

■ Equipment Review

Icom IC-706MkII HF + 50 MHz + 144 MHz All Mode Transceiver

Ron Fisher VK3OM
24 Sugarloaf Road
Beaconsfield Upper VIC 3808

It's almost three years since I reviewed the original IC-706 (November 1995 issue of *Amateur Radio* magazine). Just over a year ago ICOM introduced the IC-706MkII with claimed better performance in several areas.

Well, is the Mark II version really better than the original IC-706 or not? Read on and all will be revealed. We have subjected both models to close laboratory testing and the outcome is very interesting indeed. Also, there is a very interesting option available for the Mark II version that has not been widely publicised for some strange reason. In fact, perhaps we should call the current version the IC-706MkII and a half.

What Is It?

First, though, a quick description of the IC-706 just in case you haven't got the original review and you don't know anything about the transceiver.

The IC-706 is a miniature 100 watt HF and 6 metre transceiver with 10 watts output on two metres. At the time of its introduction it created quite a sensation. After all, to include all of that in a package just 167 mm wide, 58 mm high and 200 mm deep was quite an achievement.

Of course, its main claim to fame was the detachable remote front panel which allowed the main body of the transceiver to be located under a seat, or in the boot of the car, with the front panel easily mounted near the driver's seat. In terms of what it can do, compared with its overall size, it hasn't been surpassed to this day.

Early Problems

However, there were a few slight

problems with the original version that really should not have happened in the first place. Top of the list was the very poor transmit quality on SSB. Second, but perhaps not as important, was the rather variable receiver sensitivity in the VHF general coverage range. While the amateur band sensitivity was very satisfactory, reception above 148 MHz dropped off to almost zero up to the limit of 200 MHz. Also, many operators considered the two metre output of ten watts was just a bit too low.

Let's cover the above problems one by one and see just what Icom have achieved with the Mark II version.

Transmit Audio Quality

The transmit quality problem was a strange one. It seems that the problems

we encountered in our original review were confined to some early models of the first production run. Later serial numbers had improved quality. To check this, I borrowed a Mark I model and tested it. It was better than our review transceiver.

The latest Mark II proved to be very much better again. The three response curves published in our present review show the differences between our early review transceiver, a later Mark I and the current Mark II.

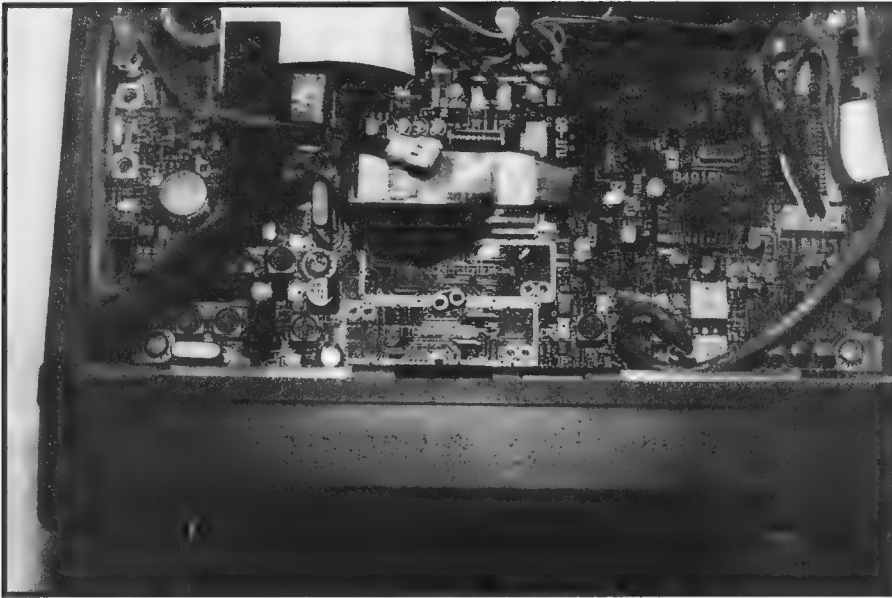
Now, I have to ask the question as to why Icom did not put out a bulletin about this. Why did they allow a poor report on one of their latest models at the time go unanswered? I am sure that their lack of action lost sales. They certainly lost mine.

Talking to Icom Australia recently, I was told that early models with poor transmit audio were modified when returned to Icom Australia for service. If you have an early model, suspect that you may have a transmit audio problem, and it hasn't been back for service, contact Icom and find out what they can do for you.

Having said that, the latest Mark II has very good transmit audio. Reference to the published response curves tell the story. The Travellers' Net co-ordinators gave their seal of approval and on-air reports were very satisfactory.



The Icom IC-706MkII HF + 6 m + 2 m all mode transceiver and the matching HM-103 handheld microphone.



A bottom view of the IC-706MkII with the case removed and the DSP board lifted

Receiver Sensitivity

Now to the next problem of receiver sensitivity. Let me say that I really did not consider this to be an important issue.

