

# EQUIPMENT REVIEW

## The ICOM IC-R72 All Mode HF Communications Receiver

Ron Fisher VK3OM \* looks at ICOMs latest receiver technology.

ICOM have built up an enviable reputation with their line of HF communication receivers over the last ten years or so, The R-70 and R-71 receivers both performed to near professional standards but at non-professional prices. Many of these receivers have found their way into government and commercial organisations where they operate 24 hours a day with excellent reliability.

The IC-R72 has been around for a couple of years now and I thought it high time we had a close look at it. Compared to the R-70 and R-71 receivers, the operation of the R-72 has been greatly simplified. However in achieving this, many features of the earlier receivers have been eliminated. To balance this to some extent, some new features have been added.

It is both smaller in size and lighter in weight than its predecessors and is in fact compatible in size and appearance with the IC-725 and IC-728 amateur HF transceivers. Frequency coverage is guaranteed from 100 kHz to 30 MHz, and receive modes are upper and lower sideband, CW, AM and FM. The latter is available only as an option. An AC

power supply is built-in and operation from 12 volts DC is possible, but this requires an optional power cord and socket.

Dimensions are a compact 241 mm wide, 94 mm high and 229 mm deep and the all up weight is 4.8 kg. Having been brought up in the days when some form of a communications receiver was an essential part of the shack, I still consider a good receiver as a standard item in my set up. With most modern transceivers incorporating a general coverage receiver, I can appreciate many amateurs thinking that they can get along without a separate receiver. Well maybe, but one thing a modern transceiver cannot do is transmit and receive at the same time. You might need to check your transmitter for spurious outputs, check a contact on 80 while you are working on 20. The possibilities are only limited by your needs and imagination. If you have yet to qualify for your HF licence, then a good receiver is the way to check out activity on the DX bands, or maybe to listen to your local WIA broadcast. Interested? Well let's have a good look at the R-72 and see if it fits your requirements.

### The IC-R72, Features and Facilities

Now let's look a bit closer at the R-72. It is double conversion for all modes except FM where it is triple conversion. The first IF is 70.45 MHz, the second is 9.01 MHz and the third (for FM only) is 455 kHz. The main SSB and AM filters are at 9.01 MHz and two narrow CW filters are available as options. Like any good piece of modern equipment, the R-72 is microprocessor controlled.

Frequency selection is via the smooth tuning control in ten Hz, one kHz, and one MHz steps. Direct frequency entry is available via the front panel key pad which lets you enter down to the last 10 Hz for spot-on accuracy. The actual tuning knob is extremely smooth to use and is heavily weighted to allow spinning across wide sections of the band.

When the AM mode is selected, the tuning rate changes to 1 kHz steps although this can be changed to 10 Hz steps if required. In the SSB and CW modes 10 Hz steps are the automatic selection. Frequency and status readout is via a large and clear LCD display. Frequency readout is to 10 Hz and mode and memory channel number are clearly displayed. To the left of the display is a fairly small "S" meter which is calibrated in standard "S" units up to S9 plus 60 dB and up to 5 for SINPO reports.

A common question asked about a piece of equipment these days is, how many memories does it have? Well the R-72 should satisfy everyone. It has 99 memories which store both frequency and mode. As we will see later, some of these memories can be used in rather ingenious ways. As an aid to sight impaired listeners, ICOM offer a speech frequency readout.

In line with its simplified operation, there are only three rotary controls, AF gain, squelch, and of course the tuning knob. There is no RF gain, bandpass tuning or notch filter. The AGC is switchable for fast or slow decay, but as there is no RF gain, it cannot be switched off. Ten and twenty dB front end attenuators are provided and can be cascaded to give 30 dB. The receiver RF stage can be switched in or out to improve strong signal handling. To complete



The attractive front panel of the ICOM IC-R72 receiver.

the interference rejection facilities, a two position noise blanker selects normal or high blanking level.

Another operating aid is a built-in clock which can be set to turn both the receiver and an external tape recorder on and off. There is also another remote connector which will switch a tape recorder on and off when the squelch opens and closes. Very handy if you need to record a signal expected to come on air at some unknown time.

A unique feature is the AM tuning indicator. This lights up when an AM signal is correctly tuned. I found that it lights when the signal is within  $\pm 500$  Hz of the tune position.

