Review

Roger Cooke G3LDI finally gets his hands on the latest offering from Kenwood. The TS-590S has been a long time coming and has been eagerly awaited by Kenwood fans!

It's Here! The Kenwood TS-590S

The TS-590S is the new high frequency (h.f.) and 50MHz transceiver from Kenwood and has been long awaited. It has been several years since an h.f. radio has emerged from the Kenwood stable and there are quite a number of dedicated Kenwood fans waiting for this one! However, the International nature of Amateur Radio came to the surface when I was unpacking it – as I found a selection of manuals in six different languages to test my linguistic skills!

The new TS-590S employs down conversion for the first intermediate frequency (i.f.), resulting in excellent dynamic range when adjacent unwanted signals are present. It is also equipped with a 32-bit Floating-point d.s.p. featuring advanced technology that enables the rig's unique i.f. automatic gain control (a.g.c.). These, plus other advanced features are what h.f. enthusiasts all over the world have been anticipating.

Typical Kenwood Styling

The TS-590S has a typical Kenwood styling and appearance, with a large liquid crystal display (l.c.d.). This is adjustable in brightness and also colour selectable, orange or green with a wide viewing angle.

From an engineering standpoint, as can be seen from the photographs, the transceiver is really well put together. There is a predominance of surface mount technology so I would suggest that servicing is not within the normal Radio Amateur's capability.

The main specifications are shown at the end of this article**.** More details are available on the Internet for those wishing to see a full list. A wide variety of accessories are also available.

The review transceiver was supplied with the voice guide unit, which is invaluable for the visually impaired. However, I'm fortunate enough to have good vision for my age!

There's a wide variety of parameters to set up. A comprehensive menu system is used in conjunction with multi-function front panel buttons. I soon realised it would pay to spend some time with these to become familiar with the various selections that are available.

An important feature to start with is the built-in automatic antenna tuning unit (a.a.t.u.) with 32 frequency ranges that automatically change as you change the variable frequency oscillator (v.f.o.) frequency. Three antenna inputs on the rear panel allow for two transmit antennas and one receive antenna. A built-in multi-function c.w. keyer caters for the Morse enthusiast. And for those that enjoy remote operation, providing you have two v.h.f./u.h.f. transceivers; the TS-590S is equipped with *Sky Command II* to enable this function.

Note*:** Sky Command *is a system that allows the operator to remotely control and operate the 'main' rig via Sky Command capable mobile or hand-held rigs.* ***Editor.

Like many modern transceivers, the TS-590S transmit section uses a die-cast aluminium chassis, together with a large heat-sink to increase heat dissipation efficiency. The cooling system uses two large 60mm square fans, which enables them to run at a much lower revolutions per minute (r.p.m.) while still providing more airflow. Lower r.p.m. means less noise! This careful type of design feature makes the transceiver eminently suitable for DX-peditions or during contests.

Control & Host Programs

The *ARCP-590* Radio control program and *ARHP-590* radio host program will

be available as free download from the Kenwood site. There's a growing interest in remote operation over the Internet and I think that this is yet another very different and new facet of our hobby that has an appeal for some operators.

It's also possible to use the COM port to a v.h.f. or u.h.f. radio and pass the cluster spots to the transceiver, which then moves to the spot frequency. However, using a contest program such as *N1MM*, it's possible to do that with the program connected to an Internet Cluster Node, and it's much faster. (The same could apply to the TS-590S, of course).

Main Attractions

One of the main attractions of the TS-590S design, in my opinion, is the receive side. At 21MHz and below, the transceiver employs down conversion. The first roofing filter at 6kHz bandwidth is directly after the mixer and the second roofing filter is a 2.7kHz wide device after the post amplifier. This gives a good dynamic range and enables the transceiver to deal with strong adjacent channel interference, enabling copy on weak signals that wouldn't be possible in some transceivers.

Optimum operation is again assured by the use of the 32-bit floating-point digital signal processing (DSP) at the i.f. This controls a wide range of features such as the a.g.c. function, channel filtering and noise reduction.

