

■ Equipment Review

Alinco DX-70

HF/6 Metre

All Mode Transceiver

Reviewed by Ron Fisher VK3OM*



The Alinco DX-70 transceiver.

That's right, Alinco is now in the business of producing HF-transceivers. Well known for their VHF and UHF hand-held and mobile equipment, this is their first piece of HF gear. As we will see, they are jumping in at the deep end and taking on the "big three" head on.

The DX-70 is designed to compete with the Kenwood TS-50S and the ICOM IC-706. Yaesu are yet to throw a competitor into the ring in this field but, no doubt, will do so very soon.

The DX-70 is essentially the same size as the TS-50S and the IC-706 and is right in the middle as far as weight is concerned. The TS-50S is the heavyweight at 2.9 kg, the DX-70 is 2.7 kg and the IC-706 the lightest at 2.5 kg. All these transceivers feature 100 watts output on the HF bands up to 30 MHz and full general coverage receivers. However, the DX-70 adds six metre coverage with 10 watts output and the IC-706 provides six metres with 100 watts output and two metres with 10 watts output. Prices run in reverse order. The TS-

50S will cost you \$1599, the Alinco DX-70 \$1799, and the IC-706 \$2478.

One feature, though, that sets the Alinco and ICOM apart from the Kenwood TS-50S is that they both feature removable front panels. I will look later at the mechanical set up of the Alinco's front panel compared to the ICOM.

Alinco DX-70 Features and Facilities

The DX-70 is ideal for both mobile and fixed station use. The remote front panel would make a mobile installation much easier. However, one cable is required to connect the front panel of the transceiver to the main chassis, and a second cable is needed to extend the microphone as the only microphone connector is located on the main transceiver chassis.

Unfortunately, the DX-70 uses four in-line multi-pin connectors, two on the panel and two on the main chassis. I must admit I have never been too sure just how to disconnect these. Do you pull on all the

wires at the same time hoping they won't rip themselves out of the plug? Or what? Well, that's a problem facing you with the DX-70. Alinco need to put this right. Perhaps they should take a good look at the ICOM IC-706. ICOM got it right the first time.

Now, let's look at what the DX-70 has to offer. Briefly, it has almost everything that current SSB transceivers have and, in some cases, more. Let's see what you get. Twin VFOs, 100 memories, a full general coverage receiver tuning from 150 kHz to 30 MHz and from 50 to 54 MHz, an effective IF shift, a non-adjustable noise blanker, both receiver and transmitter offset tuning, four selectivity selections (9 kHz for AM and FM, 2.4 kHz for SSB and wide CW, 1 kHz for CW and narrow SSB, and 500 Hz for narrow CW), a receiver pre-amplifier plus -10 and -20dB attenuation, three transmitter power levels (an internal switch selects 100 or 50 watts on HF while a front panel button selects 100 (or 50) watts and 10 watts – power output on 6 metres is 10 watts on high and 1 watt on low power), a speech processor for added punch on voice modes, and full break-in for CW operators.

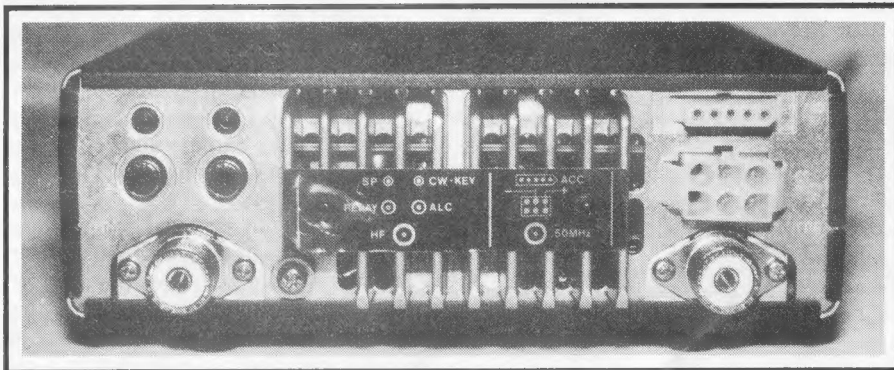
In addition, the AGC can be switched for fast or slow recovery (but cannot be switched off), both "Band" and memory scanning is available, and the transmitter final amplifier is cooled with a small but very effective fan which is thermostatically controlled so it only comes on when required.

