

Icom IC-9100

First impressions of the latest HF to UHF transceiver



The Icom IC-9100 HF-VHF-UHF transceiver.

INTRODUCTION. Icom first unveiled plans for a new base station radio covering HF, VHF and UHF bands during the summer of 2009 and since then samples have been shown at various exhibitions and shows. It has been a long wait but the IC-9100 should soon be fully available. I was fortunate to obtain early access to a pre-production sample for a few days and this is my first impression of this comprehensive radio.

The IC-9100 is a fully-featured HF radio also covering 50, 144 and 430MHz. An optional internal module adds the 1.2GHz band. Dual receivers and duplex operation is provided on different band combinations together with full tracking satellite operation. Another optional module adds full D-STAR support.

THE BASICS. The IC-9100 is a well-proportioned, medium-sized base station radio requiring a 13.8V supply. At 11kg it is quite heavy for its size but inside it is densely packed with circuit boards, metal screens, substantial heatsinks and a diecast chassis.

There are four band groupings, each fitted with a separate antenna connector – HF + 50MHz, 144MHz, 430MHz and 1.2GHz (if the module is fitted). There are two independent receivers, Main and Sub, each with a full set of similar features and functions. Each band group can be accessed from either receiver but not from both simultaneously. Hence HF can be allocated to one and any of the VHF/UHF bands to the other, or 2m on one and

70cm on the other etc. If the Sub receiver is turned off, all bands are available from the Main receiver. For general coverage receive the HF band tunes from 30kHz to 60MHz.

All the usual modes are provided including reverse sidebands on CW and data – and modes can be set independently for the two receivers. Digital Voice and Digital Repeater modes are supported with the D-STAR option fitted. The transmitter uses the Main receiver frequency only, not the Sub (except for satellite operation) but a single key press simply swaps the Main and Sub functions. Twin VFOs (A and B) are provided for both receivers and this allows split frequency transmit operation on the Main channel.

The transmitter provides 100W output on HF, 50MHz and 144MHz, 75W on 430MHz and 10W on 1.2GHz. The Sub receiver remains fully active whilst transmitting on the Main channel, allowing cross-band duplex operation.

RADIO DESIGN AND ARCHITECTURE. The radio uses four separate signal paths for the four different band groupings. On bands up to 430MHz the receiver uses a dual conversion superhet with image rejection first mixers as used in the IC-7800 and IC-7600. On HF + 50MHz the first IF is 64.455MHz, with a 15kHz bandwidth roofing filter fitted as standard. 3kHz and 6kHz bandwidth filters are available as options and all three can be fitted and selected manually from the menu. On 144MHz the first IF is 10.85MHz and on

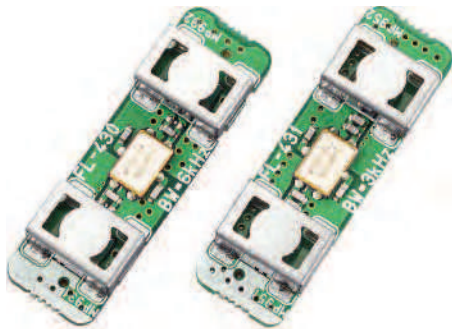
430MHz it is 71.25MHz. On 1.2GHz the receiver is triple conversion, the first two IFs being 243.95MHz and 10.95MHz respectively. In all cases the final IF is 36kHz, which directly feeds a DSP for all signal processing functions, channel filtering, notches, noise reduction etc. Two similar DSP units process two 36kHz chains separately to give the Main and Sub receivers similar features. Narrow roofing filters are only available for the HF + 50MHz band.

Inside the box, the construction is fairly conventional, with the

usual substantial diecast frame, integral fan blown heatsink areas for the separate power amplifier boards and a front-panel unit that hinges down. Both receiver outputs are routed to a single 7cm speaker mounted in the case top but separate outputs are available from dual external speaker sockets on the rear panel or through stereo headphone output.

FRONT AND REAR PANELS. The front panel layout is similar in concept to other Icom radios, in particular the IC-7600. A smooth operating, weighted tuning knob provides fine resolution tuning as well as fast navigation across the bands. Separate buttons select bands and modes, dedicated rotary controls are used for the main functions and easy to access pushbuttons for other features. A crisp and bright monochrome LCD panel dominates the panel with mode and context specific buttons along the bottom. The setup menu is fast to access and easy to use with plain language descriptions shown on the LCD. Overall the front panel is very well thought out, logical, friendly and easy to use.

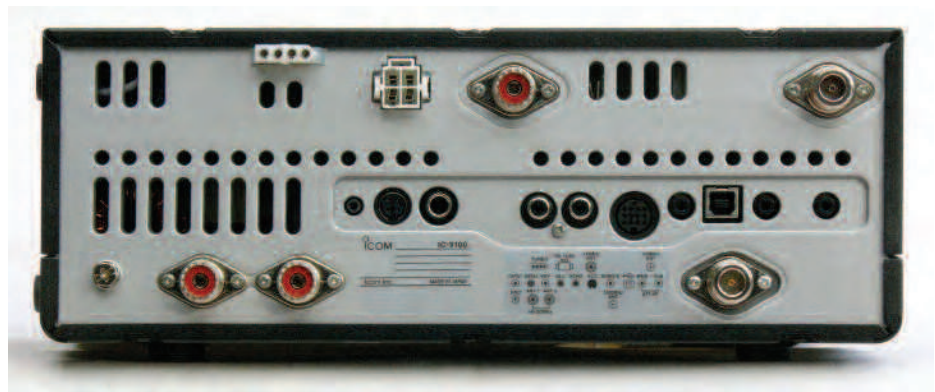
On the rear panel two antenna sockets are available on HF/50MHz band, with single sockets for the other bands. There are no connections for external receive antenna or low-level RF output. DC power can be fed through the antenna sockets for the VHF and UHF bands for external preamplifiers and a range of accessory preamplifiers is available. The usual accessory sockets and linear amplifier control lines are provided and in addition