The (already briefly mentioned) pre-set type a.a.t.u. enables quick band changing and it also operates when the TS-590S is receiving. When the transmit frequency changes, the requisite pre-set is loaded into the antenna tuner circuit to ensure that optimum matching is rapidly achieved without having to retune. The operator can configure a maximum of 32 frequency ranges for both v.f.o.s to change the operating mode automatically as the v.f.o. frequency is changed.

The Menu System

To use the menu system efficiently, I had to keep referring to the manual, but this is to be expected – the rule RTFM (Read the Flaming Manual!) applies here! Most transceivers are menu driven these days and they all have a different way of operating the menus. However, after a few trial runs, I soon got used to adjusting various menu items. There are 88 menu selections and these can be set up in two different files, Menu A and Menu B.

The operator can choose to have one menu for one type of operation and the other menu for something completely different, or even set up the transceiver for two different operators! There are also two programmable keys on the front panel, **PFA** and **PFB**. There's a list of menu items that can be assigned to these buttons, as well as four extra buttons on the desk microphone, an optional extra. Unfortunately, for the review I had the fist microphone and this doesn't have that facility.

The menu number information is in the main display area and in the sub area is the menu item information. This scrolls from right to left. Once the Menu button is pressed the menu number can be selected by using the **MULTI/CH** control. It took me a while to get used to the menu selections until I just followed the orange arrows on the keys concerned.

The USB/COM Ports

Thanks to the addition of a USB port, the TS-590S can be hooked up to a PC with a USB cable, enabling PC control of the transceiver plus transmit/receive audio connectivity. The *ARUA-10* software to control the USB audio system line of the PC can be downloaded from the Kenwood Internet site.

Data can also be transposed from one TS-590S to another or similar Kenwood transceiver by directly connecting the two transceivers by using the COM RS-232 connectors on the rear apron. The built-in firmware is also upgradable on-line.

Repeater & FM Operations

For those that enjoy h.f. repeater use, both narrow and wide frequency modulation (f.m.) is available and when propagation allows, the 28MHz repeaters can be used along with those on 50MHz. Tone access is programmable with a selection of frequencies as is an identifying scan function.

It's also possible to select a Continuous Tone Controlled Squelch

The rear panel of the transceiver showing the h.f. and 50MHz antenna inputs.

Product
The Kenwood FT-590S h.f. and 50MHz transceiver

Supplier
Kenwood Communications UK

Pros
The TS-590S is pleasant and intuitive to use and once the operator is familiar with the controls/menu, etc., it will hold its own with any of the more expensive transceivers.

Cons
As a mid-price range transceiver the TS-590S doesn't have some of the bells and whistles of a transceiver costing more. However, it does have some bells and whistles that the more expensive transceivers don't have!

Price: £1521

Accessories
HS-5 Deluxe Headphones, HS-6 Lightweight Headphones, MB-430 Mobile mounting bracket, MC-60A Desk Microphone, PS-60 Heavy Duty Power Supply and P-23 External Speaker.

Further Information
www.kenwood-electronics.co.uk/products/comms

System (CTCSS) sub-audible tone to concur with someone you only wish to hear, rejecting all others. There's also the amplitude modulation (a.m.) mode available for those who wish to occupy large parts of the spectrum!

The VGS-1 Voice Guide Unit

The VGS-1 Voice Guide unit unit is an option (it was supplied fitted on the review rig), but is invaluable for the visually impaired. It can be seen in the picture as the small aluminium box on the main printed circuit board (p.c.b.) at the top left corner.

In use the VGS-1 announces the key function and frequencies each time the operators presses a key. You can also record two 30 second long messages in memory channels one and two and two 15 second long messages in memory channels three and four. It's also possible to store the last 30 seconds of an incoming signal to the VGS-1 for later playback.

The VGS-11 also 'speaks' an extensive selection of menu items and their settings, plus the receiver S-meter and transmit power levels – which will be very helpful for visually impaired operators.