Many of the transceiver's functions are controlled via the "Function" button. This is done in two ways. Firstly a single push of the "Function" button gives access to the second function on several controls. These include noise blanker on/off, AGC fast/slow, memory to VFO, memory write and priority channel select. Then, by giving the "function" button a quick push followed by holding it down for one second, the following "set-up" functions become available: CW offset setting, LCD brightness, automatic power off function, automatic USB/LSB selection (correct sideband for band in use), speech compressor on/off, CW break-in delay time and several others.

The DX-70 has two antenna sockets, one for HF and one for six metres – a very handy facility.

DX-70 On The Air

To put the DX-70 on the air you need only a 13.8 volt DC power supply, either AC operated or a standard car battery for mobile or portable operation, and an antenna. The supplied microphone is fitted with a standard eight pin connector and this actually plugs into the main transceiver



The rear panel of the DX-70, clearly showing the separate antenna SO-239 socket for 6 metres.

chassis with the microphone lead going through a slot in the front panel. This certainly makes for a neat looking installation and, with the use of the normal eight pin connector, allows you to use an alternative microphone with very little effort.

The main tuning control is very smooth, but perhaps a trifle small. The tuning rate is 5 kHz per knob revolution, which feels just right. Rotating the knob faster than about one revolution per second speeds up the tuning rate to about 20 kHz per revolution. Band changing is selected via the "MF SEL" button. The first push of this brings up the memory channel number. Push two brings two icons above the leading two MHz figures and you can then use the "MULTI-FUNCTION" knob to select each amateur band in turn. A third push of the "MF SEL" button allows you to select each MHz in sequence for general coverage receive use, while a fourth push brings in selection for 100 kHz steps. A fifth push then puts things back to normal.

This operation is one of those things that takes time to explain but, in fact, not long to do. However, in this area I think the TS-50S wins out for simplicity. If you are contemplating a lot of band changing, you can, of course, leave it in the amateur band selection mode. When changing bands you will always come back to the last used frequency on that particular band which is a very handy feature.

The received audio quality on the internal speaker was very good on SSB but a bit thin on AM. A good quality external speaker made a very noticeable improvement here and was certainly worthwhile on SSB also. The preamp and attenuators are selected in sequence by pushing the "RF" button.

I found that the noise blanker often introduced a fair amount of distortion. There may be an internal preset level control but no mention is made of this in the instruction book. I did not actually use the transceiver mobile but I feel that, while the

blanker would reduce ignition noise to a low level, the distortion on strong signals could be a problem.

There is a separate readout for the RIT which has a +/- 1.4 kHz range. While on the subject of the display, the main frequency readout is to 100 Hz. The "S" meter is a bar graph which doubles as a relative power output indicator when in transmit mode. No other metering is provided. There are many other status indicators included in the display, including sideband in use, RIT/XIT, VFO A/B, noise blanker on, AGC slow/fast, pre-amp attenuator status, etc. Illumination of the LCD is adjustable via the "function" set-up procedure.

The selectable selectivity was great for eliminating QRM. The 1 kHz band width is actually somewhat wider than specified which made it ideal for narrow SSB reception, particularly with the IF shift slightly off-set.

