

CQ REVIEWS:

The Kenwood TS-50S Transceiver

BY LEW McCOY*, W1ICP

Every once in a while something comes along that simply revolutionizes our thinking in amateur radio. Usually this is some mode of operation or new piece of equipment.

For years amateur radio existed for CW and AM phone operation. After World War II the hobby started to move. The first major change was single side-band operation, and this author was in on the beginning of this new mode. SSB required considerable changes in receiver design. This mode soon became the accepted method of phone transmission. Next, with the advent of solid-state devices, we started to see revolutionary design changes. Much of this can be attributed to the huge success of FM and repeater operation. These modes then led to high-speed data-transmission design, and we quickly became addicted to packet and other methods of high-speed information transmission.

The advent of computer chips really revolutionized design in transmitters and receivers. At a convention one time I presented a lecture on the future design possibilities and use of computers in amateur radio. Many of my listeners thought I was blowing smoke (!), but if the facts be known, I didn't even begin to approach what was going to happen. And that leads us to this product review.

We all have marveled and wondered at Japanese design ability, particularly with computer chips in transceivers. The Kenwood TS-50S seems to be nearly the ultimate result of these techniques. Why? Let me spell it out for you. This is a transceiver with a general-coverage receiver going from 500 through 30 MHz, complete low-band amateur coverage 160 through 10 including WARC bands, and 100 watts output. Plus it has a multitude of special features including 100 (!) memories; CW, SSB, AM, and FM modes; and more which we will cover in this review.