Data Modes

Regular *PW* readers will know that I'm a keen RTTY operator and of course, I was interested in trying the 590's capabilities. However, reading the manual it told me that an 'MCP' was needed for RTTY operation. I wasn't sure what this was, so I had to search for it and it turned out it means Multimode Communications Processor. In practice, I think this could mean any data interface as long as it's connected to the ACC-2 13 pin DIN connector on the rear of the transceiver.

There's a pin-out diagram on page 67 of the manual which should help with the wiring of a connecting lead. Selecting FSK from the front panel enables high tones (the standard for FSK) to be used, namely 2125 and 2295Hz, although 2175 is mentioned in the manual as the high tone. However, as much as I'd have liked to, I didn't get the time to try the transceiver on data modes.

Other data, audio frequency shift keying (AFSK) modes are connected to the same port, using the audio input and output lines to either a Terminal Node Controller (TNC) for packet, pactor, PSK31, SSTV and so on. Bandwidth settings are controlled and set by the concentric controls Hi-shift/Lo-width on the front panel. The roofing filter is set automatically for mode and bandwidth and cannot be changed.

Memory Functions

There are the usual features associated with memory functions in modern transceivers, 110 channels in total. 100 of these are for normally stored data, such as skeds, DX monitoring, etc., and **P0** to **P9** are used for programming tuning ranges and scan ranges. All the usual functions are there, including memory recall, transfer from memory to v.f.o. and vice versa, so a study of the book is called for to become familiar with them all.

The operator can assign names to each memory channel, up to a maximum of eight alpha-numeric characters. There's also a scratch-pad quick memory similar to that on the Yaesu FT-1000MP, with a stack of 10, the bottom one of which eventually falls off.

Interestingly, there's an extremely versatile scanning function, which is programmable and can cover either the complete receiver, **VFO Scan**, a **Program Scan**, using the memories in whatever way you wish. Again, reading the book is essential here.

Operating On CW

For the c.w. operator, there is a built-in programmable electronic keyer which is very nice to use and the paddle just plugs into the socket on the rear apron. It has a range of 4 words per minute (w.p.m.) to 60w.p.m. I tried both and will leave it to you to guess which one I found easier! My normal chatting speed of 25w.p.m. is quite adequate. However, for those into contesting, an external contest program would be better as the built-in-keyer has no incremental serial number facility.

The individual operator can, however, program one of the four c.w. memory channels to interrupt the playback and insert their own serial number. The transceiver came with a sidetone of 850Hz (a frequency which I found to very unpleasant) so I quickly lowered this to my usual 400Hz and it was fine. The rise time is selectable in the menu 1,2,4 and 6 and I found 4 to be the most pleasant. The dot/dash weighting is also programmable and there's provision for either full break-in or semi-break-in.

I dislike full break-in for c.w. operations and found there was a distinct thump using that (as there is on my own transceiver). I much prefer semi-break-in with a time constant set to just maintain transmit during a space and again this is adjustable.

The four memories are also easily programmed and each one can store approximately 50 characters. Playback is simple; just push the same memory channel and off it goes! These can be set to repeat if necessary, a 'CQ TEST' perhaps on one channel.

Additionally, if you really want to make life difficult for yourself, you can even use the **Up**/**Down** keys on the microphone as a paddle! The usual ability to swap paddle position is also available, reversing dots and dashes and there's also a socket on the rear apron for a straight key.

One nice thing I found when listening to the c.w. end of the band in s.s.b. mode, a menu setting will allow you to use the keyer instantaneously if you want. And it doesn't matter what sideband you are listening to either – very useful indeed for busting a pile-up without having to resort to changing modes and retuning! Another neat feature is the auto zero-beat, which is selectable or not from the front panel. This ensures that you'll be zero beat with the station you're calling.

Editorial note: *David Wilkins G5HY of Kenwood Communications UK up-dated us on an important modification to the TS-590's internal electronic keyer: David writes, "We asked Japan to add a choice of Mode-A or Mode-B keying to the internal keyer. Earlier models of the transceiver were fixed in Mode-B, which some operators took an intense dislike to – so we regard this new feature as being very much what the customer wants!"*

Other Features

One thing that's not built-into the TS-590S is a separate sub-receiver. However, it also has split operation with the two v.f.o.s. To listen on either frequency would entail swapping, so there's no ability to monitor both frequencies something I do a lot here at G3LDI and I don't think I would like to be without a separate sub-receiver.

