

Cost:	£1699.95
Company:	Kenwood
Contact:	Sales
Tel:	(01923) 816444
FAX:	(01923) 212477
Website:	www.kenwood-electronics.co.uk

The TS-2000 HF, VHF and UHF Transceiver

So much technology is packed into the new Kenwood TS-2000 that two *PW* staff have had to share this review! Tex Swann G1TEX looks at the v.h.f, u.h.f. and computer aspects while Rob Mannion G3XFD leads off with his h.f. evaluation.

I've waited for a very long time to try out the recently introduced Kenwood TS-2000 but this is understandable when you consider just how much design work has to be put into modern transceivers. The results of Kenwood's endeavours is such that to be fair to the transceiver and to keep readers as fully informed as possible, this equipment evaluation is being presented by two *PW* Staff.

Tex Swann G1TEX, *PW*'s Technical Projects Sub-editor will be presenting his opinions on the v.h.f. and u.h.f. aspects of the transceiver together with comments on the accompanying computer software, etc. I on the other hand, will concentrate on my h.f. work with this very interesting transceiver.

What's On Offer?

So, to start off my evaluation of the latest transceiver to come from Kenwood TS-2000 I'll describe just what's on offer. However, I'll try to avoid the list-all-the-details and specifications approach (intending purchasers can read those at a dealer's) and try to present you as much information in a concise form before passing on my opinions on the TS-2000. I say this because reviews are all about opinions aren't they?

The Kenwood TS-2000 is an all-mode transceiver covering - as supplied - all the Amateur Radio bands from 1.8 to 430MHz and includes an automatic antenna tuning unit (a.a.t.u.) as standard for h.f. and 50MHz. Further coverage can be added, using an operational module to enable the transceiver to operate on the 1.3GHz (23cm) band.

The main

transceiver receiver circuitry is a quadruple conversion superhet on a.m., c.w. s.s.b. and frequency shift keying (f.s.k.) modes and uses a triple conversion on narrow band f.m. (n.b.f.m.). The sub receiver is based on a double conversion superhet for the a.m. and n.b.f.m. modes.

General coverage reception is quoted as starting from 30kHz.

control (a.g.c.) and fully adjustable filters down to 50Hz for c.w.

Maximum transmitter output is 100W on c.w., s.s.b. f.s.k. and n.b.f.m. on all bands from 1.8 to 144MHz. Maximum output is quoted as 50W on 430MHz and 10W on the 23cm (1.2GHz) band. Minimum quoted power output on h.f., 50 and 144MHz is 5W, and 1W on 1.2GHz.



● Kenwood UK's user-friendly TS-2000 which Rob G3XFD considers to be a worthy stablemate for the TS-870.

● Fig. 1: Close up view of the very clear, simple and straightforward l.c.d. main display, showing the multi-function meter. The selected DSP filter parameters are displayed under the Filter logo in the form of bargraph segments (see text).



However the receiver I had tuned to below 30kHz and Kenwood confirm that this will normally be the case

Intermediate frequencies (i.f.s) for the quadruple conversion superhet main receiver are as follows: The first i.f. on the general coverage range (300kHz to 60MHz) is 69.085MHz or 75.925MHz (the i.f. is selected automatically when satellite mode operation is in use). For 144 and 430MHz the first i.f. is 41.894MHz and for the 1.2GHz band it's 135.495MHz.

The second i.f. is 10.695MHz, the third is 455kHz and the fourth is 12kHz. On the sub-receiver (dual conversion) the first i.f. is 58.525MHz and the second is 455kHz.

The transceiver is provided with dual high speed digital signal processing (DSP) facilities. These provide high speed automatic gain

The maximum quoted power output on amplitude modulation (a.m.) 25W on 1.8 to 144MHz and 12.5W on 430MHz and 1W on 1.2GHz. The minimum on h.f., v.h.f. and u.h.f. is 5W and the lowest output available on 1.2GHz is 1W.

Other important features include: a built-in 9600/1200bps TNC for DX packet cluster tune (PCT). There's also an Instant Satellite communications key.

Switching On

In my opinion the **acid test** for the ever increasingly complex equipment arriving on the Amateur Radio market is switching on the unit for the first time. In my experience this can be a process fraught with difficulty, but it wasn't so with the FT-2000 because it only took a moment and was achieved

without referring to the manual - quite remarkable when you bear in mind the complex nature of modern equipment! However, the supplied manual **is really excellent** and to get the best out of the transceiver many features **it really is required reading!**

Once the transceiver was on I was greeted by the synthesised voice from the (optional) built-in unit which told me the frequencies. Normally I'm not happy with these annoying voices but this one was very friendly, and did not seem to have an accent.