But here is the real eye-opener and why I wrote the above introduction. The

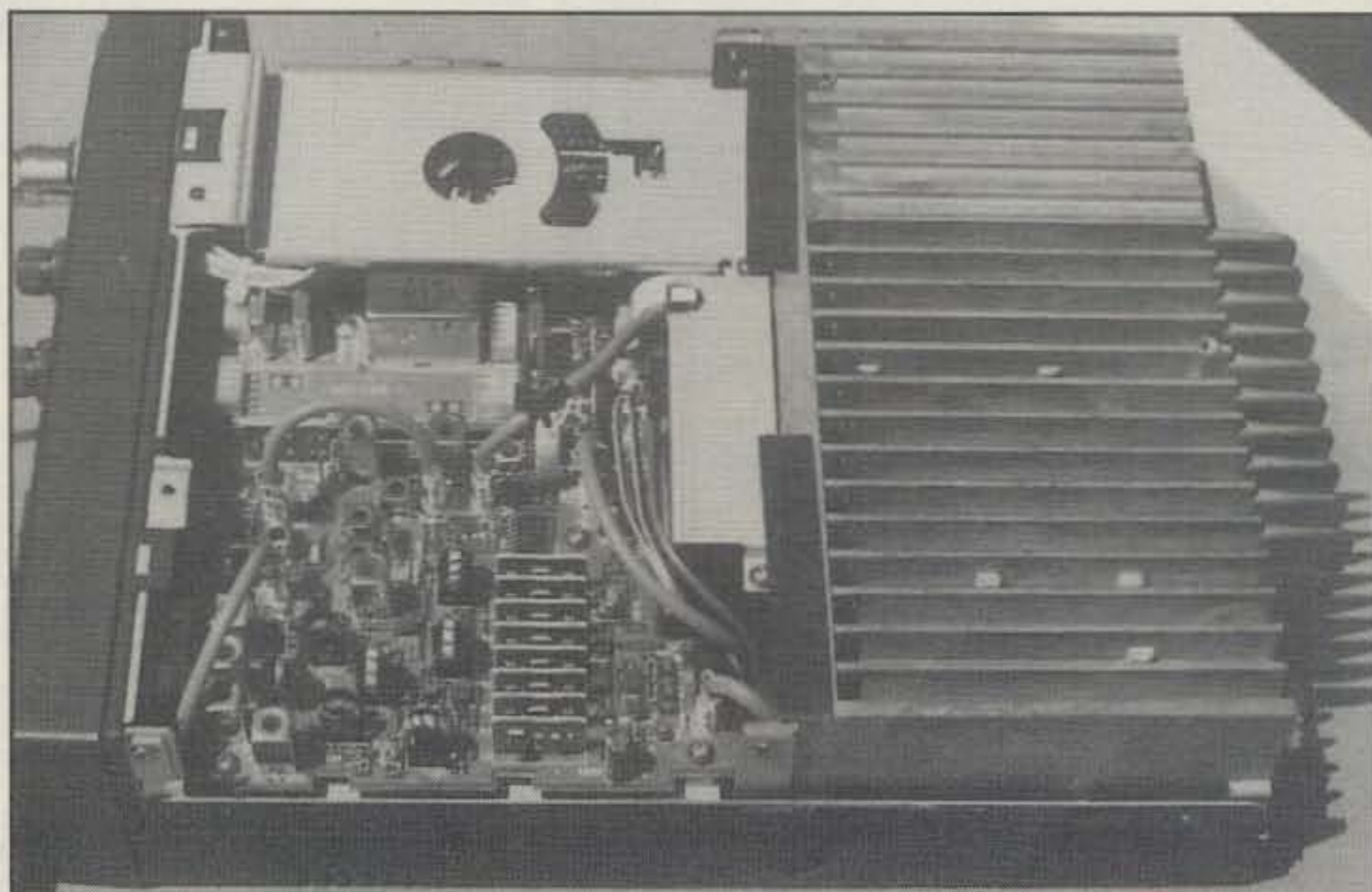


A view of the front of the Kenwood TS-50S. As explained in the text, the mic serves as a "tuning" control along with other front-panel control items.

transceiver measures 179 by 60 by 233 mm. That's about 7 inches wide, 2 3/8 inches high, and 11 inches deep! This is small enough to put in a desk in the living room; no one will ever know it's there! This radio (and you can be cer-

tain that competitors will follow) is going to open up low-frequency mobile, plus put amateur radio within reach of many who do not have the space for large equipment.

Before I go any further, just how good



A view with the top cover removed. At the upper left is where the speaker sits (it is not visible in this photo). Note the large heat sink at the rear.