DX-70 On Transmit

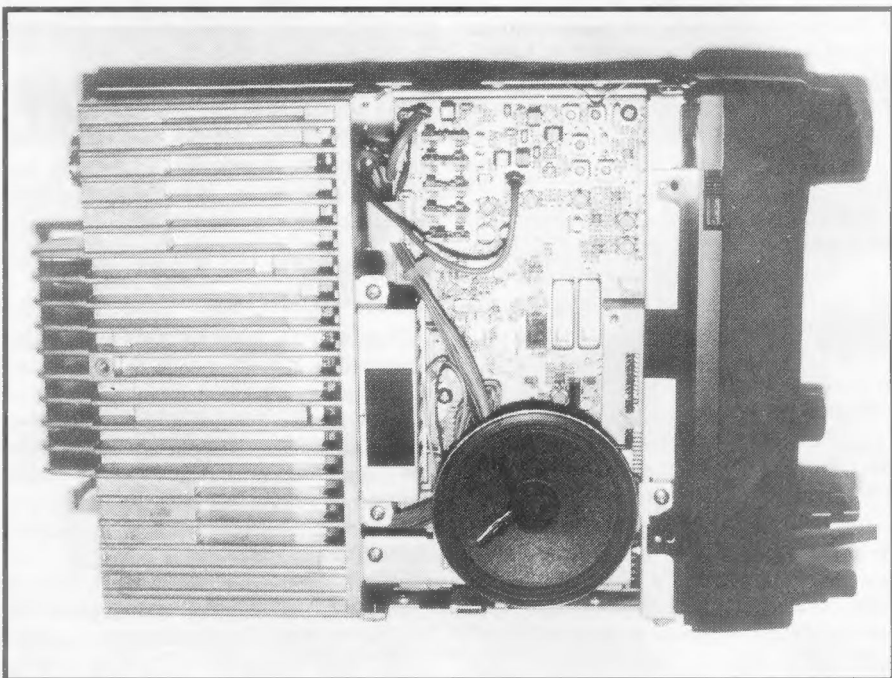
What better place to try the transmit capability of the DX-70 than on the 14.116 MHz Traveller's Net. Peter and Roy can really pick the good ones from the not-so-good. They gave the DX-70 a very clean bill of health. The only slight problem was that the speech processor produced some audible distortion, so don't use it on local contacts. The rig delivered a full 100 watts output but I noted that it was fairly critical of the correct load impedance. Output power was reduced with an SWR above 1.5 to 1. CW operators are very well catered for. You can choose full or semi break-in, and also zero-in the transmit signal on the signal you are listening to. CW keying was found to be very clean.

Alinco EMS-42 Microphone

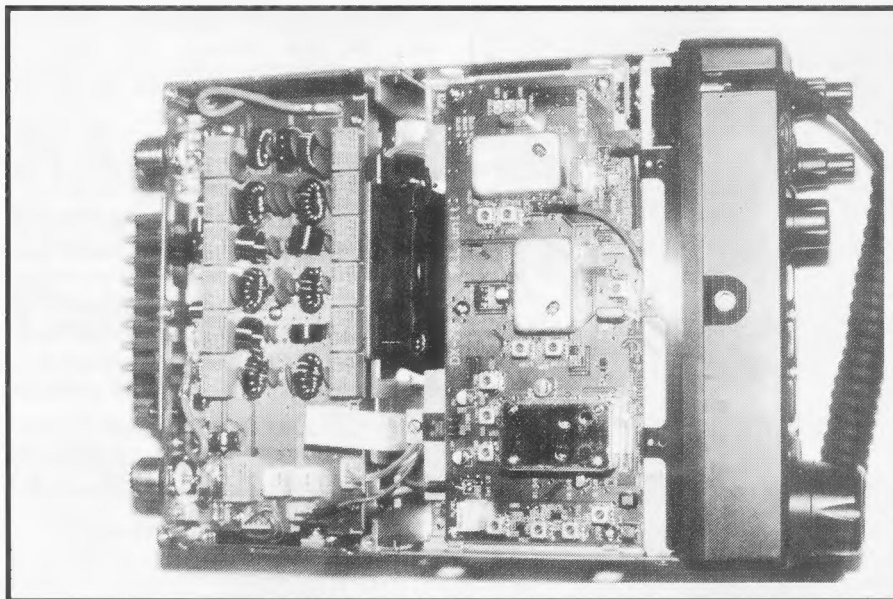
This is the microphone supplied with the DX-70 as standard equipment. It has a low impedance dynamic insert which produces very clean audio quality. There are three micro-switches inside, two for the up/down buttons on top of the casing and one on the side actuated by the PTT button. The shape of the case fits the hand very well and the up/down buttons on top are easy to operate. The verdict is that it is a very nice little microphone which is easy to use.

