The Icom IC-7000 HF/VHF/UHF T

Carl Mason GW0VSW, enjoys his Amateur Radio when he can get away from his intensive work as a TV news and sports cameraman. He was particularly delighted when offered the chance to review Icom's latest portable/mobile rig. Read on!

When the *PW* Editor called me to ask if I was interested - I have to say that I was rather keen to try out the new Icom IC-7000 h.f./v.h.f., u.h.f. all-mode transceiver!

It must be over 10 years ago now since Icom introduced the IC-706. In those days the '706 was advertised as "The Next generation h.f./v.h.f. compact transceiver capable of operating in both the home as a base station or as a mobile/Portable rig".

The IC-706 could be found on many a DXpedition, large and small. There's no doubt that it became a huge success and was followed by the improved MkII and MKIIG versions, which addressed some of the small problems found in the earlier model. One such gripe was the poor speech quality - especially on v.h.f! That's something that has definitely been addressed on the new model with the addition of various optional microphones to suit your operating environment.

Advanced All-Mode

The IC-7000, **Fig. 1**, is very similar to the '706 although the case is not quite as deep, measuring just 167(W) x 58 (H) x 180(D) mm and weighing in at 2.3kg. The IC-7000 must surely rate as one of the most advanced all-mode mobile transceivers available today.

Whether it's in the shack, in the car or used portable, Carl Mason GW0SVW thinks the Icom IC-7000 is a truly versatile package (see text).

The fitted digital signal processing (DSP) is at the intermediate frequency (i.f.) level and this is just one of several features of the impressive radio. In fact, the IC-7000 uses two DSP chipsets for improved processing on all the Amateur bands.

Altogether there are 41 bandwidths available as standard and you can even select a 'sharp' or 'soft' filter shape to suit your operating taste. A variable twin pass-band tuning (PBT) allows you to either reduce the i.f. pass-band, or to shift the entire pass-band to eliminate most QRM.

The 2.5in (63.5mm) colour thin-film technology (TFT) display, **Fig. 2**, is another interesting feature of the transceiver. Not only does this display provide the operator's current operating set up, showing items such as frequency readout, selected memory, filter in use and mode indicators, it also includes a two-mode band 'scope!

In the **centre mode** the 'scope is centred on the receiving frequency and in the **fixed** mode the bandscope sweeps a fixed range. Eight of the most used radio functions are controlled by dedicated function keys, and these are all arranged around the display. One quick push of a button turns that function on or off. A longer push will allow adjustment of that function's settings. A useful addition is an

Transceiver

By Carl Mason GW0VSW

Fig. 2: Close up view of the TFT display (see text).

Fig. 3: An unusual photograph, clearly demonstrating the TFT display's capabilities (see text).

Fig. 4: The supplied HM-151 microphone (see text for comments).

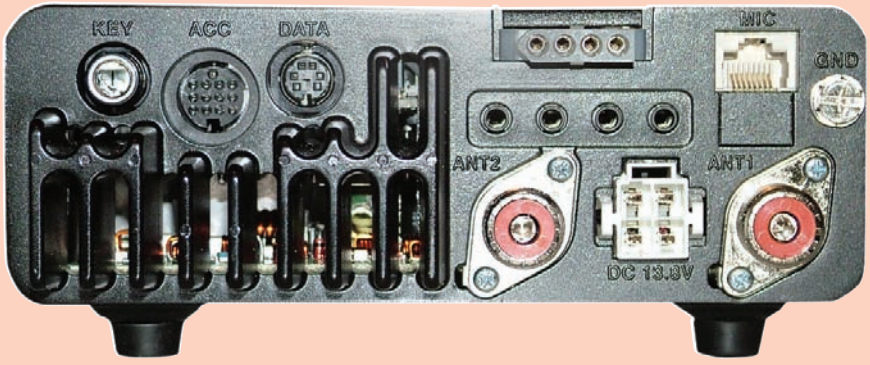


Fig. 5: Rear panel of the IC-7000 (see text).

Fig. 1: The Icom IC-7000 ready for action. Carl Mason GW0VSW regards the TFT display on this rig to be remarkably effective (see text).

