

Equipment Review

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The Kenwood TS-450S All Mode HF Transceiver

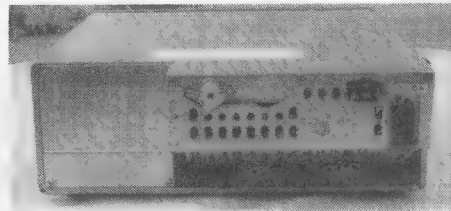
IT SEEMS THAT THE DESIGN staff at Kenwood have really been working overtime, with three new HF transceivers hitting the deck over the past few months. Firstly, the TS-850S, which seems to be creating quite a stir amongst the DX experts, and now a replacement for the popular TS-440S. We hope to take a close look at the 850 in the very near future, but for the moment we will concentrate on the 450. However, to round out the story, the new 450 is also available with 6m coverage, and in this guise is called the TS-690S.

The TS-450S follows the line started with the TS-430S back in 1983. Yes, it doesn't seem that far back. The TS-440S was introduced in 1986, so both of these have been around a long time. All three models share a very distinct family resemblance. All were built to provide a general coverage receiver with transmit output on all of the HF amateur bands. All have 100 watts output, and the two later models have built-in automatic antenna tuners. Front panel size is the same for all transceivers, with the depth varying slightly with each model. The new TS-450S is actually 8mm shorter than the TS-440, however, it weighs in at 200g more than its predecessor.

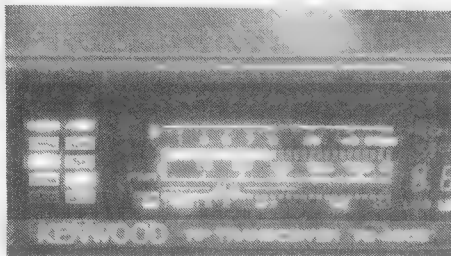
Probably the biggest change to the casual observer is the new colour - it's now charcoal black in place of the old silver grey. I've never been enthusiastic about black equipment, but I have to admit that the TS-450 looks very smart.

The TS-450S' New Features

Many of the new features on the 450 have been carried over from some of recent Kenwood HF transceivers such as the TS-140 and the TS-950, and many are brand new. Let's look at some of them. The meter is now a digital bar type with a multi-function display. In other words, you can monitor two different parameters at the same time. On receive, the 'S' meter function is on at all times. As well as this, the audio output level from the appropriate detector in use can also be monitored. This function can be selected or de-selected as required. On transmit, the normal indication is for power output, with either ALC or SWR measurements as selectable options.



Rear view of the TS-450S. The blank panel on the left takes the 6m final for the TS-690S



The Metering System on the TS-450S. Note filter selection indicator on the left.

Memory channel selection now has a separate control - you don't have the confusion of using the normal tuning knob. The memory channel knob becomes the VFO channel control when in the VFO mode.

This useful feature was first seen in the TS-140/680 and later on the TS-950. On the 450, the normal step is 10kHz, but this can be changed to either one, two or five kHz. As is usual these days, there are two VFOs, but now on the 450, thanks to the new direct digital synthesizer, the tuning is much smoother with an almost complete absence of clicks and pops. Also as a result of this, a tuning rate of one kHz per tuning knob revolution in 1Hz steps is provided as a selectable option from the standard 10kHz per knob revolution. As with the TS-440, 100 memory channels are provided. As well as storing frequency and mode, they can store filter selection and AIP selection (more about AIP soon). With the addition of the separate memory selector control, and some changes to the memory controls, the whole memory system is now much easier to use. As with the 440, memories can be allocated for such things as setting limits for programmable band

scan and for split frequency operation. Ten memories are available for setting tuning limits for, say, 10 segments of amateur bands to allow VFO tuning confined to those band segments. This feature is certainly a boon to the contest operator for setting up sections of the bands required to either tune through or scan across.

The AIP or "Advanced Intercept Point" first featured on the TS-950S and then on the TS-850, is included in the TS-450. The AIP allows the operator to choose between high front end gain (AIP out), or for a reduced gain with reduced noise floor level and increased intermodulation characteristics. One very nice feature of this is that AIP is automatically switched in for reception on the lower frequency bands where lower gain is very desirable. However, if the higher gain is needed under perhaps low ambient noise portable operation, it can be switched out.

