

Audio quality is generally very good. But the audio from the external speaker jack and headphone jack is somewhat hissy. Seems like the hiss is in the 5-6 kHz area. It is in fact annoying. Much to my surprise though, the line-out does NOT contain hiss. I connected my ELPAF filter to the audio output and that cured the hiss problem. That done, it is evident that the receiver itself is in fact very quiet, even compared to the 746Pros. I had the pleasure of comparing audio quality of 4KZ-1620 when it was mainly at or below threshold level. The IC-7000 matched, and partly surpassed, the IC-746Pro. I got the same impression during the night with massive interference from EU stations.

The use of the Auto or Manual notch filters and noise blanker does not degrade the audio quality much, contrary to what I have experienced when using the UT-106 DSP unit with the R-75 or IC-703.

The 8 kHz Tone

Early production runs had an 8 kHz tone in the audio circuit which was annoying and of course an embarrassing design flaw. Swedish Radio Supply had removed this prior to shipment. IC-7000's with serial numbers higher than 0202151 (Europe) and 0504451 (USA) do not have this problem –

i.e. all IC-7000's produced from early spring 2006 and onwards. If you happen to have an IC-7000 with the 8 kHz tone present, contact your Icom service centre. Icom has a Service Information Bulletin on the issue.

Conclusion
The Icom IC-7000 is an excellent SW and MW DX receiver. It is compact, has excellent sensitivity and selectivity and has all the necessary tools to pull a station out of the noise mud. It is not cheap though at USD 1500/NOK 14000/GBP 1000, and of course it doesn't hear twice as well as a radio that costs half the price.