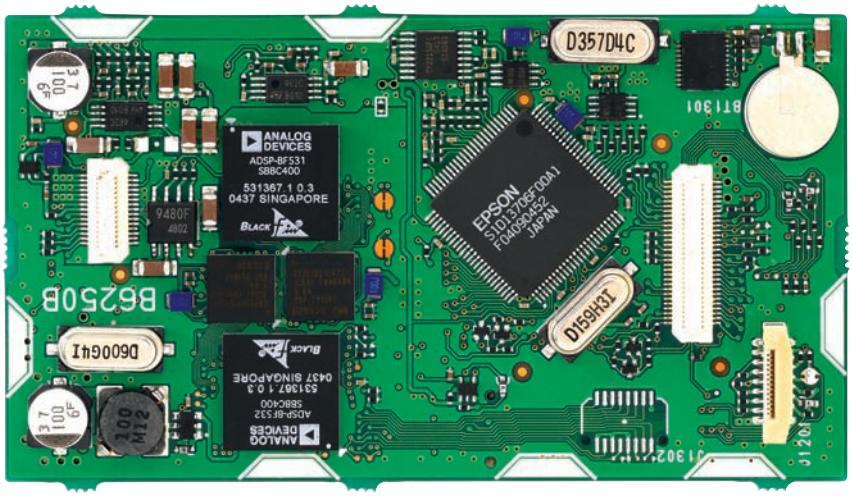
internal memory keyer, which provides four memories for station information or contest exchanges.

The keyer also performs automatic repeat and can also be set up to generate contest serial numbers. Added to this, there's a digital voice recorder that can record for up to 25 minutes, an RTTY demodulator with reader on the TFT screen, adjustable s.s.b. bandwidth, video output and a clock with timers. There's also a DTMF memory and full break-in with adjustable c.w. pitch and a detachable control head. (**Note:** The control head does, however, require an optional separation cable).

So, after the long list you'll get some idea of the amazing facilities available in such a compact package! Out of the box the IC-7000 came with the HM-151 backlit remote microphone, a d.c. power lead, spare fuses, ACC cable, 3.5 and 6.5mm plugs, microphone hanger clip, ferrite bead and the essential manual that runs to 156 pages.

Wide-Band Receiver

The IC-7000 covers all Amateur bands from 1.8 to 28MHz as well as 50, 144



No - it's a radio - not a computer!

and 430MHz and includes a wide-band receiver. Modes of operation include c.w. a.m., s.s.b. f.m. and RTTY. The receiver has wide-band f.m. (WFM) for listening to broadcast stations as well as TV audio.

The case, as already briefly mentioned, is quite compact and extremely well constructed. It should survive the rigours of mobile installations or rough use on DXpeditions with ease!

At the left of the front panel are the **AF/RF** Gain controls. Obviously, you can set the audio frequency (a.f.) volume to suit your taste and hearing. However, I must say that I found the audio quality from the IC-7000's speaker exceptional for its size.

The audio frequency (a.f.) gain and squelch levels are normally set to the '12 o'clock' position for normal use and the squelch is particularly effective when using f.m. This control can be set as an auto function using the internal menu and will operate as an r.f. gain control in either c.w., s.s.b. or RTTY modes, or as a squelch control in a.m., f.m. and WFM modes.

Beneath the AF/RF gain controls, is the **Power** switch followed by the **Pass band Tuning/Memory Channel/RIT** (receiver incremental tuning) control. The general PBT function electronically reduces the i.f. pass-band width by shifting the intermediate frequency slightly outside of the i.f. filter pass-band to reject interference and it's normally set in the centre position.

The limit of the variable range depends on the pass-band width and mode, which for most modes is in 25Hz steps. The operator has to push-and-hold the button for one second to select the menu group and again to select the menu. There are 501 of these memory channels in five memory banks.

Using the **Memory mode** can be useful for quickly changing to your favourite frequencies or bands. The RIT control allows you to adjust your receive frequency up to ±9.999kHz in 1Hz steps without moving the transmit frequency. Incidentally, it's one control I find I'm using more frequently these days - as operators seem less inclined to accurately tune into my signal during a QSO! Especially when using s.s.b. on a crowded band.

Next comes a series of four buttons running vertically. Select the Mode you wish to operate in. Those available on the IC-7000 are **SSB** (**LSB/USB**), **CW**, **CW-R** (Reverse), **RTTY**, **RTTY-R** and they are selected by pushing the button briefly. Pushing and holding for one second allows you to access **AM**, **FM** and **WFM**.

The **Pre-Amp**: This amplifies received signals in the front end circuitry to improve the signal-to-noise ratio and sensitivity. (I used this function a good deal and it was working well when copying weak signals on h.f.).