Filter selection has been upgraded on the TS-450S. It is now possible to make independent filter selection in both the 455kHz IF and the 8.83MHz IF channels. A selection button is provided for each IF channel and the selection takes place sequentially. This is, of course, provided that some of the optional filters are installed. A special display to the left of the meter shows the selection. Strangely though, no display indicator is provided for the narrow SSB filter, although this filter can be installed in the transceiver. You can, though, have a wonderful choice of selectivity for AM reception with either 12 or 6, 6 with tighter skirt selectivity or 2.4kHz. No actual 6kHz crystal filter, as offered with the R-5000 receiver or the TS-930 and TS-940 transceivers, and even the old TS-430, is available for the TS-450.

On transmit mode, better control over power output is provided with both a carrier and a power control. The "power" control will reduce the transmitter output on SSB down to about eight watts. With the accurate power metering, it will be easy for novice operators to set the 450 up for exactly 30 watts output. Transmitter cooling has come in for attention with two cooling fans built into the final amplifier. These come on as soon as the transmitter is keyed up on any mode. The

Australian version of the TS-450S will come complete with a built-in automatic antenna tuner, but the TS-690 (the version with 6m coverage) will not have the ATU as standard. It will, however, be available as an option. Interestingly, both transceivers will sell for the same price. Take your pick, an auto ATU or six metres. Both transceivers have been configured to connect to the Kenwood DSP-100 digital processor unit. According to the Kenwood literature, this unit converts the signal into a digital waveform (and back to analogue) and permits the audio passband to be tailored for maximum clarity. As a DSP-100 was not included with our review transceiver, we were unable to check its performance.

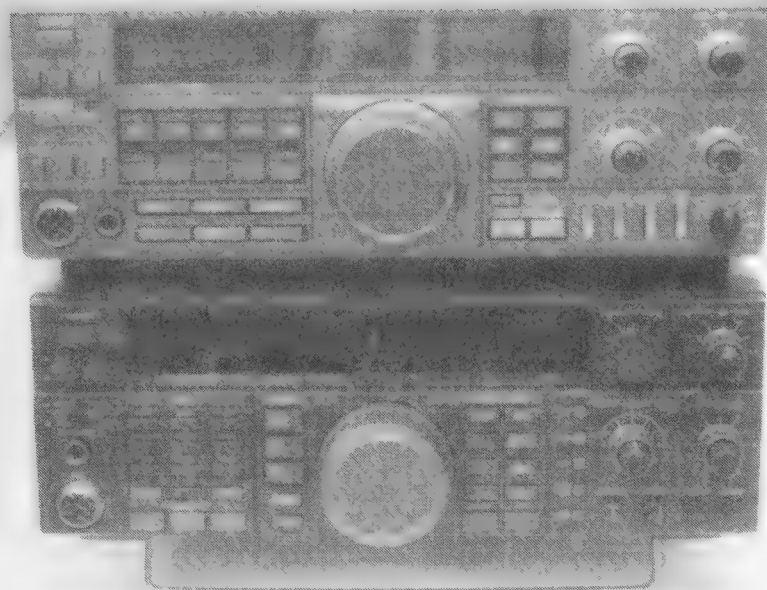
The TS-450S on the Air

The first thing noted was the improved feel of the main tuning control. Having just been reacquainted with the TS-430 (the old original), I think that the feel of the main tuning deteriorated somewhat on the 440S. It lacked the finger hole provided on the 430's tuning knob. It also had a rather sharp edge at the front, making it uncomfortable to rotate by rolling your finger around the circumference. Well, the 450 doesn't have a tuning knob with a finger hole, but it is very much smoother and is, in fact, not far behind the famous 930/40/50 tuning knob. As with the earlier model, the dial drag is fully adjustable.

With the AIP switched out, the receiver felt very lively. I did a side by side test against the 440, and while no discernible difference could be detected in signal readability, the 450 certainly produced more audio output at a given setting on the audio gain control. I am sure many mobile operators will appreciate the extra gain. Lack of receiver gain is a common complaint from TS-440 owners using their rigs under mobile conditions.

Next thing noted was the very marked increase in status indicators. There is one for just about everything. In fact, the only thing that lacks an indicator is the receiver RF attenuator. Have you ever wondered why your receiver sounds dead? Maybe the next model will include an indicator for this. One of the nice features on the later Kenwood transceivers is the automatic sideband selection when changing bands. Naturally the TS-450 has this feature too.

Frequency readout is to 10Hz and is certainly accurate to within better than ± 50 Hz. If you need better stability than this, then you should order the SO-2 superior stability temperature compensated crystal oscillator. This has a stability of $\pm 5 \times 10^{-7}$ which should please the most critical. The RIT/XIT readout is to



The Old and the New. The TS-440S on top, the new TS-450S below.

the nearest 100Hz. Incidentally, the RIT/XIT can be programmed to cover either ± 1.1 or ± 2.2 kHz. This is one of the many functions selectable when the transceiver power is switched on.

