

## RADCOM USER REVIEW

# IC-706 Eleven Band Transceiver

A user-review by HQ Staff.

**T**AKE A LOOK around your shack. You've probably got most of the following: an HF transceiver, a 6m transceiver, a 2m multi-mode, a general coverage receiver, a VHF scanner, an electronic keyer, a speech compressor and an AM/FM broadcast radio. What if you could replace the whole lot with one box retailing at under £1200? And what if the box were so small you could fit it all in the car or in your holiday hand-luggage? A pipe dream? Not at all with the latest from Icom.

### FACILITIES

THE IC-706 MEASURES just 167W x 58H x 200Dmm and weighs in at 2.5kg. In this package, you get 100W on all HF bands, 100W on 50MHz and 10W on 144MHz, together with a receiver covering long wave to 200MHz, and whole lot more. The front panel detaches for remote operation using the optional separation cable.

Included with the radio is a sturdy double-fused 12V power lead, a hand microphone, spare fuses, and plugs for connecting a TNC, RTTY equipment, Morse key etc.

There are over 100 memories. 99 can contain independent transmit and receive frequencies, mode, CTCSS frequency or 1750Hz burst, and an eleven character name (eg 'Repeater R0' or 'Club net'). Two more contain scanning limits and another - the Call Channel - which is available on 144MHz only. The dial is not automatically locked during memory mode so once a memory is selected it performs in a similar (but not identical) way to VFO mode - this can lead to confusion.

Two VFOs are provided and memory contents can easily be transferred to either VFO - handy for rapidly switching between, say, 1.831MHz CW, 14.333MHz USB and 144.750 NBFM with repeater offset and CTCSS. Tuning steps are variable between 1Hz (200Hz per knob revolution) and 1MHz.



The Icom IC-706 is the smallest 100W HF/VHF transceiver presently available.

Up to ten Memo Pads are provided for the temporary storage of frequencies and modes (for instance of contest multiplier stations you are waiting for). These can be recalled at any time.

The acid test for many DX operators is "how easy is it to work split?". The answer is: "very easy". The 'quick split' option - pressing a function key for about a second - equalises the VFOs (or selects a programmable offset) and activates split operation. The transmit frequency can be monitored by a single button push. The word SPLIT appears prominently on the display to remind the operator to re-set after use.

For repeater operation it is possible to use the main tuning dial, having programmed in a

-600kHz offset (using the quick split function described above) and a 1750Hz toneburst. However it is much more convenient to use the memories because individual CTCSS tones can be set and the quick split function can be retained for HF use.

### CONTROLS

THE FRONT PANEL is crowded but, with the exception of the RIT button, is very accessible. The tuning knob, which occupies almost the whole height of the panel, includes a finger-hole and is a pleasure to use, even at the slowest setting.

Rotary controls are fitted for AF Gain and either Squelch or RF Gain, RIT shift and IF Shift. A miniature jack socket is provided for headphones.

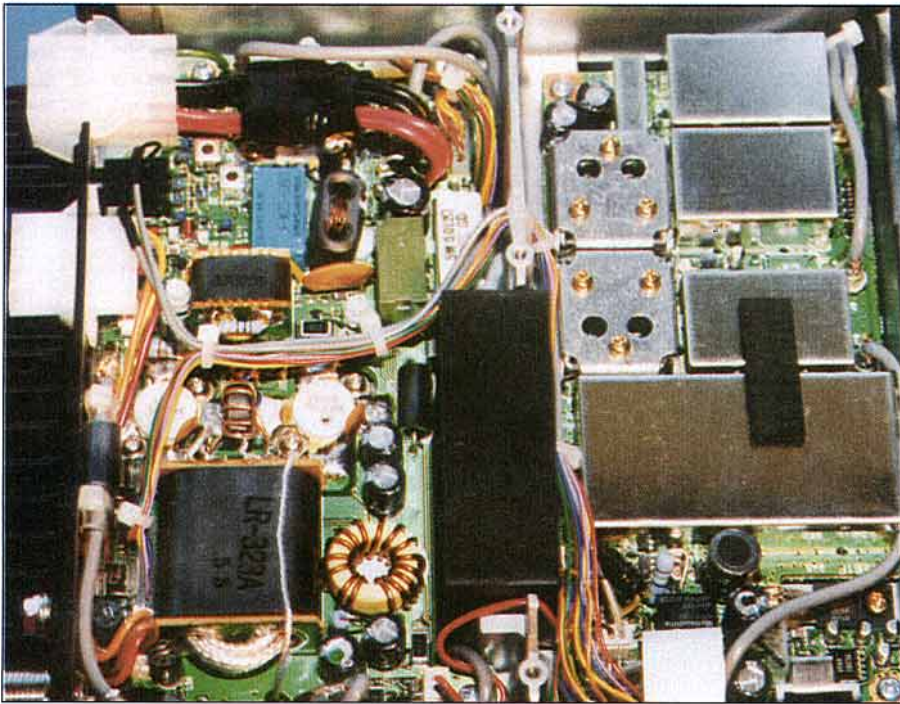
All of the other controls are push buttons, the majority of which operate in conjunction with menus on the display. These handle facilities such as pre-amp/attenuator, memories, noise blanker etc.