The transceiver is remarkably compact.

The **Attenuator:** The attenuator reduces the distortion or spurious signals you experienced from strong signals nearby or from broadcast stations. (Not something I needed to use much during the review period).

Next is a **Tuner/Call button.** An optional accessory for the IC-7000 is the **AT-180** automatic antenna tuner (a.a.t.u.) and the tuner button allows you to turn this on once it's connected. The antenna in use is then automatically tuned (once the s.w.r. goes higher than 1.5:1 for h.f.). However, for 50MHz the operator has to push and hold the Call button for one second for the tuner to match.

Note: When using long wire antennas the **AH-4** automatic tuner is recommended and this will enable operation with a wire 7m or longer on 3.5MHz and above.

Main Menu Group

The **Menu/Group** button provides access to the main menu group or to sub-menus. The operator can then select various functions such as **VOX**, **Automatic Gain Control**, **Split Frequency operation**, **Microphone Gain**, **Band Scope**, power levels and so on, using the F1-4 buttons under the screen as selectors or the main dial to set levels.

All told, you can adjust over 50 of the radio's settings using these memories. This all seems rather complicated when you first encounter it but those of you familiar with the IC-706, will agree that after a while accessing the menus becomes second nature and the functions very easy to select or set.

Main Display

Alongside the control keys is the 2.5inch (63.5mm) TFT main display, which on the IC-7000 is colour, was very easy to read in the variety of light conditions I encountered during the review. Contrast and brightness can be adjusted in 1% steps and the background colour can be changed from A - Black, B - White and C - Blue. The photograph, **Fig. 3**, shows just how good a display is possible on this unit!

The operator can decide on the font size they'd like displayed and whether they want it basic or italic. You can even set your callsign to be displayed in the opening screen when turning the power on!

Underneath the screen are four multi-function buttons marked F1 to F4. Like most electronic equipment these days, each button has several functions depending on the time they are pressed or the sequence used. It's something we all have to live with and in fairness to Icom I found that after a period of time, accessing these menus became much easier. Mind you, I always kept the manual near! (Just in case).

The display not only shows the

operating frequency and the various functions that have been set, it can also display a 'meter' for either **RF Power**, **SWR**, **ALC** or **Compression** levels one at a time, or all four simultaneously! Alongside this there's also a small bargraph to show the internal temperature of the transceiver!

More Buttons!

To the right of the screen are four buttons. In ascending order these select the **Noise Blanker**, **Noise Reduction**, **Manual Notch** or the **Auto Notch/Voice Recorder**. The Noise Blanker eliminates the pulse type noise such as that from car ignition systems, or electrical line noise (this feature is not available in WFM). The noise reduction function is designed to enhance a signal in the presence of noise by using the DSP circuitry, and the amount of this is adjustable. The default setting for this is level 4 but this can be altered to suit your taste from 0 to 15.

The manual notch filter can be used in either the selected s.s.b., c.w., RTTY or a.m. modes and can be turned on or off by momentarily pushing the button. Pushing this for one second accesses yet another sub menu where the filter width can be set from **Narrow**, **Middle** or **Wide**.

Auto Notch Functions

The transceiver has both an **Auto Notch** function in the s.s.b., a.m. and f.m. modes. This automatically attenuates up to three beat tones or tuning signals and so on, even if they are varying. The manual notch can be set to attenuate a frequency via the set mode in yet another memory. (A voice recorder can be selected by the same button and I'll cover that later in the review).

A **Tuning** Step button comes next, under which are two light emitting diodes (l.e.d.s) indicating **Transmit** (**TX**) and **Receive** (**RX**) and below that is a button for **Speech Lock**. Next is the **Main Tuning** knob, which is very smooth in operation.

Tuning can be carried out in steps of 0.1, 1, 5, 9, 10, 12.5, 20, 25 and 100kHz to suit your taste and are all independently selectable for each mode. Friction on the tuning knob can be adjusted by a small lever to the right hand side and it can even be set to feel like a ratchet with a very positive 'click' as you turn it! The **BAND Up** and **Down** buttons are positioned in the right hand corners.

Folding Stand

There's a small folding stand on the base of the IC-7000's case, as found on previous models and the speaker and fan units are to be found on the top of the case. There are several different brackets including the MB-105 and separation cables like the OPC-1443 available, should you decide to remove the front panel and mount it away from the main body.