Received audio quality was very good. On both SSB and AM the audio was clean and well balanced, with very low distortion at normal listening levels. I checked the SSB/CW product detector distortion and found it to be only 0.6 per cent, an excellent figure. The internal speaker produced very acceptable quality, but the transceiver really deserves a good external speaker to make the most of the rig's capability. The headphone output is compatible with stereo phones, and the output level has been set to suit low impedance headphones.

AGC has fast or slow selection, but there is no provision to disable it. The slow position produces very well controlled action with no sign of pumping on decay or clicking on make. To be critical, I would prefer the slow action to be just a bit slower. In fact, come to think of it, I have yet to see an amateur transceiver the AGC of which was anywhere near too slow. I note that the noise blanker now has a normal and wide selection. While the old Russian Woodpecker has all but disappeared, it seems to have been replaced by several other intermittent nasties, so I am sure that the wide noise blanker will come in handy from time to time. The level of blanking is not adjustable, but seems to have been rather well set. Some cross-modulation is noticeable, but overall is not too bad.

I am glad to see that the speech synthe-

sised frequency readout is still available as an option. I am sure our sight-impaired amateurs will appreciate this.

In the QRM reduction department, the TS-450 has an IF shift and an audio notch filter. Both of these have been with us for a long time, and are still very worthwhile. In fact, I much prefer the audio type notch filter to the more upmarket IF type. The latter usually has a notch which is too wide at the top of the curve, and so affects the audio quality to a very marked extent. The audio type as fitted to the TS-450 is sometimes a bit difficult to set but, once adjusted, is very effective and does not cause any loss of quality.

Of course the receiver is only half the story. Let's see how the transmitter performs. Firstly, the output power was checked and found to be right up to the 100 watt mark on all bands. Although we did not have a TS-690 to test, it was noted that the output on six metres is a very healthy 50 watts. There is also a separate SO-239 connector for the 6m antenna, or you can switch both 6m and HF output to the same connector. All very nice.

An interesting point is that the power supply rating for full output needs an output of 20.5 amps. Although my power supplies are only rated at 20 amps, they didn't blow up or, for that matter, do anything strange at all.

Actually putting the transmitter on air produced the first surprise. The two fans came on straight away. While they are not too intrusive, they are not exactly whisper quiet either. However, running all the time, they should keep things very

cool.

SSB quality was checked using three different microphones. The MC-42S hand-held, the MC-60 desk microphone, and my faithful Shure 444D. All produced first-class audio, but in general the two desk microphones were preferred. Just the same, you will not be disappointed with the results you get from the standard hand mic.

One of the things I haven't been asked by our readers to check on is the CW keying. The 450S's CW output was very clean. Several checks were run, but no sign of clicks was detected. The tests were carried out using a straight hand key.

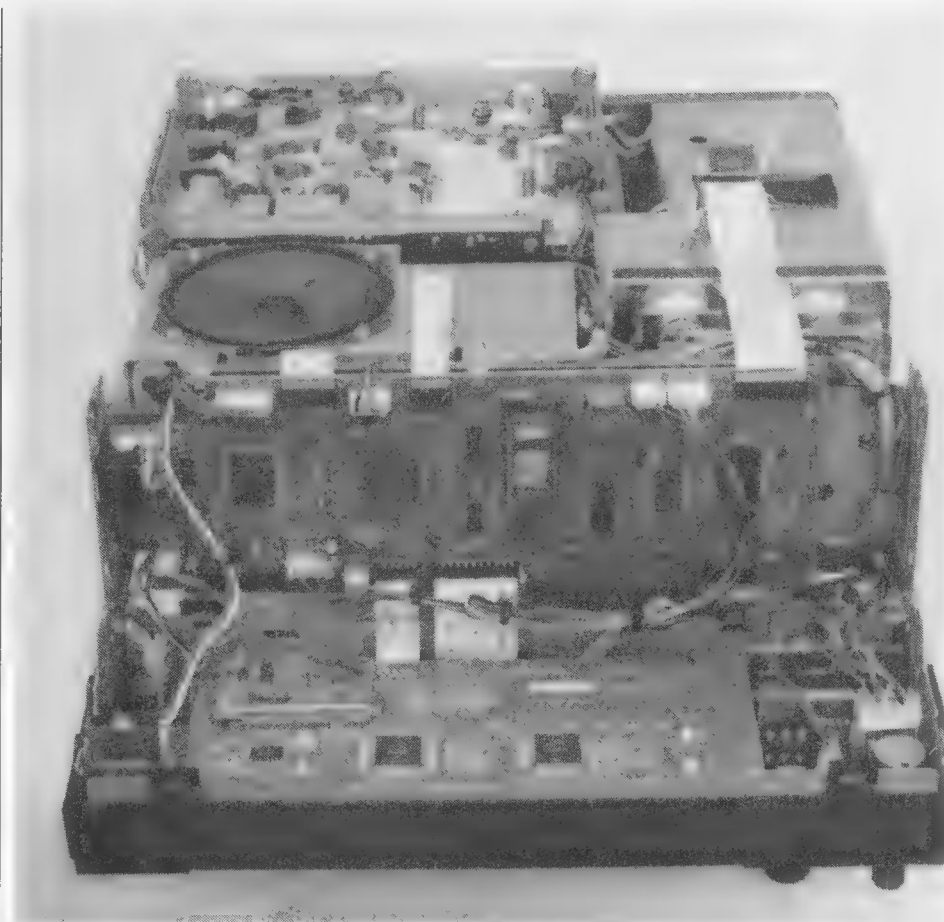
Getting away from old-fashioned CW, those interested in digital modes won't be disappointed with the TS-450. There are dedicated connectors for connection to a RTTY keyboard as well as a TNC to interface with your own computer. Details on how to do this are well covered in the instruction manual.