Mode changing is simply a matter of pressing the Mode button the appropriate number of times. Band changing is achieved by pressing the TS button to select the band option, and then using the tuning knob.

The display is backlit bright yellow which makes the black LCD letters very easy to read. Many of the displayed items are user-selectable or only appear when the appropriate menu is accessed so the resultant display



Rear view of IC-706 showing the dual antenna sockets and many other connections.



Inside view underneath the IC-706.

is not over-crowded. Visible all the time are the mode in use, 'Split' when accessed, a clear readout of the entire frequency (to 1Hz if selected), options such as 'NB' for noise blanker, the VFO in use, the memory in use, a bargraph and the current menu.

The rear panel is very crowded. It contains a large heat-sink, two 'UHF' (SO-239) antenna sockets - one for below 60MHz and the other for above, a ground terminal, an accessory socket, jacks for external speaker, RTTY, remote control and key/paddle, a microphone socket (this is in parallel with one just below the front panel), 12V DC input and a socket for the optional automatic antenna tuner.

Usefully accessible through holes in the side panel are adjustments for speech compressor level, beep/sidetone level, VOX and Anti-VOX.

**RECEIVER**

THE RECEIVER is specified from 300kHz but the review model tuned down to 30kHz. It provides continuous coverage to 200MHz (automatically switching aeriels at 60MHz) with relatively few 'birdies', none of which interfered with amateur bands reception. Note that this means yet another amateur band - 4m - is available, but only on receive.

Modes covered are USB/LSB, CW, CW - reverse, RTTY (FSK), AM, NBFM and wide (broadcast) FM. Filter bandwidths are shown in the Specifications box opposite. Fitted as standard are additional narrow filters for AM and NBFM, the latter being useful for future 12.5kHz channel spacing or for operating on 29MHz. Disappointingly, a narrow CW filter is available only as an optional extra at £65 (500Hz) or £69 (250Hz).

Three pre-set levels of sensitivity are available from the front panel: normal, pre-amp and 20dB attenuator. These proved adequate for most purposes. However, if finer control is needed the Squelch knob can be set to act as an RF Gain control when used on CW, RTTY

and SSB, whilst retaining its Squelch function on AM and NBFM.

A tuneable IF offset is provided to help reduce adjacent QRM. It comes with a novel miniature graphical display showing how the wanted signal relates to the filter edges.

The noise blanker proved effective on static and man-made noise in CW and SSB modes, but it completely ruined AM reception by badly distorting the wanted signal.

Tiny fingers are required to activate the RIT ON button. If care is taken not to 'nudge' the RIT Shift control, the RIT could be left on permanently. The button lights up to warn that RIT is on. A shift of up to 1kHz in either direction is permitted.

Slow or fast AGC time constants can be selected, but there is no facility to link AGC speed to the mode switch, so if fast AGC is selected for CW, slow AGC must be separately selected for SSB use.

The S-meter is an LED bargraph and, although no substitute for a real meter, it is well designed with fast attack, slow decay and an optional 'peak hold' facility.

Scanning is available either between programmed limits, on all memory channels or on selected memories. There are several methods of resuming the scan after a signal is detected.

In the short time the IC-706 was available

for test, it was not possible to check one of the more esoteric facilities, the Simple Band Scope. This uses the dot matrix display to show graphically the activity over a band of frequencies.

The IC-706 was air-tested during the SAC CW Contest which provided a high level of activity. No problems were noticed once the RF gain was set to a sensible level. The receiver performed well on the medium wave with no cross-modulation, despite the high powered Brookmans Park BBC transmitter being only six miles away. One flaw emerged when tuning on the quiet 10m and 4m bands: The synthesiser was quite noisy, giving the impression of a busy band, until the knob was halted whereupon the 'signals' disappeared. The noise seemed to have been picked up on the long-wire antenna in use and would probably not have been prevalent on a remote coax-fed aerial.

