

There are plenty of radio goodies about and Chris will guide you to the best buys.

# Buying Second-hand

**T**he summer Amateur Radio rally and boot sale season has been in 'full steam' and I hope that, if you've been able to visit one, you've managed to pick up a bargain or two. Maybe helped by recent *Buying Secondhand* articles in this series.

This time, as promised, I'll be detailing a couple of 'get you going' high frequency (h.f.) transceivers, ideally suited for a first 'all round' rig and at a price which hopefully won't break the bank. The Icom IC-706 and Alinco DX-70 transceivers both offer the ability of fixed, mobile, and portable operation, and have broadly similar capabilities.

The first models of each were launched back in 1995, and over the years each transceiver model has had three different variants, generally an increase in power at v.h.f., etc. (Please see the description later on the individual transceivers for more details).

## What's The Cost?

I know one of the first questions readers will ask will be, "What will one cost me?" This is of course often hard to say, as in the past when a second-hand 'buy' is prominently featured in a magazine such as *PW*, this increases the desirability of the rig. However, it can also often 'wake up' people who already have one that's lying dormant and unused under the shack desk or in the house loft and prompt them into selling it!

So, the resultant price – at least for a short while after such a feature – can either go up or down from what it was before! But as a guide I believe you should be able to pick up first, i.e. early, model variants of the DX-70 for under £200 and a first model variant of the IC-706 for under £250. Later models, with more features and of course being newer and thus less-used, will of course usually attract higher prices.

I've been fortunate in using various models of both the DX-70 and the IC-706 myself in the past, each of them at home and out and about in my car. This as well as being able to fully

and stringently test them at the time for technical performance in my measurement lab. So, I've no hesitation in recommending either to readers as a second-hand radio, providing of course you follow my advice regarding each one!

I know the DX-70 has been, and probably still is, a 'favourite' of the *PW* Editor **Rob Mannion G3XFD**. I must admit to having a personal preference for the IC-706GMkII (albeit available at a higher price), but that again is personal preference and each radio would be ideal as starter or all-rounder transceiver.

Having said that, the DX-70 has stood the test of time and after 15 years from its launch, the latest model in the DX-70 series, unlike other radios that have faded in the past, is still here on the market and selling well!

Now for a couple of points to watch out for when you're buying second-hand. The first is the inclusion, or not, of CTCSS (sub-tone) in the IC-706, or whether you need to add an optional module for this. It will be important if you're interested in 50, 144 and 430MHz repeater operation rather than single sideband (s.s.b./c.w. (Morse).

Secondly, you should check whether either rig has extended 7MHz (40m) band transceive coverage. Additionally, you need to check for 5MHz band coverage transmit if you're licensed for this or hope to be in the future. If not then don't worry too much, because for each transceiver model featured I've given details on how to add this to a second-hand radio.



Fig. 1: The original Alinco DX-70 with its matching antenna 'tuning' unit.

## The Alinco DX-70

The first DX-70, **Fig. 1**, first appeared in early 1995, and offers h.f. and 50MHz transceiver coverage on amplitude modulation (a.m.), c.w., narrow band frequency modulation (n.b.f.m.) and s.s.b. The rig has 100W output on h.f. (switchable to 10W for low power operation) plus 10W on 50MHz, switchable to 1W low power. A little later came the DX-70T, which was virtually the same as the DX-70 but with narrow filters fitted as standard.

Chris Lorek G4HCL takes a look at several h.f. transceivers which you can hopefully pick up at a bargain price.

Finally, in 1999 the DX-70TH, Fig. 2, was launched, and this model is in fact still available and on current sale – it's similar to the DX-70T but the 'H' signifies it has a higher power of 100W on 6m. The operation and appearance of each is identical apart from the model number on the front and rear panels.

Each model has a transmit frequency range within the normal Amateur bands, and a receive coverage of 150kHz – 30MHz and 50 – 54MHz. A built-in continuous tone coded squelch system (CTCSS) tone encoder is included – invaluable for 28 and 50MHz n.b.f.m. (usually referred to as f.m.) repeater use.

Narrow (1kHz) and wide (2.4kHz) intermediate frequency (i.f.) filters are available for c.w./s.s.b. and 'narrow a.m.' receive. These being switchable from the front panel, together with a further wider filter for normal a.m. and f.m. use. A 500Hz filter is automatically switched in when c.w. mode is selected.

An **IF shift** control helps in fighting adjacent frequency interference on a crowded band, and switchable 10dB and 20dB receive attenuators help guard against overload, a 10dB preamplifier also being fitted. This is for use when needed on a 'quiet' band or for example whilst mobile with a small antenna. Two antenna sockets are fitted to the rear panel, one for h.f. and the other for 50MHz. The set's dimensions are 178 W x 58 H x 228mm D.