Finally, the speech processor was tried. The processor used in the 400 series transceivers is a fairly simple audio compressor. It is not as complex or as effective as the RF processors used in the TS-850 or 950 transceivers. Nevertheless, the processor in the TS-450 is very worthwhile. I suggest that it should be used only when working DX under difficult conditions. Local stations might find it a bit too forced. Overall, the transmitter parameters have been well optimised, and the results achieved were very satisfactory.

The TS-450S Optional Accessories

If you want to dress up your TS-450 transceiver, Kenwood has a great range to tempt you. Let's look at them in the order you might need them. Firstly, there are two power supplies, both rated at 20.5 amps output. The standard supply is the PS-33. This will happily run your TS-450, but is not designed for continuous output. The PS-53 is a full output supply, with built-in cooling fan and a full range of protection circuits. The power supplies will not be available in Australia until late 1991 or early 1992.

Of course, the built-in auto antenna tuner, the AT-450, is available as an option for the TS-690. Another ATU, the AT-300, is also offered. I don't know much about this one; it appears to be suitable for mobile operation as it can be mounted externally from the transceiver. Three desk type microphones are available, the MC-85, the MC-80 and, of course, the deluxe MC-60A. I know the MC-60 well, and it is indeed a superb microphone. With luck we might be able to review the



TS450S with front panel lowered. Auto ATU is on right side.

other two in one of our mini reviews in the near future.

There are no less than seven optional filters available. For CW operators there are two 500Hz filters, one at 455kHz and one at 8.83MHz. The same system applies to the 250Hz filters.

Two optional SSB filters provide 1.8kHz bandwidth and an additional 2.4kHz filter to tighten up the normal response. Both of these are at 8.83MHz.

To finish off the picture, there is a very nice looking SWR/power meter, a 232 interface unit, the VS-2 voice synthesiser and, of course, the DSP-100 digital signal processor.

The TS-450S Owner's Manual

As is usual these days, the instruction manual is just that. Unfortunately, no technical information at all is presented, apart from a circuit diagram. I feel that a few pages of circuit description would be welcomed by most amateur operators. From the point of view of a purely instruction manual, the TS-450/690 (it covers both models) does a very good job. Not that it is without errors. For instance, on page 27 it tells you to speak into the microphone from a distance of

about 5cm (6"). I leave it to you to guess the correct distance. Information on fitting the various accessories is very clearly presented. Overall, not bad, but, with very little effort, could be much better.

The TS-450S Conclusion

There is no doubt that Kenwood has produced a worthy successor to the TS-430/440 line of transceivers. It is good enough to tempt me to sell off my 440 and replace it with the new 450. I don't know. I will need to think about that for a while. Would I recommend it to an amateur looking for a new transceiver? Yes, no doubt about that at all.

There are so many very good aspects about it. The excellent tuning ergonomics, the great receiver performance. The good audio on both transmit and receive. Would I buy the digital processor option? Again I don't know. I would need to be convinced of its worth. I really think that very few will take up the opportunity. Perhaps Kenwood needs to tell us more about it.

Our review transceiver was supplied by Kenwood Electronics Australia, and all enquiries should be forward to it or one of its dealers. **ar**