On the original review transceiver I was able to hear the local fire brigade service without any trouble and other transmissions in the 170 MHz region. However, I didn't actually carry out any sensitivity tests apart from those on the normal amateur bands. I might guess that many operators would not even use their IC-706s outside the amateur bands.

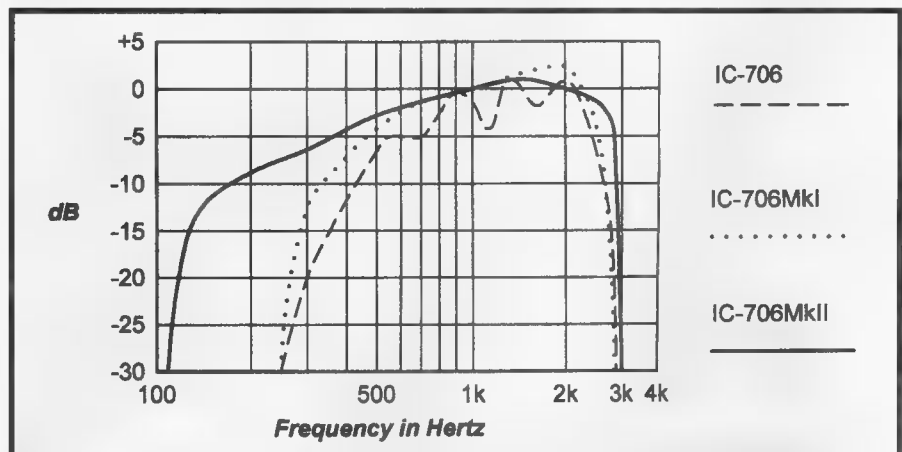
So, again I called in the services of John Patterson VK3ATQ to do a series of measurements on the latest Mark II and an original Mark I (serial number 1041). They proved to be most interesting (see Table 1). All measurements were taken with the pre-amp on, the transceiver in SSB mode, and a bandwidth of 2.4 kHz.

Measurements were not taken above 180 MHz due to the poor performance of both models.

A word or two of explanation of the figures in Table 1. Where the noise figure of greater than 20 dB is indicated, this shows that the sensitivity is below a useful figure. In this case the sensitivity is labelled as **na** (not applicable).

Table 1

Freq MHz	IC-706MkI noise (dB)	IC-706MkI sens (dBm)	IC-706MkII noise (dB)	IC-706MkII sens (dBm)
30	6.3	-134.5	6.5	-133.7
40	14.1	-126.2	8.3	-131.9
50	6.1	-134.1	5.2	-135.1
60	5.4	-134.8	6.9	-133.2
70	3.3	-136.9	11.2	-129.1
80	2.9	-137.3	8.9	-131.2
90	4.2	-136.1	9.7	-130.4
100	5.2	-134.9	7.6	-132.5
110	3.9	-136.3	5.1	-135.1
120	8.6	-131.6	9.7	-130.5
130	>20	na	4.8	-135.4
140	>20	na	2.1	-138.1
144	2.3	-137.9	1.9	-138.3
150	>20	na	2.4	-137.8
160	>20	na	4.1	-136.2
170	>20	na	9.4	-130.8
180	>20	na	>20	na



Transmit audio response curves of the original IC-706, the later IC-706MkI (s/n 1041), and the IC-706MkII. Measurements were taken with a power output of 20 W at 1 kHz on 14.200 MHz USB with no ALC, no compression, and the carrier set to -40 Hz.

The comparison is interesting. It shows a great improvement above 148 MHz for the Mark II update model and a very slight improvement for the 50 and 144 MHz amateur bands. However, for the aircraft band, the Mark I is slightly better.

The two metre output problem was fixed by increasing the power to 20 watts. A small but worthwhile increase, possibly important if you are driving an external amplifier that requires more than ten watts drive.

Digital Signal Processing

That's right! Did you know that DSP is available on the latest IC-706? Icom certainly haven't publicised this feature. The only mention I have seen is in the option list of the latest sales brochure. There is no mention of it in the instruction manual at all. Icom promised to fax me the relevant instructions for the DSP but, at the time of writing, this had not arrived.

The DSP unit, the TU-6, is not included in the basic price but is a \$158 option. When installed, a very easy plug-in procedure, it is operated via the menu system (actually S4). If the DSP board is not installed you will only be able to get to S3 in the menu sequence.

The DSP operates in the audio end of the receiver and has an automatic notch filter and noise reduction facility. The noise reduction level is adjustable, again via the same menu setting.

On-air tests showed that the notch filter worked very well and I actually found the noise reduction to give a slight improvement to the readability of signals

with a noisy background. If you are in the market for an IC-706, give consideration to including the DSP. It is worthwhile. The same DSP unit is also offered as a plug-in option on the IC-PCR 1000 computer receiver.

However, I note with interest that the UT-106 DSP unit is included as a standard feature on all IC-706 Mark II transceivers sold in the UK. They even call it the IC-706MkII DSP.

Other Improvements

That covers the main improvements, but there are several other changes that are welcome and worth mentioning.