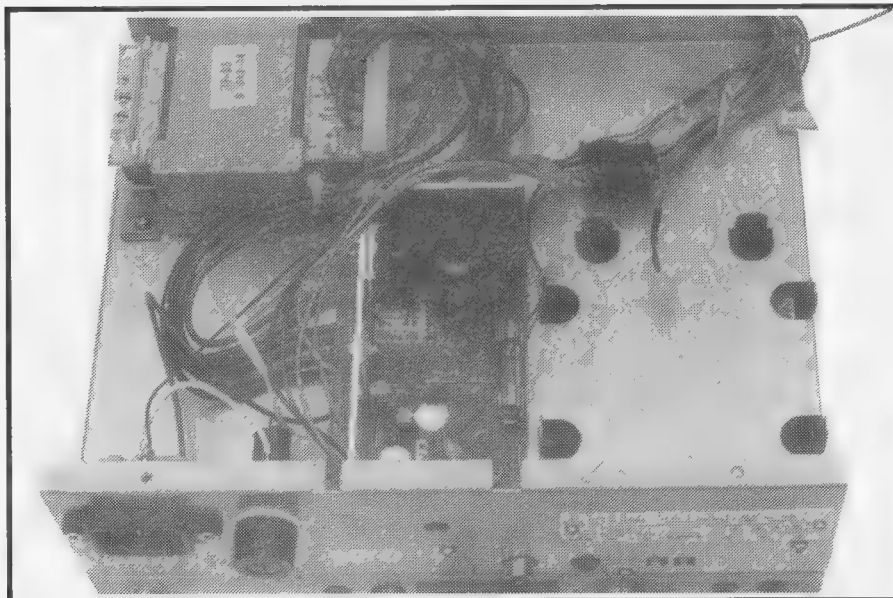
The rear panel provides a variety of interfacing connectors. AC power input is via an IEC three-pin socket which these days seems to be the standard. Both high and low impedance antenna inputs are provided, via an SO-239 coax for 50 ohms, and a pair of terminals for 500 ohms. One terminal is for the antenna and one for the earth connection.

### The IC-R72 On The Air

I connected the receiver up to my multi-band dipole and Z match ATU. This enabled me to tune the system up on most frequencies covered.

Jumping from one frequency to another proved very easy. A push of the MHz button allows you to step up or down in one MHz steps using the main tuning control. Tuning up or down in one kHz steps is achieved in the same way. At long last, ICOM have put right the jumping frequency effect when changing sidebands in SSB mode. With the R-70 and R-71, change of sidebands produced a 3 kHz change in frequency readout. Tuning with AM selected changes the tuning rate up to 1 kHz steps which is one hundred times faster than SSB tuning. I would much prefer 100 Hz stepping as I feel the 1 kHz rate is too fast. It is possible to select the 10 Hz rate for AM, but this is then too slow. Please look at this one ICOM.

Audio quality via the external speaker is quite reasonable, but as the speaker is mounted in the top of the cabinet and therefore firing directly upwards, I am sure that in many situations an external speaker would have an advantage. I tried the



**Under the top cover. This is the power supply. The open space on the right is for an internal battery for self contained operation.**

receiver with the SP-3 external speaker with very good results.

Another thing noted early on was that the "S" meter was very reluctant to move off the stop on many very readable signals. Putting the "preamp" on helped, but did not overcome the problem. Later tests were to show why (see test section of this review).

The memory and scanning facilities on the receiver are most impressive. Let's look at the scanning first. There are four modes of scanning; programmed scan, memory scan, selected memory scan and the auto-write memory scan. The programmed scan searches between any two operator selected frequencies, these being entered in memories P1 and P2.

The scan will stop when a signal is received and in the case of an AM transmission it will stop right on frequency, because of the AM tune facility. Depending on the position of a rear panel switch, the scan will either stop until the signal goes off, or it will resume scanning after ten seconds.

The auto-memory scan is the ingenious one, though. Scanning the same range as set between P1 and P2 the receiver will put into memory the first 20 AM signals received. Great if you want to check out the activity on one of the shortwave broadcast bands.

One thing missed is any form of audio top-cut control. Band pass tuning would be ideal of course. Even a common tone control could be a big help in removing high frequency audio interference, particularly when trying to dig out weak AM signals.

In general, the receiver sounded very lively particularly with the preamp switched in. No trace of front-end overload was noted. ICOM do offer (as an option) a receiver protector unit. It actually opens the antenna circuit if you happen to fire up a kilowatt transmitter next door!

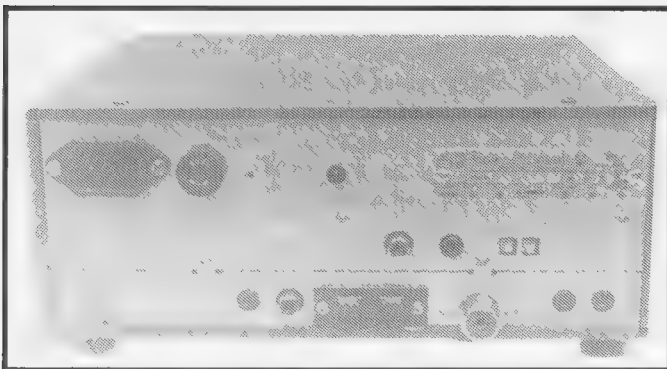
The best feature of all is the wonderful ICOM memory system. Select a memory and then tune away from it, up and down the band. Push the memory button again and you are returned straight back to the memory channel. Surely the most versatile memory system of all.