The front panel can be detached and an optional cable used to link this to the main transceiver 'body', which you can then mount elsewhere, maybe next to the feed-point of your mobile h.f. antenna. However, the microphone and speaker connections stay at the main transceiver end, so although you'll need extension leads here, but you can detach the front panel without any further connections and take it with you when you leave the car.

For on-air use, there's an internal speech processor and for c.w. operators, full and semi-break in. When I used the set on-air I found the smooth **VFO** knob control easy to use although I quickly learned how to use the set by touch alone for mobile use. I also quickly learned that I – invariably – had to use the **Dial Lock** button to keep me on frequency during a contact on the move as I found that I could easily accidentally knock the VFO control knob.

For normal mobile use, the set's 100 memory channels were useful. These, combined with a single button-push '**memory to VFO**' operation enables this to act as a band switch for Amateur and broadcast bands.



Fig. 2: The current version of the DX-70, the 'TH' version has been improved and adds more output power of 100W at 50MHz.

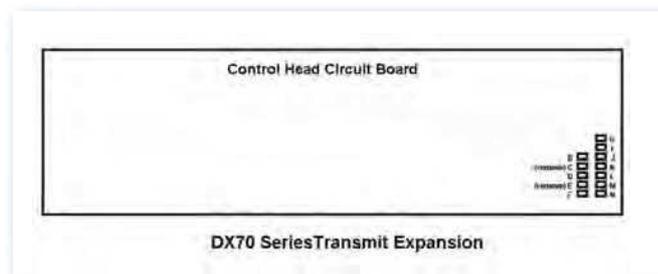


Fig. 3: See the text for expanding the transmit receive capabilities of the Alinco DX-70 series. There is no pad labelled 'A' on the left-hand column.

At home I must confess, I found the set's receiver often suffered on busy bands if I connected my full-size dipole on the i.f. bands, or my tower-mounted 3-element quad-bander Yagi beam on the higher bands and pointed at a busy Europe.

But then, the DX-70TH is a small set, and the attenuator function was useful here. However, in fairness – many users of a transceiver such as this may not be using 'monster' antennas, using more compact types. My conclusions after I'd used the rig those years ago were that Alinco had surprised the Amateur Radio world with a radical departure from their previous v.h.f./u.h.f. f.m. only offerings. But that they'd managed to do a very good job, as I found no real limitations with the set considering it's size and features.

### Things To Watch For

Now, let's look at the things to watch for on the DX-70 series of rigs. As well as the usual 'beware's' which I gave details of in the first column in this *Buying Second-hand* series, such as buying and ownership warnings, look out for severe scratching to the case if the previous owner or owners have repeatedly taken it in and out of a car. If just the front panel has been removed this won't usually be an issue, but here check the connections aren't corroded nor the front panel display fascia scratched.

See my recent article on the TM-G707E and IC-207 in the July 2010 issue of *PW* for information on how to remove any scratches if your seller hasn't been too careful in the past.

Electrical problems with the PIN diodes, which are used to switch the antenna path between the transmitter power amplifier and receiver front end circuits, have to my knowledge been reported causes of failure. So it would be a good idea to check a second hand transceiver on-air for r.f. power output (e.g. with an in-line power meter) and receiver sensitivity – here you should hear an increase in background noise on the lower h.f. bands when you connect an antenna.

### Extended Transmit Frequency

For the extended 7MHz (40m) band and for the 5MHz band – if you'd like to use these on transmit, check your seller has had extended transmit range enabled. But if not, here's how to go about it.

Remove the control head, remove the four screws from the back of this, then remove the rear panel of the control head – it's a 'snap fit' so you may need to

prise it off. Looking at the printed circuit board, with the display fascia away from you and the tuning knob on the left hand side, you'll see on the bottom right hand side of the board two columns of solder pads for surface-mount resistors, five on the left hand row and seven on the right hand row, **Fig. 3**.

Note that not all resistors may be fitted and that they're not labelled. Above each row is a distinct solder pad. To extend the transmit range, refer to Fig. 3 and remove diodes labelled C and E on the diagram (second and fourth down in the left hand column). Following this, reassemble the control head and perform a reset of the transceiver by keeping the **F** button pressed at the same time as you switch the radio on. Your memory channels, etc., will be re-set but the radio will now operate with extended transmit range.

### The Icom IC-706 & IC706G

Now let's turn to the IC-706 which, was launched in the latter half of 1995 and was an obvious competitor to the Alinco DX-70. At the time of its launch it was the most talked-about radio for many years and when the first batch arrived in the UK they were very quickly sold. In fact, I know there were several hundred UK Amateurs on the 'waiting list', with the USA 'waiting list' of around 4000 Amateurs.