The multi-function metering measures six parameters; signal strength, power output, automatic level control (ALC) status, standing wave ratio (s.w.r.), compression and the i.f. filter width.

There are several ways to selecting the operating frequency. You can do it the 'old fashioned' way, i.e. turning the v.f.o. a few or many times, or you can enter it directly from the keypad.

The keypad doubles as the band change buttons. You just have to press **ENT** first and **ENT** again to complete the selection. You can also the **MULTI**/**CH** control to change frequency in steps of 1MHz. It's also possible to select 100, 500kHz or 1MHz from the menu.

A quick QSY (change of frequency) around the band is again possible with

the **MULTI/CH** control, using steps of 5kHz and again this can be changed in the menu. Fine tuning is also available in 10Hz steps, which is selectable from the front panel. And, as we expect nowadays, receiver incremental tune (RIT) and transmitter incremental tune (XIT) are both available with the offset displayed. A clear button reverts back to original setting.

Beeps are selectable on/off but again these are useful to the visually impaired and a lock function disables some keys and controls to prevent you from changing your favourite settings.

The band change buttons are also triple band-stacking registers. Each one 'remembers' three settings of mode, frequency and other settings. So, if you wanted you could set up three changes on each band, c.w., RTTY and single sideband (s.s.b.) and just a push of the band button would take you there.

Power is adjustable in 1W steps from five to 100W and it would pay to set this for 75W when using the transceiver on data modes. This is because data modes requires 100% duty cycle operation.

To deal with interference, the TS-590S is equipped with very good digital signal processing (DSP) filtering technology. The d.s.p. can control the bandwidth, reduce the noise or take out a carrier. For reducing interference i.f. filtering is selectable from the front panel specifying the bandwidth. This is also shown on the meter display. Using the **LO/WIDTH** and **HI/SHIFT** controls, you can select suitable bandwidths for all modes.

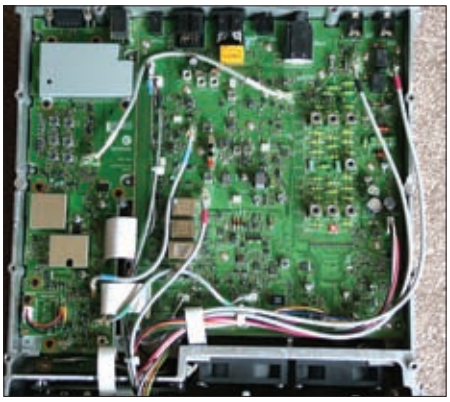
There's an auto notch and a manual notch filter, both of which are very effective and deep. The beat cancel function is also useful in s.s.b. mode and it would pay to play with these for a while to get used to them.

Two noise blankers, or 'reduction functions' in modern parlance, are used to reduce interference and a nearby electric fence was certainly quietened down by these. Electric fence are one of the penalties of living in the countryside!

A pre-amplifier is also available from the front panel, if needed. There's also a low output for use with a transverter.

A pair of slow running 60mm square fans assist the cooling on the TS-590S.

The main r.f. and filter board.



The main board has space for the optional speech unit (top left in the aluminium box).

On The Air

I completed some setting up of both the audio tailoring and the c.w. keyer and then let it loose on the air to get some reports. My first test was to go onto the Ex-G net that I attend every day on 14.337MHz using my Rhombic antenns (I used the rig intensively on this net during the time I had it on review), to obtain some reports from those regulars that know me well and would give me an instant audio report.

Much to my surprise, there wasn't one comment, so I had obviously set it up fairly well! However, when I asked for comments, the same comments came from two members of the net, that there was a lack of bass. So, I quickly made an adjustment to that and the ensuing comments were favourable.