### The R-72 On Test

Confirming our on air tests, the receiver turned in a very good result in our lab tests.

The sensitivity was very level right across the whole HF range and averaged  $0.25 \mu\text{V}$  for 10 dB SINAD for SSB and CW.

The "S" meter measurements showed up our concerns mentioned earlier. At S9 an input of  $40 \mu\text{V}$  was required with the preamp switched in, and  $80 \mu\text{V}$  with it out. So far so good.



Rear panel of the ICOM IC-R72.

At the low end of the scale though, 5  $\mu\text{V}$  was needed to give an S2 reading with the preamp in, and 10  $\mu\text{V}$  with the preamp out. With conditions the way they are on the higher frequency bands, you won't see the "S" meter moving a lot!

Audio response in the USB mode measured at 14.2 MHz was -6 dB at 170 Hz and 2.5 kHz. The curve between these points was very smooth.

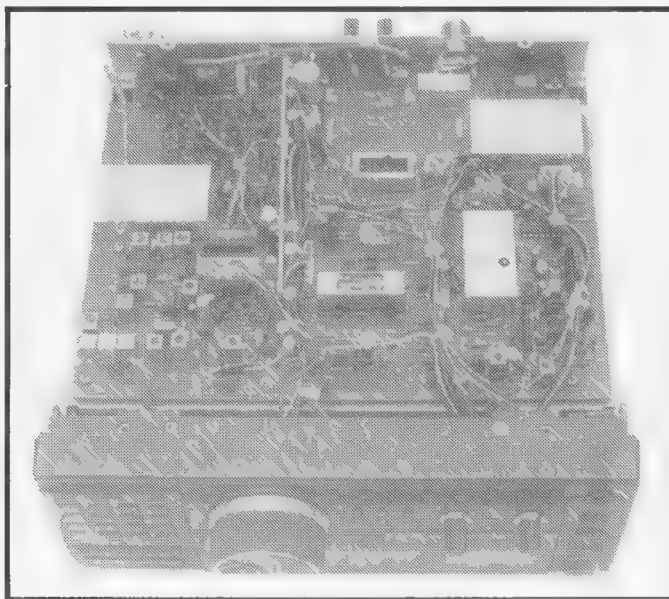
Response in the AM mode at the 6 dB points was measured at 100 Hz and 2.7 kHz. It seems that the audio end of the receiver was a slightly restricted response for a communications receiver is fair enough. Receiver audio output was measured at the external speaker jack. Terminated with a 4 ohm load, 4.8 watts at 10% distortion was produced. With an 8 ohm termination this dropped to 2.2 watts which is just a fraction above ICOM specification. SSB audio distortion at 500 mW output was a creditable 0.75%.

A final test noted that there was a significant difference in the response of lower sideband compared to upper sideband. As no circuit is supplied, it was not possible to determine the system used to produce the carrier frequency. However it may well be similar to the circuit used in the IC-725 transceiver, which suffers a similar quandary. Calibration accuracy was excellent, within  $\pm 20$  Hz. If you require something better than this, a high stability temperature controlled master oscillator can be installed as an extra cost option.

### The IC-R72 Conclusions

The R-72 is a very competent full coverage receiver.

The main circuit board of the ICOM IC-R72 receiver. The SSB filter is in the centre of the photograph.



It offers very simplified operation and therefore can be recommended to most short wave listeners. If you like to pull through the hard-to-find signal on the short wave broadcast bands, you might find the performance lacking in several areas. Without bandpass tuning, a notch filter or even a tone control you don't have a lot of control over what you are receiving. In other words, it doesn't take the place of the R-71 which does incorporate most of the above. To be fair though, I am sure the R-72 wasn't designed to replace the R-71. The AM

received quality is much better than the R-71 and the frequency readout definitely superior.

The instruction manual is aimed at the general operator and covers these aspects well. Service manuals are available for the technically minded.

Our thanks to ICOM Australia for the loan of our review receiver and all enquiries should be directed to them. Current retail price of the IC-R72 is \$1664-60.

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## WIA News

### Call for Papers

The ARRL Conference on Digital Communications (formerly the Computer Networking Conference) has issued a call for papers.

Technical papers for the Conference may be on any aspect of digital communications in Amateur Radio.

Deadline for receipt of camera-ready papers is 30 July, 1993. The Conference has been tentatively scheduled for 11 September at the University of South Florida in Tampa, Fl USA. It will be hosted by the Tampa Local Area Network.

Further information can be obtained from Maty Weinberg at ARRL HQ, 225 Main St,

Newington, Connecticut 06111 USA. (Thanks to the ARRL Newsletter).

### Growth in Japanese Amateurs

The number of amateur radio operators in Japan had reached almost one and a quarter million by September last year. With 1,242,550 stations licensed, amateurs represented 15.5 per cent of all radio and communications stations licensed in Japan at the time.

In the three months between June and September, the number of amateur licensees grew by 20,336 — that's more than the total amateur population of Australia!