Optional 6kHz and 3kHz roofing filters for HF/6m.

there are two separate linear amplifier control lines that can be allocated to the band groupings in various combinations. A USB port provides control of the radio from a PC as well as passing audio, data and D-STAR DV mode data to and from the radio. The Icom CI-V remote control interface is also provided, requiring an external level converter for PC access. A GPS receiver can be connected using NMEA data format for displaying or transmitting location information in DV mode.

KEY FEATURES. Icom radios are generally packed with features and functions and the IC-9100 is no exception. Extensive channel filtering, PBT, twin peak RTTY filter, notches, noise reduction and noise blankers similar to other recent Icom HF transceivers are all included and available on all bands. A huge amount of memory space, scanning and a rather simple spectrum scan are also included. Although the radio has dual receivers, these can only operate on different band groups, not for simultaneously checking of A and B channels in split frequency HF operation. For split frequency operation an XFC button swaps A and B channels and, with quick split and selective locking of the receive channel enabled, it is quite easy to search a pileup for a suitable transmit channel. An auto ATU covers HF and 50MHz and a very comprehensive contest memory keyer is provided for CW. A RTTY decoder is included but as it displays a maximum of three lines of 18 characters it is more of



The uncluttered IC-9100 rear panel.

a gimmick than a true operating aid.

Full facilities for repeater operation are provided including band stored offsets, a full range of analogue and digital access methods and selective squelches. A host of facilities are included with D-STAR operation for digital voice, repeater and data modes and together, with GPS, allows full position reporting, APRS and position tracking. Over 50 pages of the 200-page manual are devoted to these digital topics; far too much to cover here.

Full duplex satellite operation is supported where the uplink and downlink channels are on different band groups, typically 145, 435 and 1200MHz. Forward and reverse tracking of channels is supported and satellite memories provided to store the settings.

ON THE AIR PERFORMANCE. I found the IC-9100 straightforward to use with friendly ergonomics once the initial learning phase was grasped, particularly the logic behind the Main and Sub receiver settings. During the few days I had the radio there were a number of contests and I took the opportunity to check out the radio in the 144MHz Activity Contest, the March 144/432MHz Contest and ARRL SSB contest as well as working a number of DXpeditions on CW. Everything functioned well and I was very pleased with the results. Sensitivity on the VHF and UHF bands was good and the extra power compared with most radios helped with DX contacts. On HF no strong signal

problems were observed and good audio quality reports

were received. CW was well behaved on semi and full break-in, but a slight click was observed in the sidetone on initial characters. The armoury of filters and notches all functioned very well.

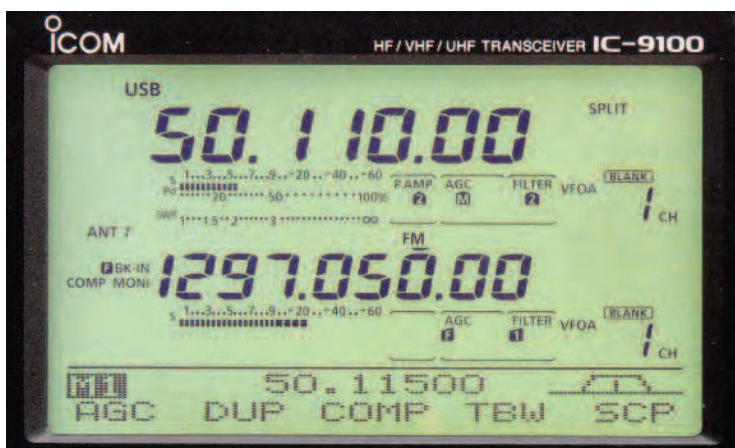
During the brief review period I did not have a chance to check out D-STAR or satellite operation.

I did not have time to carry out a full set of measurements – something I will do when the production model arrives shortly – but a brief check was made of some of the key figures. The transmit output power was well up to specification on all bands. Sensitivity was excellent, similar to the IC-7600 on the HF bands. Measured noise figures were 5dB on 144MHz and 432MHz and about 4dB on 1296MHz. Third order intercept on 14MHz appeared excellent, on a par with or even better than the IC-7600, but the measurement was compromised by reciprocal mixing noise even at 50kHz spacings. Reciprocal mixing noise was some 3dB to 6dB worse than the IC-7600 and closer to the IC-7000 or IC-7200. This is most likely to be the performance-limiting factor with strong signals, although I was using a pre-production model. Compared with 14MHz, reciprocal mixing was also some 6dB worse on 144MHz and 8-10dB worse on 432MHz, which might be an issue with nearby strong signals in contest conditions. These measurements will, no doubt, differ in production models and I look forward to running proper tests on one.

Overall, the IC-9100 is an excellent all-round solution for someone with wide ranging interests spanning HF to UHF and all modes of operation. I hope to carry out

a full review later when the radio becomes fully available but in the mean time it looks to have been well worth waiting for.

My thanks to Icom UK for the loan of the pre-production radio.



The monochrome display is clear and easy to read.



The optional UX-100 band unit gives 10W on 23cm.