An interesting facility is wide FM which allows the IC-706 to be used as a sensitive VHF broadcast receiver, albeit without stereo or squelch. This, together with the long and medium wave coverage, would allow the IC-706 to be used in a car in place of the broadcast set.

The loudspeaker was disappointing. It faces upwards, producing a good, clear, sound, but had a tendency to buzz on CW signals. Its frequency response was ideal for communications purposes but very poor for broadcast signals, even on AM. An external speaker sounded fine, though, and the volume could be turned up quite loud without noticeable distortion.

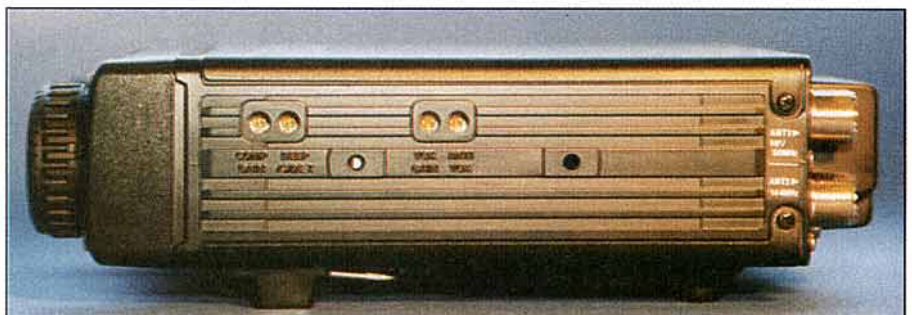
**TRANSMITTER**

MODES AVAILABLE on transmit are: CW, USB/LSB, RTTY, AM and NBFM. Output is reduced to 40% on AM. The provision of 100W on 50MHz puts the IC-706 ahead of several of its rivals.

The supplied microphone felt good and has only the most basic controls - UP/DOWN buttons, a LOCK slide switch, and a lightly sprung transmit switch. The buttons can control frequency or memory channels.

Power output is continuously variable from a nominal 5W to 100W (1 to 10W on 2m). Transmit is inhibited outside amateur bands and Martin Lynch tells us that initial attempts to provide transmit on 4m have proved unsuccessful (looks like time for a bit of home-brewing!) The fan, which runs continuously - even on receive - speeds up noticeably on transmit.

The front panel bargraph can be switched to display relative power out, SWR or ALC. This latter is important when setting up the



Side view showing screwdriver adjustments for VOX etc.

built-in speech compressor. VOX is available and adjustments can be made without opening up the box.

Icom have for some time incorporated an electronic keyer into their budget rigs, and the IC-706 is no exception. This means that yet another separate box has been done away with and greatly enhances the radio's value to the CW operator who enjoys portable working. Anyone who has forgotten their key on an expedition and has made QSOs by tapping wires together will appreciate the novel facility of being able to use the microphone's UP/DOWN keys as a Morse paddle - amazingly easy to use! In addition to taking a standard paddle (normal or reverse), the keyer can be configured to take a straight key or mechanical bug for those who prefer more personalised Morse.

Full or semi break-in is provided, together with 'no break-in' ie an external switch. Delay times are fully adjustable. Full break-in worked OK but the clattering of a relay on each dot proved very distracting. CW sidetone is adjustable from 300 to 900Hz.

## HANDBOOK

THE 60-PAGE manual is helpful and is written in reasonably good English. It describes all of the controls with helpful flow diagrams for the numerous Menu driven functions. It does, however, assume a knowledge of amateur radio terms and practice, unlike some other handbooks. Diagrams are used extensively and no problems were experienced in understanding the radio's facilities. Usefully, Split and Repeater operation have a page each. No circuit or block diagrams are included.

## EXTRAS

OPTIONAL EXTRAS include a voice synthesiser (switchable English or Japanese), a high stability crystal unit, filters (250Hz, 500Hz, 2.8kHz or 1.9kHz), an automatic ATU, mobile mounting bracket, loudspeakers and many more. Note that, although the additional filters can be installed by the user (ie they are plug-in), only one at a time may be installed.

## CONCLUSION

THE IC-706 IS straightforward to drive and has a very usable front panel considering its size. On the air reports were all positive. And what fun to be able to listen to broadcast FM whilst automatically checking the local 2m net frequency every second or so!

