

NCJ Reviews: The PIEXX TS-930 Microprocessor Board

By Pete Smith, N4ZR

Why would anyone, with the millennium almost upon us, go to the trouble of reviewing an add-on piece of equipment for the Kenwood TS-930, a radio that belongs more in the 1980s? Aren't all the big dogs using FT-1000MPs? Or Omni 6+s? Or whatever?

Well, no, not really. For many of us, particularly contesters like me who much prefer CW, it's still arguable that there is no better radio out there than the TS-930. With the surge in SO2R (single operator, 2 radio) operation, budgets are being stressed to come up with two modern radios. Meanwhile, the used price of the TS-930 has dropped toward the neighborhood inhabited by much less capable radios.

The big problem with the 930 is that it has always seemed insoluble to add computer control, because the radio wasn't designed for it, and lacks any sort of computer port. For modern SO2R operation, the inability to control the second radio always seemed to disqualify the TS-930 as a serious candidate.

Now, all this has changed. It began a year or so ago when Chris Sieg, WA3LDI, was asked to repair a friend's TS-930. He discovered that the microprocessor board had been ruined by leaking memory batteries, and that Kenwood no longer makes the necessary part. Now, most people would have given up, but Chris owns and operates an electronic prototyping company, so he has a unique combination of microprocessor design know-how and PC board production capability. Even then, most people would have hesitated to take on such a complex project, but Chris says he decided to do it "for grins."

The result is the PIEXX TS-930SE (enhanced) microprocessor board, which is a plug-compatible replacement for the original unit in the TS-930. The new board takes advantage of the advances in microprocessor design that have taken place since the TS-930 was designed, first and foremost to do away with the requirement for backup batteries. But that's only the beginning. Almost as an afterthought, he says, Chris decided to add a serial port to the microprocessor board, and implement a subset of the Kenwood communications protocol. That one decision made him this contester's best friend, extending the life of my late-model TS-930, which was about to be retired in favor of a TS-850, or some other computer-controllable contest radio.

The TS-930SE's serial port connects directly to your computer, without the need for a level converter or added chips inside the radio; already, this threatens to severely impact the market for TS-940s and TS-850s, which need one or both. The communications work flawlessly with TR Log and CT 9.39 or later, and Chris

continues to evolve the firmware to make sure it works smoothly with other non-contest logging software.

Because the TS-930 uses direct mechanical switching for mode control, it cannot be commanded to switch modes from an external computer. This is a minor inconvenience in contest applications, compared to gaining the ability to command band and frequency changes, read frequency into the computer, and control and clear the RIT from the keyboard or with stored sequences. In all these respects, the TS-930SE makes the TS-930 work like a TS-850 and other next-generation rigs.

The modern microprocessor used gave him a lot of additional memory space to work with, so Chris didn't stop there. The TS-930SE microprocessor does a number of other tricks. For the contester, these include, in particular:

- ❑ 3-speed main tuning and selectable slow tuning rates – Fast QSY, yet two slow tuning rates (2.5 and 10 kHz per revolution) for easy fine tuning.
- ❑ Pre-settable initial frequencies on each band – no more lengthy retuning. During any operating session, last operating frequency on each band retained for quick band changes in contest situations.
- ❑ RIT can be cleared while in Transmit mode. Old TS-930 users will particularly appreciate this one!
- ❑ RIT tuning by main tuning knob when D. LOCK pressed. Selectable tuning rates.
- ❑ Pre-settable initial frequencies on each band – no more lengthy retuning. During any operating sessions, last operating frequency on each band is saved and returned to if you go back to that band.
- ❑ Band data outputs from the microprocessor board are provided, to control the Top Ten Yaesu/LPT band decoder, enabling fully automatic antenna selection.

The TS-930SE also gives massively expanded memory capabilities – up to 99 individual memories, while retaining the original switch-selected 8-memory scheme (one memory is committed, though, to the band-start frequency storage). An optional minor modification to the radio enables remote S-meter readout through the serial port, which is used by some software, such as DX4WIN, and by Kenwood's own RCP software.

Installation

As mentioned above, the TS-930SE microprocessor board is plug-compatible with the original board, requiring no wiring changes unless you choose to implement the S-meter option, which requires a single connection on the underside of the radio. My TS-930 had never had the case off in over ten years, and I do not consider myself technically skilled, but I had no difficulty following the detailed installation instructions and clear photos provided in the manual, and

the modified board worked immediately. Because some TS-930s (including mine) have a wiring modification that reverses the direction of main tuning, I had to reverse two wires on one of the plugs, but the manual anticipated this and provided step-by-step instructions. The microprocessor board itself is of top quality surface-mount construction, and should be trouble-free.

The serial port on the TS-930SE is unusual in that it is terminated in a modular plug, and the connection to the outside world is provided through a modular telephone cord with a DB-9 connector on the other end. Because of the way the TS-930 is constructed, there is no easy way to bring this cord out the back of the radio. However, it would be fairly simple to run it out through the hole left by one or more of the unused phono plugs on the back of the radio (such as the phone patch connections), by threading it down and across the underside, inside the bottom cover. Alternatively, you could do as I did and just bring the modular cord out through the original sliding cover that gives access to the original battery compartment. Because the modular cord is flat and thin, this solution is unobtrusive and will bother only the most fastidious.

If you desire to use the Top ten band decoder output, a second modular cord is required, of the type used for Ethernet network connections. Again, you'll have to decide whether to bring it out from the back or the top.

Operation

I have used my TS-930SE for about 4 months now, for both routine operation and contests, including the ARRL Phone and CW DX contests, and the just-completed WPX phone. It worked flawlessly with the band-map in TR Log, providing effortless band changes and S&P QSY to beat the pileup to packet spots. Running QRO, I saw no difficulty whatever with RF interference, although I later wound a few turns of the modular cable near the radio through a Radio Shack snap-on core, just to be safe. Other beta-testers have used the board, in conjunction with CT, in single and multi-op environments with similar, trouble-free results.

Conclusion

I am delighted with the new lease on life the TS-930SE microprocessor board has given my TS-930. It would be worth it simply to be able to forget about changing bands in my contest logger, when I change bands on the radio. The new tuning rates have made me a better S&P contester, and the ability to have TR Log clear the RIT after each CQ is worth its weight in gold. More casual DXers will find the additional memories a real pleasure, and those who are into computers will find using the modified radio fascinating.

The PIEXX TS-930SE microprocessor board is available for \$259 plus \$8 shipping (in the continental U.S.) from PIEXX Inc., 13 Main Street, Hillsboro New

Hampshire 03244, telephone (603)464-5625. Photographs of the board and the complete text of the user manual are available on PIEXX's web site, www.conknet.com/PIEXX. An optional programming board, which will permit changing the microprocessor's firmware for custom applications, is \$40 plus \$5 shipping in the continental U.S.