Manufacturer's Specifications & Features

Type:	Icom IC-7000 Amateur h.f/v.h.f/u.h.f transceiver
Frequency range:	TX: 1.8-28, 50,144 and 430MHz
	RX 300kHz - 200MHz/400-470MHz
Modes:	a.m., c.w., s.s.b., f.m., RTTY, PSK31
RF Power output:	h.f./50MHz 144MHz 430MHz
	2-100W 2-50W 2-35W
FM/SSB/CW/RTTY/AM:	1-40W 2-20W 2-14W
Voltage:	13.8V d.c.
Current drain	RX: 1.3-1.6A TX: Max 22A
Impedance:	50Ω, 2 x SO-239
Dimensions:	167W x 58H x 180Dmm
Weight:	2.3Kg

Other features:
DSP, Digital IF filters, Two point manual notch filter, Memory keyer, Auto repeater functions, Multi-function meter Power/SWR/ALC and Compression, 100-step noise blanker, 24 hour clock, CTCSS, DTCS tone squelch, 2.5in TFT display, Back-lit buttons, IF-DSP, 508 memories, Voice recorder, Detachable control head, CI-V, Pre-amp, Digital RF speech compressor, Remote control microphone, RTTY demodulator, Adjustable SSB TX bandwidth, Band-scope, Built-in voice synthesiser, DTMF memory, Audio equaliser.

Microphone HM-151

The microphone supplied with the transceiver is the HM-151, **Fig. 4**, and it has a variety of functions controlled from a keypad. Using the keypad the operator can change band, mode, select a filter, check transmit frequency or programme the function keys to suit personal requirements. Two microphone sockets are provided. (One just under the front panel, and another at the rear) though you can only use one of these at any one time

Rear Panel Connections

The rear panel, **Fig. 5**, on the IC-7000 has the same facilities as are provided on the IC-706. There are two antenna sockets with one for h.f./50MHz and the other for 144 and 430MHz. There's also a 6.3mm type stereo jack for connecting a c.w. paddle or key, and an internal keyer is provided.

Also provided are four sockets, and these include the **Video Out** jack, **Icom CI-V** remote computer interface. However, I must say I was disappointed that there wasn't a USB connector as nearly all of us now have those on our home computers! It would make interfacing far simpler.

Next is an RTTY socket, and one for an external speaker. There's a 13-pin ACC socket for connecting external equipment like a linear amplifier or automatic antenna selector. Also included is a 6-pin data socket where you can connect a soundcard or TNC, plus a microphone connector, ground terminal and the d.c. power socket for use with the supplied cable.

The Morse Mode

For GW0VSW, the 'Morse mode' is the main interest and the IC-7000 does not disappoint. A 6-60 words per minute (w.p.m.) keyer has been included, having four memories and contest serial numbers can also be set. Incidentally again, the instructions to set this up are quite complicated and would take a while to get used to.

Keying speed is, again, set-up in the menu, although I would have preferred something a little easier and quicker to adjust the speed. Going through the memory to change this could be tedious, especially in the heat of a contest for example.

The relay can be heard clicking away when c.w. is being used, but if you're like me and tend to wear headphones - this shouldn't be a problem. I tried a paddle and straight key during the short review period and both worked very well.

Operating On Sideband

Let's now look at operating on s.s.b. And to begin, for sideband operating it's important that you have the IC-7000 set up correctly. So, practising what I preach, I followed the instructions in the manual, adjusting the microphone gain to a suitable level indicated by the ALC meter on the screen

Fig. 6: Denzil Evans GW3CDP/M helped to evaluate the IC-7000's performance on v.h.f. (see text).

and had no problems. In fact, comments on the audio quality during the review period were very complimentary.

As mentioned earlier, the operator can adjust the s.s.b. transmit bandwidth (**TBW**) and I had tried this before on the last version of the IC-756PRO. The filter attenuates frequencies on both the high (500Hz, 2700, 2800 and 2900Hz) or the low side (50Hz, 100, 200 and 300Hz) and you are able to store three combinations of these settings.

Defaults are already set and are 100-2900, 300-2700 and 500-2500Hz. I used the widest settings for all my s.s.b. activity and had no complaints!

The supplied microphone is okay with all its 'bells and whistles', but there's no doubt that my IC-SM6 base station microphone out-performed the fist microphone at all times. I did try this with the OPC-589 adapter I acquired for my IC-706, but used the supplied microphone for the rest of the review!