As with the Alinco DX-70 it also offers an h.f. and 50MHz multi-mode transceiver, with a detachable front panel, in a similar sized case. It also came with optional narrow filters and the same frequency range – but with added 144MHz transceiver coverage and wide-band f.m. reception.

The transceiver measures 167(W) x 58 (H) x 200mm (D), and like the DX-70 it has a removable front panel to allow you to take this with you when you leave the vehicle.

An optional remote cable kit is again also available to allow you to remotely mount the radio body away from the car dashboard, **Fig 4**.

A very comprehensive range of operating features are built-in (too many to mention in detail here) and you'll need a good read of the manual to learn how to operate them all! Note however, that CTCSS isn't fitted as standard in the IC-706 and IC-706G – so you'll need an optional internal add-on



**Fig. 4:** As with the Alinco DX-70, the IC-706 series can have a remote location for the control head, making it easier to remove the unit, when not in use.

board for this. than the original IC-706 along with a doubling of the 144MHz transmit output power of 20W. Still later on, the IC-706MkIIIG came on sale, which increased the 2m transmit power output further to 50W (adjustable down to 5W) and, significantly, added 430MHz (70cm) multi-mode transceive coverage with a transmitter power output of 20W maximum, adjustable down to 2W for low power operation.

This later model was, I'm sure, intended to appeal to users who'd like a combined h.f. mobile rig, together with a 2m/70cm dual band rig for mobile repeater operation and the advantage of a multi-mode all-band rig for hilltop DX operation.

When I used the set, coupled to my h.f. antenna system at home (a combination of wires, dipoles and beams), it operated reasonably well, although I usually needed to have the r.f. pre-amplifier switched in on 'quiet' bands such as the upper h.f. bands and v.h.f. While on 3.5MHz (80m) and 40m, at night, the set suffered a little from strong signals and I typically needed to have the attenuator switched in.

When operating mobile, I tended to use the memory channels almost continuously, every channel acted virtually as a 'separate v.f.o.' – I could simply tune away from each as I wanted with a turn of the tuning knob. This knob usefully

had a small tension

adjustment lever, either stiff for mobile use, or free-wheeling for shack use – which I appreciated.

As such it had the edge over the DX-70 in terms of features but came along at a higher price, which second-hand models hold, typically £50-90 more than the DX-70 at the time I write this article.

Just a few years later, the IC-706MkII, **Fig. 5**, came along, this had better technical performance



**Fig. 5:** The IC-706MkIIIG offered operation on the major Amateur bands from h.f. to u.h.f.

### The IC-706MkII

The IC-706MkIIIG was provided with a higher power – 50W on 144MHz, together with 430MHz coverage and Icom included the CTCSS sub-tone encode and decode as standard. This could previously be added as an optional plug-in unit, but with

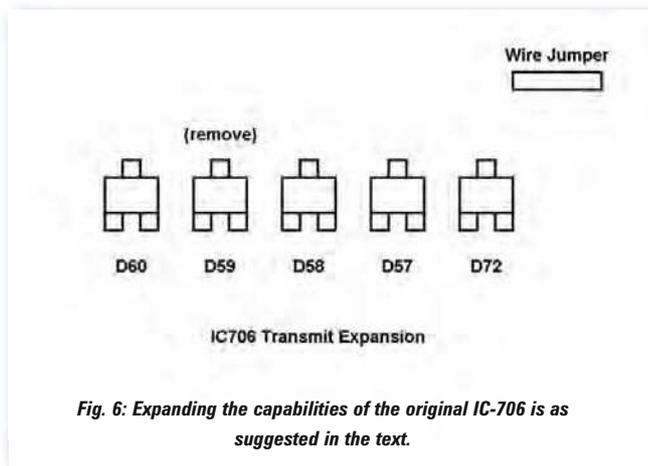


Fig. 6: Expanding the capabilities of the original IC-706 is as suggested in the text.

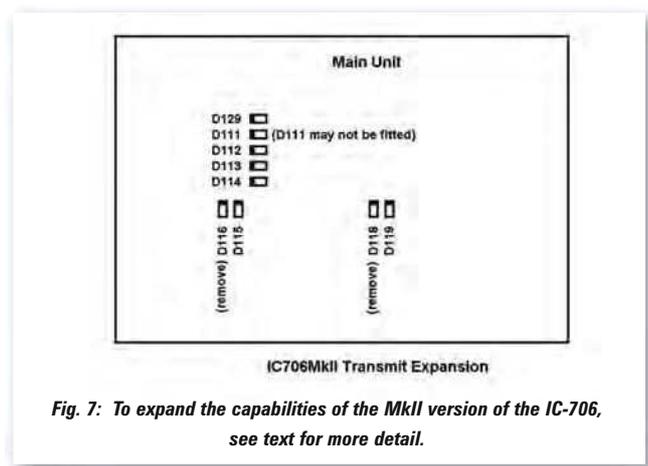


Fig. 7: To expand the capabilities of the MkII version of the IC-706, see text for more detail.

this version it was built in as part of the main p.c.b. circuitry.