DX-70 On Test

Firstly, I checked the power output and current drain on each band. Maximum output in CW mode with 13.8 volts DC supplied to the transceiver was:



Top view of the DX-70 with the cover removed.



Bottom view of the DX-70 with the covers removed. Note the centrally mounted cooling fan.

Band	Power Out	Current Drain
160	112 watts	18 amps
80	118 watts	18 amps
40	110 watts	16.5 amps
30	105 watts	15 amps
20	100 watts	14 amps
17	100 watts	14 amps
15	105 watts	14.5 amps
13	95 watts	14 amps
10	95 watts	14 amps
6	9.5 watts	2.6 amps.

In the low power position, the power output averaged 16 watts over all the HF bands and was 2.5 watts on six metres. Current drain on the HF bands averaged about 7 amps and on six metres it was 1.8 amps. PEP output on SSB was the same as the CW readings, as was FM on 10 and 6 metres. The AM output (for the 160 operators) was about 25 watts.

I then carried out tests to estimate the transmitter inter-modulation distortion. Again, the figures obtained were estimated on a comparative basis with a transceiver

with known figures of distortion and were measured with normal SSB modulation. The DX-70 produced a figure of -20 dB which is 2 dB worse than the IC-706. There was very little difference with the processor switched in or out; however, the processor did produce quite audible distortion and was generally not liked by listeners.

Next, the transmit audio response was measured in the SSB mode (see Fig 1). The method used was the same as detailed for the IC-706 review in the November 1995 issue of *Amateur Radio*. Basically, the response shows a smooth bass roll-off with the -6 dB point at about 450 Hz. At the top end the -6 dB point was at 2.9 kHz. The mid-band ripple did not exceed +/- 1.5 dB. Most listeners found the audio response very pleasing with the exception of the distortion produced by the compressor.

There was a difference in the response between upper and lower sideband with

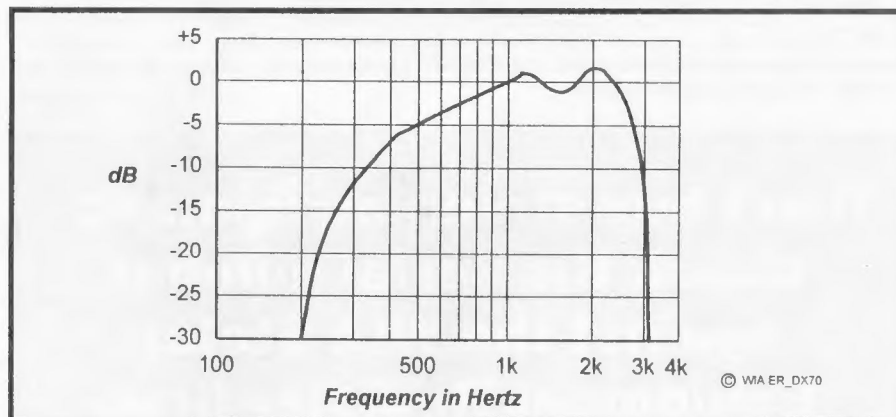


Fig 1 - A plot of the transmitted audio response of the DX-70, using USB on 14.2 MHz with no compression and no ALC.

slightly more bass on lower sideband. In retrospect, I feel that the upper sideband response would have sounded slightly better if it had been shifted nearer to the filter to match the lower sideband response. Both carrier and sideband suppression were excellent, each being in excess of -60 dB down.