The cooling fan is now controlled with a thermostat and only operates when the transmitter reaches a pre-set temperature. This makes for much more relaxed operation compared to the earlier model where the fan was on the whole time.

Split cross band operation is now available if required. For some strange reason this was not possible on the original Mark I.

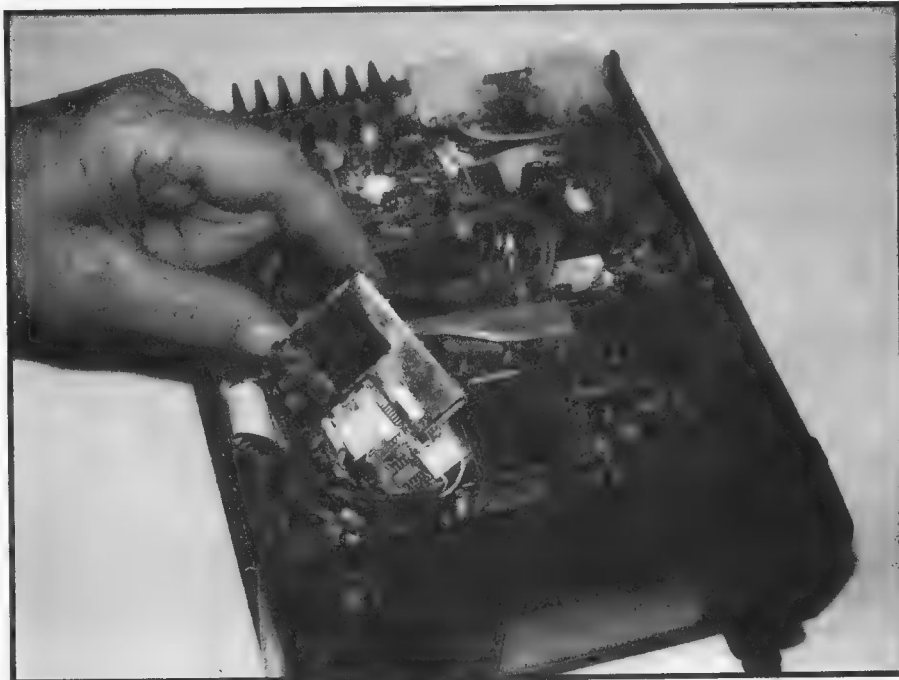
The RIT control of the original IC-706 has gone and has been replaced with a multi purpose 'click stop' control. In addition to RIT this control selects memory channels and also allows moving through the bands in programmable steps the size of which can be selected to suit the mode in use. For instance, 25 kHz is ideal for two metres FM.

The IC-706 Mark I provided space for only one optional filter. Space has been found in the Mk II for two optional filters. You can now have a narrow CW filter and perhaps a wide or narrow SSB filter. There are five optional filters available that include two CW filters of 250 and 500 Hz bandwidth, two SSB filters at 2.8 and 1.9 kHz, and an RTTY or narrow CW filter of 350 Hz bandwidth.

Installation of the filters is easy. They plug straight in and no soldering or removal of circuit boards is required.

IC-706MkII On Air

General operation of the IC-706MkII is a case of good and not quite so good. I guess when you have a front panel of the size to fit this transceiver, the number of controls that can be included is limited. To overcome this, Icom use a menu system, through which a large number



A top view of the IC-706MkII out of its case. The position of the optional plug-in filters can be seen towards the centre immediately behind the front panel.

of functions can be accessed. This is where problems arise.

It might take several button pushes to get to the section that is needed. Such simple things as switching the noise blanker on and off can become quite an exercise. To add to this, a copy of the menu instructions is required to give you a sporting chance of finding what you need.

I believe that Icom have recognised some of these problems and have tried hard to overcome them. A new section of the menu now allows quick selection of the three most used bands. You can program any three amateur bands and select any one of them with a single button push.

However, back to the beginning. Initial switch-on is quite different on the new model. Before the transceiver springs into action, the display cycles through an interesting sequence which includes a complete display readout, transmitter power output status and then any RIT offset. This all takes about three seconds after which the transceiver comes to life on the last used mode and frequency.

Received audio quality is now slightly better through the larger internal speaker although the review model had a decided rattle at around 400 Hz. This was

particularly noticeable on steady tone during our testing procedures. For home station use I would recommend a good quality external speaker.

If you intend to remote control the transceiver in the car, an external speaker is essential as the received audio might sound slightly muffled from under the seat or from the boot.

The feel of the tuning control on the 706 is without doubt the best of the small transceivers and the selectable tuning rates are very well chosen.

IC-706MkII Conclusions

There is no doubt that the IC-706MkII is still a leader in its field with features not available anywhere else. The new Mark II version is an improvement over the original model and a vast improvement over our 1995 review transceiver. Providing you can master the complexities of the menu system, the results you get should be excellent.

The Icom IC-706MkII recommended retail price is \$2691. However, if you shop around you might find it at a somewhat lower price.

My thanks to Icom Australia for supplying our review transceiver and to John Patterson for supplying the comparative receiver figures and the loan of his IC-706MkI.

ar