In fairness to Icom, they clearly state that the supplied HM-151 microphone is more tailored to mobile operation with it's slightly restricted audio response. However, I'm sure that anyone who buys and uses the 7000 for a while, will be able to set up any microphone to work just as they want it to, using the variable settings in the transceiver.

Keyboard Modes

The IC-700 incorporates RTTY and digital (keyboard) modes. However, I'm no expert when it comes to RTTY and digital modes so, it was interesting to find that the IC-7000 has a RTTY decoder already built in. An external TNC is not needed when you wish to receiver a Baudot signal. An RTTY tuning indicator makes tuning that much easier and a tuning meter is automatically displayed on the TFT screen when the decoder is turned on.

Once again menus can be tailored to suit individual needs for the keyboard modes. For instance, you can select the

Fig. 7: Find the IC-7000! The transceiver (see text for Carl's comments) seems to be 'lost' in his shack. But size isn't everything as he found out!

new line code of the internal decoder which by default is CR, LF or CR+LF (CR = Carriage return, LF = Line feed). But to be honest, I'd really need to have the transceiver a while to assess this properly and get to grips with operating using this mode.

Working VHF & UHF

The IC- 7000 is fully equipped for working on the v.h.f. and u.h.f. bands. For me this was useful in a base station but not so much for when working portable or mobile. I tend to use both of these higher bands for local rag chewing only and not for long distance contacts.

With the help of **Denzil Evans GW3CDP** - who monitored my transmissions - I managed to try out both bands from my car. This was achieved by using a small vertical antenna on a magnetic mount on the roof of my car, **Fig. 6**, at locations around our homes up to 24km (15 miles) apart.

The signal strength remained good at 5W and the audio quality was once again crisp and clear, despite some strong local interference. However, I have no doubt that there are those amongst you that will push the rig to its limits and achieve far better results - bearing in mind the limits of such a small transceiver.

One limiting factor of the IC-7000 for the keen v.h.f. operator, is not being able to receive on more than one band at a time and listen for a satellite or local repeater. You can however, set the variable frequency oscillators (v.f.o.s) to transmit on one band and receive on another.

You can of course, also store your favourite repeaters in the internal memories with a standard offset and tone setting. The receiver in these bands is reasonably sensitive, and I had no problems listening to Band II v.h.f. broadcast stations. I particularly enjoyed this when the bands were dead, or when monitoring the control tower at Swansea airport or some of the local maritime channels.

Digital Voice Recorder

The IC-7000 has a built-in digital voice recorder with up to four channels for transmitting, where 90 seconds can be recorded. On receive, there are up to 99 channels available, where a maximum message length of 120 seconds can be recorded, with a total message length for all channels of up to 1500 seconds. This is a very useful addition, especially for those who are interested in contesting or DX operations where consecutive calls are being made.

One touch recording is possible if you are listening to a signal, and this is activated by pushing the **ANF/REC** button for one second to begin the recording and pushing it again for one second to stop. This recording is automatically stopped after 120 seconds or when the total recorded time reaches the maximum allowed.

With conditions so poor during the period when I was doing the review I did record a "CQ" call and used it often. This saved my voice and made for a less stressful operating period!

Built In Clock-Timer

The transceiver has a built-in 24-hour clock, which is always displayed and includes a **Power Off** timed function. This automatically turns the IC-7000 off when no operation has been carried out for a set period between 30-120 minutes in 30 minute steps. A second clock is available so you can have, let's say, both local time and UTC displayed or even the time in another country.

Mobile & Portable On HF

The IC-7000 is designed as a portable rig and I was keen to try it out in my car (E certification is pending and should be approved very soon) to see just how well it would work on h.f., I tried various Pro-AM mobile whips, but conditions only really allowed contacts to be made on the 7MHz band.

Despite several calls to Icom requesting a loan of the AT-180 unit, there wasn't one available in time. I was somewhat disappointed as it would have

been nice to have used the auto tuner in a mobile/portable environment to see just how well the pair worked. However, I decided to use my old MFJ-971, which did the job well and had no problems matching my whips.

The bands were in very poor shape and I did struggle to make any contacts. On 7MHz **DR2006O** operated by **Marcus DF1DV**, she was able to control his large pile-up to pull me out of the noise giving me a 5 and 7 report 'in the clear'.