The 'G Mark II also has a useful standing wave ratio (s.w.r.) measurement facility on h.f. and 50MHz. The facility is not just on the tuned (working) frequency but either side of this, with a simple **SWR** bargraph display, which appears along the bottom section of the liquid crystal display (l.c.d.) panel.

Mobile whips can have a rather narrow bandwidth on h.f., and you can only shift frequency so far before the s.w.r. becomes too high, so this could be rather useful for mobile operators. On air I found the performance on receive had the edge over the original IC-706, this being reflected in the lab measurements I'd made. The IC-706MkII would also have a similar receive performance improvement.

### Things To Watch For

With the IC-706 and IC-706MkII an important thing to bear in mind – if you intend to operate the set on 144MHz and, with the IC-706MkII, on 430MHz, is to make sure there's a CTCSS option board internally fitted to the set you're intending to buy. As these transceivers aren't current models you may well have difficulty finding a CTCSS board. So check first if one is available if this is important to you before agreeing to buy a set without CTCSS. The IC-706MkII has CTCSS fitted as standard.

Again if you want to operate on the whole of the 7MHz band, check it has extended transmit coverage. But if it hasn't, I've detailed the modification for each variant of the set below.

The microphone connector on each model plugs into the lower front of the set, with the microphone lead going vertically downwards. This could have imposed strain on the lead where it enters the plastic plug, causing intermittent operation, especially if the rig was used as a mobile by the previous owner(s).

If you can inspect and test the radio first, wiggle the lead about while you're transmitting, and check for any breaks in your transmitted audio and intermittent transmission. It's not too serious as you can slightly

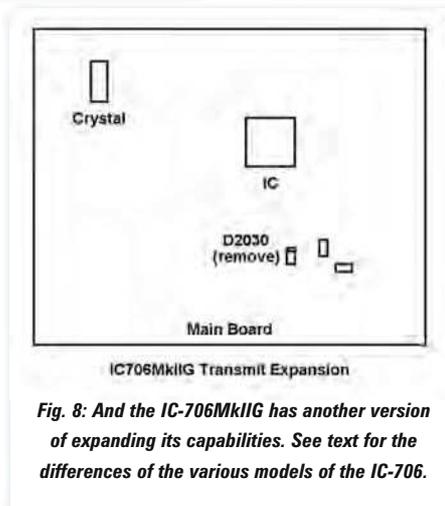


Fig. 8: And the IC-706MkIIG has another version of expanding its capabilities. See text for the differences of the various models of the IC-706.

shorten the lead a little, but you'll need a new plug and a special plug 'crimping tool' to fit this.

### Extended Transmit Frequency

Extending the transmit frequency range for the IC-706 series isn't difficult. For operation on the extended 40m (7MHz) band you'll need to ensure your radio is enabled for this, also for 5MHz, here are the details for each variant;

**The IC-706:** On the main printed circuit board (p.c.b.) by the filter option location, you'll see a row of five surface mounted dual diodes, Fig. 6, next to a jumper wire. Using a small (but hot) soldering iron, lift up the lead(s) on one end of D59 to disconnect it (or if you wish) also then heat up the lead(s) on other side and remove it completely.

**The IC-706MkII:** On the main p.c.b., you'll see an oblong metal can, and near to this are a few rows of surface mount diodes. Take a look at the accompanying diagram, Fig. 7, and, using a small (but hot) soldering iron, remove D116 and D118 by applying heat to one of the legs and lifting the diode away from the board.

**The IC-706MkIIG;** On the main p.c.b., under the speaker near to the crystal, you'll see two rows of solder pads for surface mount components, Fig. 8. On position 10 along this row from the left you'll see a diode, D2030, soldered in. Simply remove this diode using a small (but hot) soldering iron on the leads. After you re-connect your d.c. supply the radio will be automatically reset and the transmit range expanded on h.f. and v.h.f.

**Next Time**  
That's it for this month and I shall be back soon with a further *Buying Second-hand* column. If you'd like any particular types of radios covered in this series then please do get in touch. I've already a nice pile of ideas and information in the pipeline – but I'd welcome being guided further by readers' interests.

### Next Time

I can be contacted by E-mail to [g4hcl@rsgb.org.uk](mailto:g4hcl@rsgb.org.uk) or by post to **PO Box 400, Eastleigh, Hampshire SO53 4ZF, UK.** 'Bye for now, see you next time!