And (unlike Tex who told me he switched it off!) I found the facility very helpful when tuning around as I worked. Undoubtedly, I feel that operators who have no sight at all, or more commonly have failing sight, will find the facility very helpful.

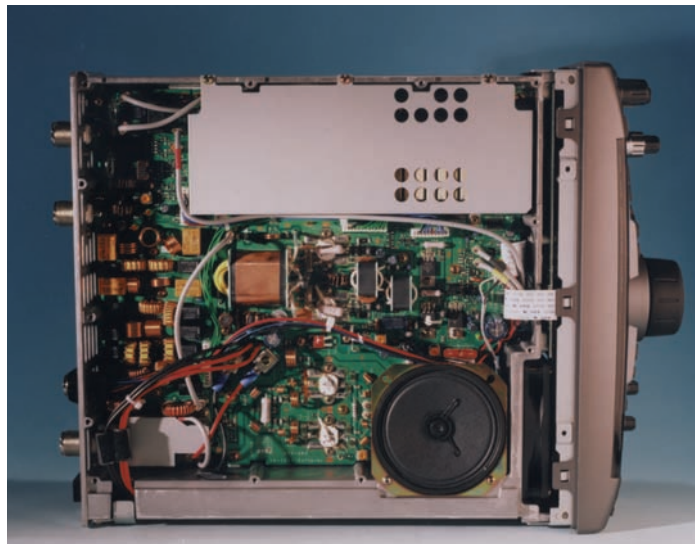
The TS-2000's large l.c.d. main panel and display is excellent. It's extremely clear, with a light yellow-buff coloured background, and due to its size I think that the digital frequency display is ideal for anyone with visual problems. The multi-function l.c.d. meter is also very useful, clear and has many functions.

In use I found that the front panel display showing the settings on the DSP filtering to be excellent. Tailoring the filter to your own satisfaction is made so much easier because you can see just what configuration has been selected.

At first I wasn't too sure about the front panel ergonomics and the general lay-out of the controls - bearing in mind that I'm an enforced left-hander of course! However, despite this I was soon feeling very much at home when operating the transceiver at home and to a very limited extent - when operating from my car in the portable mode.

Incidentally, although I feel that Kenwood have thought of this transceiver generally as a main station rig...it's my opinion that it will prove very useful for portable operation. It's just the right size for either option as far as I'm concerned.

Kenwood have obviously put a great deal of effort into designing a good front panel. I'm very impressed and felt very much at ease during the hours I had the transceiver on the air. So, with that reminder it's time to recount just how much I enjoyed using the '2000 on the bands.



● Fig. 2: Inside top chassis view. Note the relatively large loudspeaker which provides excellent audio quality on Amateur transmissions and broadcast stations (see text).

On The Air

It was my intention to carry out some of the on-air testing from my preferred h.f. portable site at Holt Heath near Wimborne. However, the spreading tragedy of the Foot and Mouth disease put paid to any ideas of extended h.f. portable operations. Despite this, I managed one afternoon and several evenings on the way home from the office.

With the facility of running at reduced power I found that the '2000 did very well indeed from my car. In fact it's small enough to place above the instrument panel, directly on the driver's side of the windscreen. What a delight it proved to be!

Using the TS-2000 from the car proved to be a great idea and I had QSOs with stations all over the UK and into Ireland and far beyond on both c.w. and s.s.b. Incidentally, the built in electronic keyer meant I didn't need to take my own keyer unit, all I needed was my paddle (I'm finding a straight Morse key difficult at the moment due to my arthritis). I've no adverse comment whatsoever about the built-in keyer, it was ideal for me and the menu control, like all the menus on the transceiver seemed exceptionally easy to use even for this dinosaur of a Radio Amateur!

Operating mostly on 7, 14 and 18MHz - with short excursions to 3.5 and 28MHz, I quickly found that the receiver was excellent, with the added support of the very efficient DSP facilities for difficult conditions. However, on my favourite band of 7MHz I found that the DSP really came into its own -

found that conditions on 7MHz were difficult enough to put a strain on my own base-station transceiver which is used with a W9GR DPS-II unit. Normally, I find that this little add-on unit works extremely well with any of my own transceivers which range from two to over 20 years old, but conditions were so difficult that the W9GR unit did not have the flexibility of the DSP provided on the TS-2000.

On c.w. I soon found that the claim of brick-wall selectivity provided by DSP filtering was again proved right. I'm sure that once they've tried it out, even the most experienced c.w. operator will be most impressed with the flexibility and effects of the DSP filtering on c.w.