I heard several other Europeans but was unable to work them. A change to 14MHz was greeted with just one s.s.b. station audible, **Bill M5VIM** near York, who gave me a 5 and 5 on his G5RV before he faded away. A few minutes later *PW* HF Highlights reporter **Chris G1VDP/P** in Cornwall was heard at 5 and 7, but despite several attempts to work him he could not quite get my suffix and he slowly disappeared in the noise!

Lower down the band there were a few c.w. stations operating and I managed a very difficult QSO with **Thaddy HB9DNB** in Lucerne, Switzerland. He was RST339 with me and I was RST559 with him.

The QSB and QRN allowed me to use the IC-7000's filters to good effect, and with the help of the pre-amplifier another call made it into the log. All told I managed to work most of Europe with both voice and the key and copied many DX stations around the globe.

The skip conditions were slightly unusual during the short review period and I monitored quite a number of G stations on 14MHz drifting in and out from well over 59+ to unreadable! My best contact was on this band was with **Toni SV8/HA4DXI** (A Hungarian Amateur working from Greek territory) on EU-174 with 55/59 being exchanged.

Stateside calls finally came in late afternoon with some very strong signals but I wasn't able to achieve a QSO. However, I'm sure with more time and better antennas it would be possible to have worked some of DX stations.

Incidentally, during the mobile period I only needed to consult the manual on a few occasions to adjust settings when I lost track of where I was in the menus! So, I think that with due care and attention to the installation the IC-7000 would perform very well in the car on both h.f. and the higher bands.

Base Station

As a base station, **Fig. 7**, the IC-7000 takes up very little space and looked lost amongst all my other equipment! In fact, the SP-21 speaker I have dwarfed the '7000, but did provide a slight improvement on audio quality although, I prefer to use headphones for most of my operating.

Using a manual a.t.u., it wasn't long before I was working stations on my G5RV on bands from 3.5 to 18MHz. I managed EA6 (Spain), K (USA), OE (Austria), ON (Belgium), DL (Germany), OK (Czech Republic), OH (Finland) and SP (Poland) with little difficulty one afternoon using both c.w. and s.s.b., although conditions could have been better.

I feel the transceiver wasn't as sensitive as the IC-737 I normally use, but it was good enough to work everything I heard. In time I could probably live with it as my 100W rig, when not operating with my usual QRP transceivers.

Exceptional Transceiver

In rounding off the review, there's no doubt in my mind that Icom have produced an exceptional transceiver in the IC-7000. For a multi-band rig in such a small package, that can be used either mobile or portable or as a base station, it's ahead of its class.

The TFT screen is superb and contains just the right amount of information and is easy to read in a variety of lighting conditions. The menus seem complicated at first, but after a while their use becomes second nature. Besides, once you have set up most of these to suit your own particular operating style you won't have to adjust them again!

The number of facilities built into the IC-7000 are truly amazing and it's impossible to do it justice in such a short review. Despite this, I do hope that I've managed to give readers a taste of what is on offer in this remarkable package. It has something for everyone, whether you are an operator or short wave listener. If you want just one transceiver to do everything this one has to be it! For the money I am sure you will not be disappointed. **PW**

Fig. 8: Underside view of the chassis.

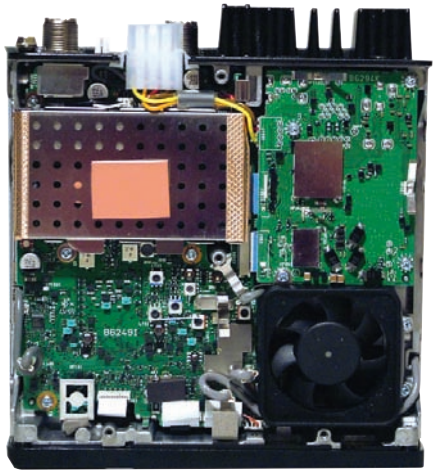


Fig. 9: Top chassis view, with the cooling fan on the right.

Product

Icom IC-7000 all-mode mobile/portable transceiver

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Pros & Cons

Pros: There's no doubt in my mind that Icom have produced an exceptional transceiver in the IC-7000. For a multi-band rig in such a small package, that can be used either mobile or portable or as a base station, it's ahead of its class.

Cons: No USB socket for home computer use, and no a.a.t.u. (optional accessory) available for review.

Price: £1049.95

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