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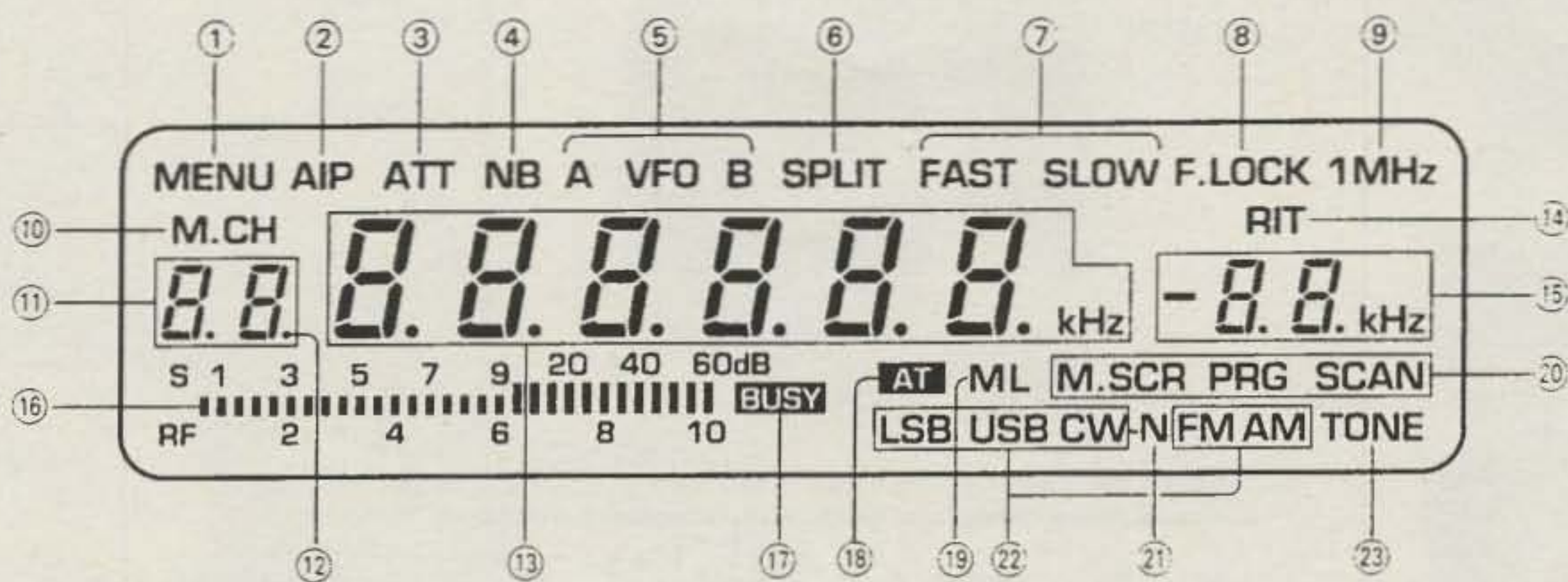
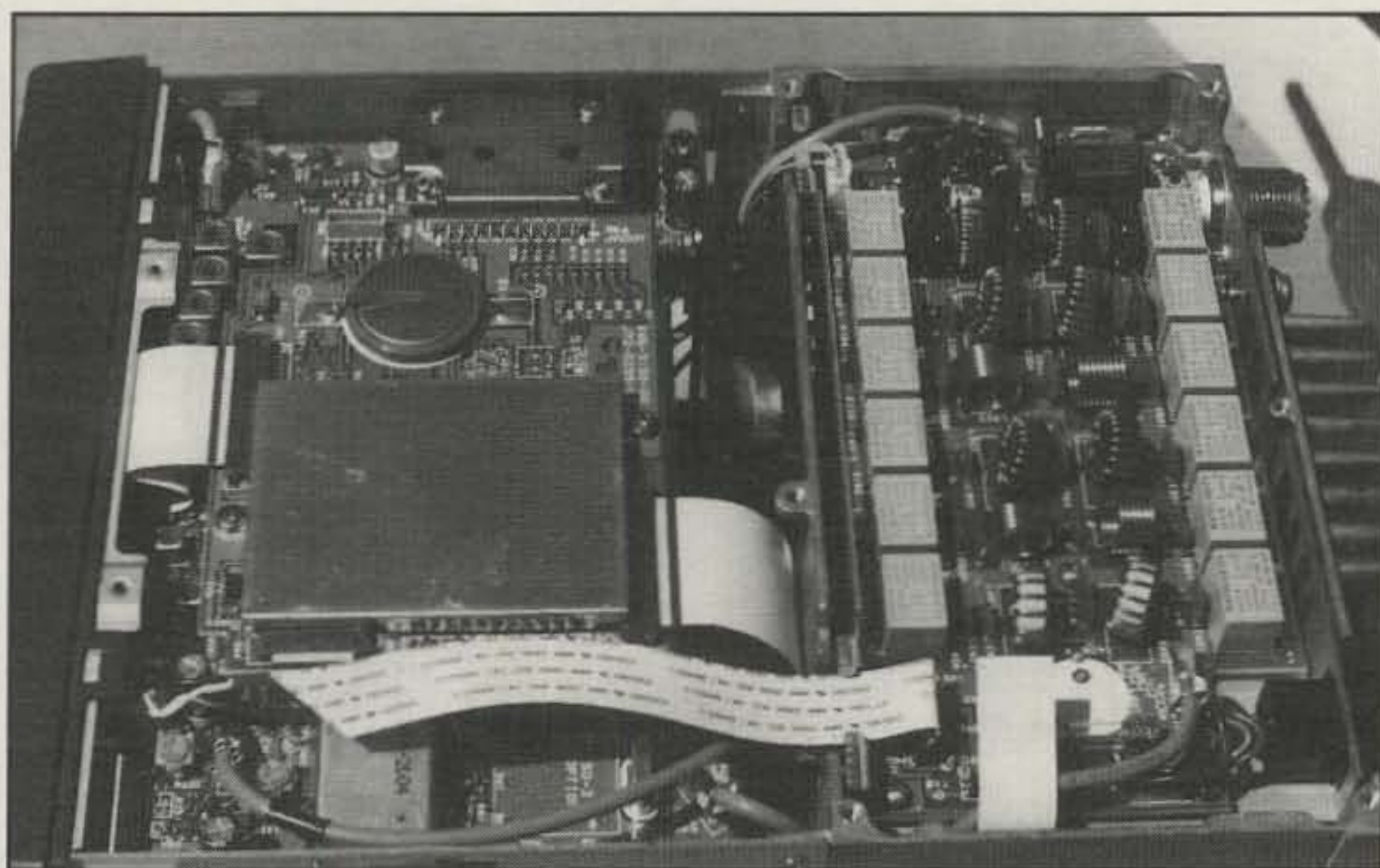


Fig. 1— This drawing, taken from the transceiver's manual, shows the display with the various functions.



In this bottom view can be seen the compact construction techniques.

is this small radio? The first questions I am asked are how easy is it to tune and are the controls too small. Let me assure you, I have large hands and I had no real problems tuning and using all the functions available. Let's get on with the review, and you be the judge.

The TS-50S weighs in at 6.4 pounds (power supply is separate), and power requirement is 13.8 volts (plus or minus 15 percent) at 1.45 amps receive and 20.5 amps transmit.

As I mentioned above, maximum output is 100 watts for SSB, FM, and CW with lower steps of 50 and 10 watts. For AM the maximum is 25 watts, down to 12.5 and 2.5. Output modes are SSB (balanced modulator), FM (variable reluctance), and AM (low-level). I very carefully measured power output in all the categories and found the manufacturer's ratings to be exact.