Despite my praise for the effect of DSP on the c.w. mode, I feel that the most spectacular effect for the operator has got to be the improvement it offers on s.s.b. QSOs - especially on 7MHz, and particularly 3.5MHz during the evenings. This was clearly demonstrated on several weekends when I either listened into, or joined in with, the Worked All Ireland net

proving to be superbly effective.

And up on 14MHz the annoying QRM from packet stations operating almost directly on the 14.1MHz cw. beacon frequencies was dramatically reduced. Even under the worst QRM I found it possible to copy the fairly low power beacons - despite the best efforts of the h.f. packet transmission to drown them out!

Operating from my home I

● Fig. 3: Under chassis inside view.





● Fig. 4: Rear panel view of the TS-2000 (see Tex Swann G1TEX's review comments).

● Fig. 5: Starting the installation process for the ARCP-2000 software, standard with the TS-B2000 'black-box' version of the rig, but a useful optional extra with the TS-2000E.



on 7.068MHz - here the help of the DSP was remarkable, reducing noise, splatter from nearby channels and generally assisting in the reception of the relatively low level signals from mobile stations very effectively indeed.

Listening for long periods, whether it be Amateur transmissions or h.f. broadcast stations, was made much easier by the DSP. A far cry from the switchy-sounding audio

effects I first reported on a few years ago when reviewing DSP equipped transceivers.

The audio quality reports I was able to provide pleased me and the stations I worked. Additionally (a very important test I think) a number of stations commented that my voice was very recognisable. An excellent compliment to communications quality radiotelephone s.s.b. speech I feel!

Tex Swann's Opinion

So, now it's Tex Swann G1TEX turn to give his opinion on the TS-2000. To begin he provides his own quick overview of the complete transceiver package.

"I was asked to have a look at the v.h.f. and computer control side of the TS-2000 and to voice my opinions and comment. So, what did I find? Well, I found a rather pleasing rig, that is not only a very capable radio, but can also receive from v.l.f. through the short wave bands, and includes the 144 and 430MHz bands.

Anyone who would like to try the new v.l.f. band might need to look no further. The receive side starts at 300kHz and goes right through to 60MHz without a break. But that's the receiver side, the transmit capabilities are almost as good, covering, with the exception of 70MHz, all the amateur bands from 1.8 - 430MHz.

The TS-2000 seems to break the Amateur Radio bands into two main areas. There's the h.f. band (which on the TS-2000E includes 50MHz) and the v.h.f./u.h.f. bands, cover 144 and 430MHz.

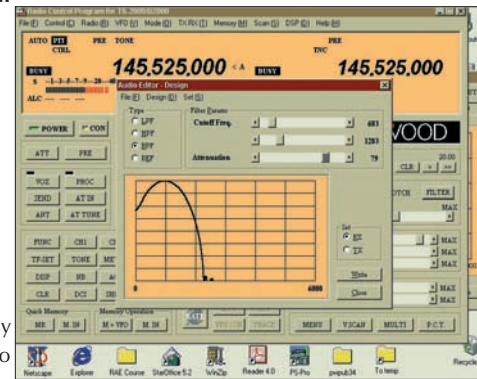
The 1.2GHz (23cm) band will drop neatly into this latter section if the optional 1.2GHz module is fitted. But sadly there doesn't look as if there will be a 70MHz option, falling as it does, between the two major area of Amateur activity.

The antenna sockets on the back panel seem to reflect the band layout. Socket labelled Ant 1 and Ant 2 cover the h.f. bands, both cover 0-60MHz - operator choice. Though they seem to be interchangeable, in reality one of the

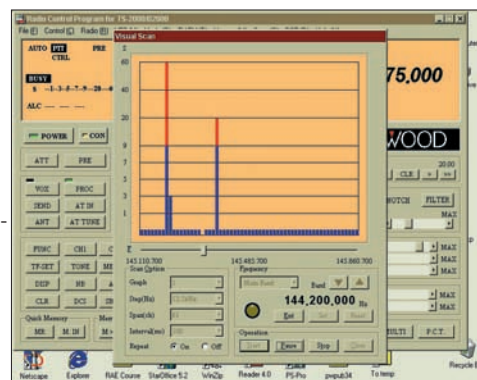
outlets would be for the real h.f. bands of 1.8-28MHz bands and the other could feed a 50MHz specific antenna.

Both the 144 and 430MHz bands have their own non-selectable dedicated antenna output sockets. This would also apply to the optional 1.296GHz unit, for which there is a space for its antenna outlet marked on the back panel.