Receiver Tests

The first test was to check the S meter calibration. In common with the TS-50S and the IC-706, the S meter is a series of bars on the LCD and is calibrated at S1 to S9 and then +20, 40 and 60 dB. There are actually 16 bars between S1 and S9. I measured the calibration at 14.2 MHz and then checked the input required to produce S9 on each amateur band. The results are as follows:

S Unit	Preamp On	Preamp Off
S1	2.3 μ V	6.8 μ V
S2	2.6 μ V	8.0 μ V
S3	3.6 μ V	11 μ V
S4	4.6 μ V	14 μ V
S5	5.8 μ V	18 μ V
S6	7.8 μ V	25 μ V
S7	10.3 μ V	37 μ V
S8	10.9 μ V	49 μ V
S9	20.0 μ V	60 μ V
+20	120 μ V	300 μ V
+40	500 μ V	1800 μ V
+60	2000 μ V	5000 μ V

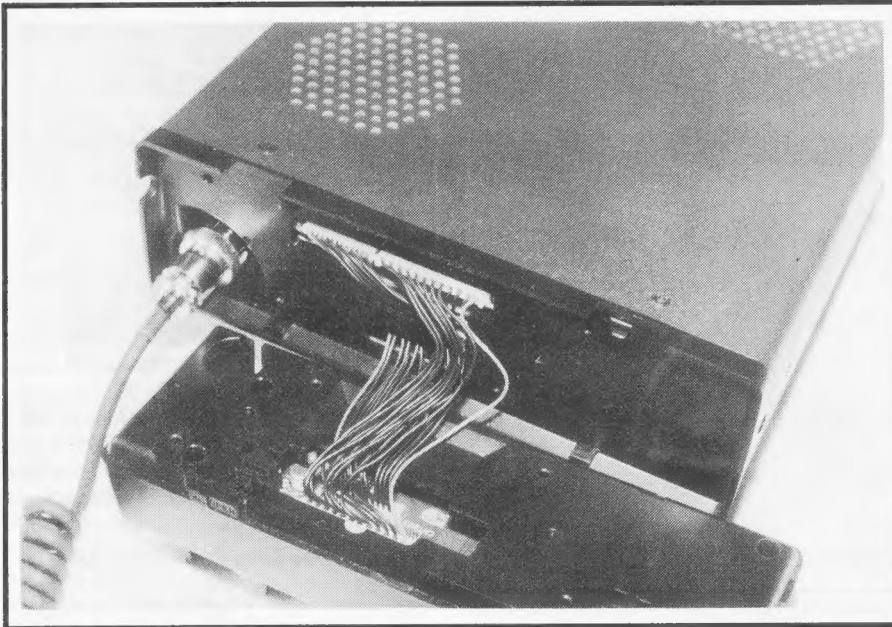
The signal required to produce S9 on each amateur band with the pre-amp in operation was measured as follows:

Band	Input for S9
160	21 μ V
80	20 μ V
40	20 μ V
30	20 μ V
20	20 μ V
17	24 μ V
15	24 μ V
13	24 μ V
10	25 μ V
6	17.5 μ V.

The switchable attenuator provides -10 and -20 dB of attenuation, and these were checked as being spot on. The received frequency response on SSB was the same as the transmit response shown earlier.

I next measured the response for AM receive with the following results:

Frequency	Response
100 Hz	-14 dB
200 Hz	-6 dB
400 Hz	-2 dB
600 Hz	-0.5 dB
1.0 kHz	-0 dB
1.5 kHz	-1 dB
2.0 kHz	-2 dB
2.5 kHz	-3 dB
3.0 kHz	-5 dB
3.5 kHz	-10 dB
4.0 kHz	-13 dB.