Two things disappointed - the lack of a narrow CW filter and the synthesiser noise on 28 and 70MHz.

Having said that, this is a rig which can replace virtually all of your shack in one go at a price which is almost covered by the sale of your existing gear!

There's plenty to interest the keen Class B licensee, too, with 100W on 6m and a VHF general coverage receiver to check the progress of sporadic E. What is more, this really is a complete multiband station for taking mobile or on holiday. The IC-706 is set to become the ubiquitous rig of 1996. Now where's my cheque book . . .



The front panel is easily removed to allow for easy installation in even the tightest spaces.

## AVAILABILITY

THE IC-706 IS available from a number of RadCom advertisers (though currently demand appears to be exceeding supply). The review model was very kindly loaned by Martin Lynch - Amateur Radio Exchange Centre (see advertisement on page 62) and

we are most grateful to him and to the customer of his who was prepared to forego the pleasure of playing with his new toy for 48 hours whilst we checked it out. The price from Martin Lynch is £1195 and you can try one out for yourself at 'Lynch's Open Day' on 18 November. ♦

## SPECIFICATIONS

Source: IC-706 Handbook

### General

Receive frequency coverage	300kHz - 200MHz ( <i>but see text</i> ). Specifications guaranteed only on amateur bands listed below.
Transmit frequency coverage (UK version)	1.800 - 1.99999MHz; 3.500 - 3.99999MHz; 7.000 - 7.300MHz; 10.100 - 10.150MHz; 14.000 - 14.350MHz; 18.068 - 18.168MHz; 21.000 - 21.450MHz; 28.000 - 29.700MHz; 50.000 - 54.000MHz; 144.000 - 146.000MHz.
Modes	SSB, CW, AM, FM, WFM (receive only), RTTY.
Memory channels	102 (split memory 99; scan edge 2; call channel 1).
Antenna impedance	50Ω nominal.
Usable temperature range	-10°C to +60°C (+14°F to +140°F).
Frequency stability	Less than ±7ppm from 1 min to 60 min after power on. After that, rate of stability change is less than ±1ppm/hr at +25°C (+77°F). Temperature fluctuations 0°C to +50°C (+32°F to +122°F) less than ±5ppm.
Power supply requirement	13.8V DC ±15%.
Current drain at 13.8V	Transmit 20A; Receive squelched 1.5A; Receive max audio 1.7A.
Dimensions	Millimeters: 167(W) x 58(H) x 200(D). Inches 6.56(W) x 2.28(H) x 7.88(D). Projections not included.
Weight	2.5kg (5.5lb).
<b>Transmitter</b>	
Output power	HF & 50MHz: 5 - 100W (AM 2 - 40W); 144MHz 1 - 10W (AM 1 - 4W).
Spurious emissions	HF - better than -50dB; 50 and 144MHz - better than -60dB.
Carrier suppression	Better than 40dB.
Unwanted sideband suppression	Better than 50dB.
Microphone impedance	600Ω.
<b>Receiver</b>	
SSB, CW, AM, RTTY, FM	Double conversion superheterodyne
WFM	Triple conversion superheterodyne
Intermediate frequencies (approx)	SSB, AM, CW, RTTY: 69MHz and 9MHz. FM: 69MHz, 9MHz and 455kHz. WFM: 70.7 and 10.7MHz.
Sensitivity with pre-amp on (* not guaranteed outside amateur bands)	SSB, CW (for 10dB S/N) 1.8 - 29.9950MHz*, 50 - 54MHz, 144 - 148MHz: less than 0.16µV. AM (for 10dB S/N) 0.5 - 1.8MHz less than 13.0µV; 1.8 - 29.9950MHz*, 50 - 54MHz, 144 - 148MHz less than 2.0µV. FM (for 12dB SINAD) 28.0 - 29.7MHz less than 0.5µV; 50 - 54MHz, 144 - 148MHz less than 0.3µV. WFM (for 12dB SINAD) less than 10.0µV.
Squelch sensitivity threshold(pre-amp on)	SSB less than 5.6µV, FM less than 0.3µV.
Selectivity	SSB/CW >2.3kHz (-6dB), <4.0kHz (-60dB); AM >6.0kHz (-6dB), <20.0kHz (-40dB); FM >12.0kHz (-6dB), <30.0kHz (-50dB); FM narrow >8.0kHz (-6dB).
Spurious and image rejection ratio	More than 70dB (HF bands only).
Audio output power	More than 2.0W at 10% distortion with an 8Ω load.
RIT variable range	±1.0kHz max.