While trying out the TS-2000, I spent a little time just using it as a receiver, where I found it to be a creditable one at that tuning continuously from l.f. to 60MHz, rolling round at either end. But the v.h.f. and u.h.f. bands started and ended with Amateur frequencies



● Design your own audio filter. This one, G1TEX designed earlier is suitable for a c.w. session.



● The virtual scan facility in use showing signals and their levels. This display is to be treated with caution, the strong signal was only present momentarily though, looking like a single signal, but in reality it could be heard almost anywhere in the band.

only. Again rolling round at both ends of the bands. I found little to complain about while listening on h.f., but I found the v.h.f. reception a little prone to a rather powerful data mode

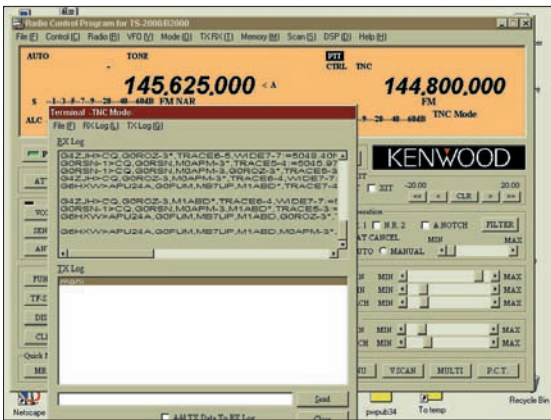


● Using the built-in T.N.C. to monitor what is being sent over local APRS transmissions.

1.2GHz as the module was not available.

Wide band reception is also available as a dealer modification. The modification provides airband (a.m.) and marine band.

● Fig. 6: In use the screen image mirrors much of what may be seen on the TS-2000's screen, but allows easier access to the workings so the rig.



● Access to the TS-2000's menus is made very much easier using the ARCP-2000 software.

using both 144 and 430MHz.

So, with the minor niggles of the data transmission breakthrough, I found that the TS-2000 is a pleasant to operate rig that both implies and delivers quality in all things.

Conversation With Locals

In conversation with a group of amateurs local to myself (10-30km) I had favourable comments from **Roger M0AUI**, **Steve G0TOT** and **Mark 2E1CEQ**

Computer Software

I also had the optional ARCP-2000 computer software to fully control all the functions of the TS-2000 from a nearby computer. The ARCP-2000 software package can, as you would expect, replicate all the function buttons of the front panel. The ARCP-2000 software is an option with the standard TS-2000, but is part of the remote control head version, the TS-B2000. I found the programs ran quite

smoothly on my P90 laptop computer, talking to the rig at up to 56Kb to control it. The software also allows you to do clever things like create your own parameter DSP filters, and to apply them to particular modes and bands on both transmit or receive. It also make tuning very much simpler and quicker.

Another trick, is that the software can drive the TS-2000's on-board packet TNC. Although I've been a supportive member of my local packet radio group for many years, it's almost that long since I've used the mode!

So, I had to try and remember how to drive the TNC from the keyboard. Packet operation was otherwise faultless (apart from my own memory) though I'd like to see text wrap in the window on the next version.

I found the virtual scan function very useful to get an insight in to what frequencies were in use on the spectrum plot display. Though the step-rate was, I felt, rather slow when a wide band of frequencies was being scanned, but very useful nonetheless!

An additional piece of software that is currently in Beta test and should be freely available soon, is MCP a memory control panel, which allows you to read, write and upload the 300+ memory locations of the radio. So, that's it from me

Product

The Kenwood TS-2000 all-mode multi-bander

Pros & Cons

Pros: Extremely easy-to-use and fits the can-take-anywhere category.

Cons: At first G3XFD found styling took a bit of "getting used to".

Summary

Well done again Kenwood! I thoroughly enjoyed using the TS-2000 and I thank Dave Wilkins G5HY of Kenwood UK, Kenwood House, Dwight Road, Watford, Hertfordshire, for the loan of the review transceiver.

Accessories

Voice synthesiser unit (VS-3), DSP-compatible desktop microphone (MC-90)

Price

The TS-2000 recommended price within the UK is £1699.95

and now it's back to him" (The Editor!).

In Rob's Shack?

So, in rounding off this review it's time for my opinions. Will the TS-2000 be found in my shack? The short answer is yes, this transceiver appeals to me very much indeed in looks, facilities, performance and general user-friendliness. This is helped by an excellent easy-to-understand manual.

I still think that in its class the Kenwood TS-870 main station transceiver is a hard act to follow - but the TS-2000 is an excellent stablemate as it's more portable and much easier to use (the '870 offers superb results but can take some getting used to). In my opinion I think that the '2000 will become very popular because it also performs extremely well on the bands, is extremely easy to use and falls into the **I-can-take-it-anywhere** category.

PW