A close-up view of the front panel unclipped from the DX-70 showing the connecting cabling and how the microphone plugs directly into the main chassis.

Interestingly, this response is within a dB or so of the ICOM IC-706. Perhaps they both use the same filter. With a good quality external speaker the AM quality is quite acceptable.

Next on the list of tests was audio power output and distortion levels. Maximum audio output into an 8 ohm load was measured at 2.9 watts at 20% distortion. The 10% distortion level was produced at 2.4 watts which easily exceeds the specified 2 watts. Product detector distortion for SSB and CW was an excellent 0.45%. Distortion on AM at high modulation levels was fairly high at 10% for 80% 1 kHz modulation.

Selectivity

The DX-70 has three and a half positions of selectivity. Let me explain. Position one is 9 kHz for AM and FM reception, position two is 2.4 kHz for SSB and narrow AM, position three is 1 kHz for narrow SSB and wide CW, and the "half" is provided by the 500 Hz wide audio filter which augments the 1 kHz filter.

In practice these all work very well, but they are all somewhat wider than the specification might have you believe. The 1 kHz filter is nearer to 1.6 kHz at -6 dB and the 2.4 kHz filter is about 2.7 kHz at -6 dB. On the surface this isn't too bad, but the selectivity at -60 dB is wider than you would expect from a top grade crystal filter.

Sensitivity

I measured the sensitivity at 14.2 MHz and at 51 MHz. 14.2 MHz SSB gave a figure of 0.2 μ V for a 10 dB SINAD. This is slightly better than the specified 0.25 μ V for

10 dB S/N. At 51 MHz the measured sensitivity is quite a bit better than the specification at 0.12 μ V for 10 dB S/N. I noted that the sensitivity was noticeably down with the preamp switched out.

Overall the DX-70 performed very well. It is not a substitute for a top grade transceiver but I feel that for general home-station use and mobile operation it would prove a very useful rig.

DX-70 Instruction Manual

The instruction manual runs to a surprising 100 pages. A full circuit diagram is included as a loose supplement. The book is divided into seven chapters plus an appendix and these cover the following subjects:

Chapter 1. Getting Started. This covers the initial setting up of the transceiver such as connecting the DC supply, key, microphone, external speaker, etc.

Chapter 2. Communication. This tells how to set up the transceiver for transmission and reception in the various modes, including packet operation.

Chapter 3 and Chapter 4. These describe the memory and scanning facilities of the transceiver.

Chapter 5. Chapter 5 is interestingly called "Interference Reducers". It covers the operation of the IF Shift, use of the narrow filters for SSB and CW, RIT and XIT (transmitter offset), noise blanker and attenuator.

Chapter 6. This chapter shows how the initial "set up" system is programmed. The options were explained earlier.

Chapter 7. Covers several adjustments such as microphone gain, CW sidetone, volume, etc.

The instruction manual is a generally well written and presented book. I give it eight out of ten.

Alinco DX-70 Conclusions

For their first attempt at an HF transceiver, I give Alinco top marks. They have produced a transceiver that would please most operators. It is in the lower price bracket and its general performance is similar to other rigs under \$2000. However, there are a few rough edges. The remote front panel is far too fiddly to use frequently. Alinco need to clean this up. The mechanics of the tuning control need improving with perhaps a slightly larger knob and a better system to adjust the tension. Also, I feel that a basic mobile mounting bracket should be included as a standard feature. However, I am sure that the DX-70 will prove to be very popular.

One thing that I cannot comment on is the service backup that the Australian distributors can provide. If I can obtain any information on this aspect I will pass it on to readers. On the same subject, I do not know if workshop manuals are available in Australia. You might need to take some of these factors into account when considering your purchase.

The review DX-70 was kindly provided by Strictly Ham Pty Ltd of 14 Church Street, Bayswater, Victoria.

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