I also worked a number of USA and Canadian stations, one in ZF1, Grand Cayman Island, ZL50VK in New Zealand and an OY and a UA9 on 1.8MHz. The Top Band QSOs were on c.w. using a 1.8MHz inverted V dipole with the apex at 90ft on my tower.

The TS-590's high contrast main display.

Using the processor made a considerable difference too, although care should be taken on the level of processing. I was using the fist microphone, so other microphones would need adjusting too and would probably provide a better response for DX working. I was using the radio with the built-in speaker, and whilst this is quite adequate, I think an external speaker would enhance user satisfaction.

Morse Mode Nice!

Operating in the Morse mode was quite nice to use, a pleasant side-tone (once lowered to 400Hz!), and I had quite a nice surprise on 1.8MHz. I used the transceiver on this band to compare the noise level with my own FT-2000. At the time I tried it, I was pleasantly surprised to find an S-3 noise level. I thought that 'Mr. Murphy' must still be on his Christmas holiday!

I worked two new countries, **4L4O** (Georgia) and **Gabriel Mardiros OD5NJ** in Lebanon. Using semi-break in makes for a seamless Morse experience and coupled with the ability to filter down to 50Hz if necessary, with minimal ringing, makes the TS-590S a very worthy c.w. transceiver.

I think that the TS-590S, with a price of £1521, is a mid-price range transceiver and as such it doesn't have some of the bells and whistles of a transceiver costing a few hundred more.

However, the TS-590S does have some bells and whistles that the more expensive transceivers don't have! I did a few tests to compare it with my Yaesu FT-2000 and to be frank it was difficult to tell any difference at all. The TS-590S is pleasant and intuitive to use and once the operator is familiar with the controls/menu,etc., it will hold its own with any of the more expensive transceivers. My thanks go to **David Wilkins G5HY** from Kenwood Communications for the loan of the radio. **PW**

Manufacturer's Specifications

General

Receiver coverage:	130kHz to 30MHz, 50-54MHz.
Transmitter coverage:	All Amateur bands including 5MHz.
Modes:	a.m., c.w., s.s.b., f.m.,f.s.k.
Sensitivity	<0.2µV.
Selectivity	12, 6, 2.2kHz, 500Hz.
Frequency stability	±5 p.p.m.
Minimum-maximum power output	5 to 100W (low output available for transverter).
Amplitude modulation pow output	Max. 25W minimum 5W.
Power supply	13.8V d.c. (±15%).
Current consumption	20.5A max on transmit. Receive (no signal) 1.5A or less.
Antenna impedance	50Ω
Antenna tunable impedance auto-tune range	16.7 to 150Ω
Dimensions	108x280x335mm (*HWD*) 4.2H x 11W x 13.2D
Weight	7.4kg (16.3lb)

Transmitter

Modulation type:	s.s.b. balance modulation, f.m. reactance modulation, a.m. low power modulation.
Maximum freq. deviation (f.m.):	Less than ±5kHz (wide). Less than ±2.5kHz (narrow).
Spurious responses:	1.7 to 40MHz less than -50dB. 40MHz or more less than -60dB.
Carrier suppression:	More than 50dB.
Unwanted sideband suppression:	More than 50dB.
Tranbsmit freq. response:	-6dB 400Hz to 2.6kHz.
Microphone impedance:	600Ω.
Variable XIT range:	±9.999kHz.

Receiver

Circuitry design:	Double superhet
1st intermediate freq:	11.374MHz.
2nd intermediate freq:	24kHz.
Triple Superhet	
1st intermediate freq:	73.095MHz.
2nd intermediate freq:	10.695MHz.
3rd intermediate frequency:	24kHz (except f.m. which is 455kHz).

Fitted items

SO-3 Hi-stability Crystal Oscillator	Fitted.
VGS-1 Voice Guide and Storage unit	Fitted (supplied with review model).

Optional extras

HS-5 Deluxe Headphones
HS-6 Lightweight Headphones
MB-430 Mobile mounting bracket
MC-60A Desk Microphone
PS-60 Heavy Duty Power Supply
P-23 External Speaker