Important measurements in a new rig

are selectivity and sensitivity. As to selectivity, for SSB the ratings are -6 dB for more than 2.2 kHz and -60 dB for less than 4.8 kHz. I found this selectivity more than adequate for SSB work. The same filter and ratings apply to CW, but there is an optional 500 Hz filter available for CW work if more selectivity is desired.

There is no doubt that this is going to be a popular DXpedition rig, so I am sure that many operators will be interested in the sharper filter. AM selectivity comes in at -6 dB for more than 5 kHz and -60 dB at less than 40 kHz. Additionally, in the SSB and CW modes you can improve the selectivity by using the IF passband tuning, a front-panel control.

Sensitivity rating at 10 dB $([S+N]/N)$ is less than 0.25 μ V from 1.7 through 30 MHz. I found that the receiver had a "quiet" noise floor, and to use an old timer's phrase, was really "hot." In other

words, it listened well. Keep in mind that this receiver is a full-blown job using double IF conversion techniques, or to put it another way, the receiver works as well as larger Kenwood transceivers.

In order to achieve the small cabinet size, many functions are "programmed" into the transceiver. For example, there is no mic nor RF gain as we normally would think of it. At first, I felt this would be a handicap—the lack of the two gain controls, that is. The RF gain is set in three steps via one of the buttons on the microphone. The gain can be set to 100, 50, or 10 watts output. I found that after using the transceiver, this was not a real handicap. In driving my amplifier, the 100 watt position was adequate for full amplifier output, and of course it was simple to retune the amplifier when I wanted less output. I also tried switching the transceiver power output down to 50 and 10 watts to reduce amplifier drive, which also works fine, but this of course required touching up the amplifier tuning.

The mic gain is set internally to either HIGH or LOW via a switch on the microphone. The gain can also be adjusted manually by removing the transceiver cover. I didn't do this, but I received many on-the-air checks that confirmed that the audio gain was set correctly. Incidentally, the manual that comes with the TS-50S is well written and extremely detailed (60 pages plus diagrams).

There are two basic MENU settings—**MENU A** and **MENU B**. By pressing the **F-LOCK** button twice, the front-panel display will show the menu-setting number and the function. For example, the **00 MENU A** will show 100 (or 50 or 10) as the power setting. Another example would be setting **05**, which is a CW setting for setting the break-in speeds (which are FULL/100/200/... up to 1800 mS). These settings are all controlled by using the tuning knob to control the

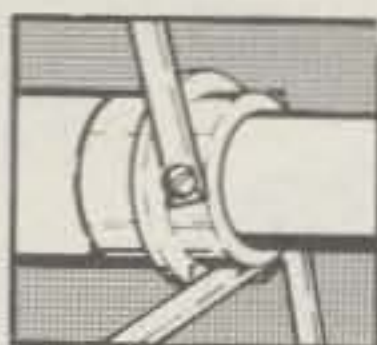
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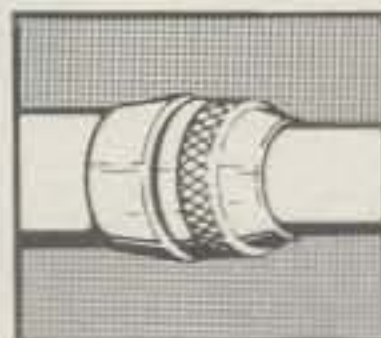
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Menu No.	Description	Selections	Default	Reference page
00	RF output power switches through three levels (100, 50, and 10 W).	100/50/10	100	20
01	Display brightness switches through five levels.	OFF/d4/d3/d2/d1	d2	-
02	AGC mode switches between slow(S) or fast(F). (SSB, CW and AM only. No selection in FM.)	S/F	S (CW:F)	19, 27
03	IF filter select. (SSB, CW, and AM only. No selection in FM.)	0.5/2.4/6.0kHz	2.4kHz (AM:6.0kHz)	20, 22, 43
04	SSB/CW mode switches between two-steps (SSB) and three-steps (ULC).	SSB/ULC	SSB	17
05	CW keying delay switches between FULL (full break-in), or a value in milliseconds.	FULL/100/200/300/400/600/800/1000/1400/1800 ms	600	24
06	CW offset switches through the range of 400 to 1000 Hz in 50 Hz steps. Sidetone is fixed at 800 Hz.	400-1000	800	23
07	CW reverse function.	ON/OFF	OFF	23
08	Tuning control disable.	ON/OFF	OFF	-
09	Busy-Frequency Stop for program scan.	ON/OFF	ON	40
10	Busy-Frequency Stop for program scan switches between Time Operated (0) and Carrier Operated (1).	0/1	0	40
11	Busy-Frequency Stop for memory scan.	ON/OFF	ON	40
12	Busy-Frequency Stop for memory scan switches between Time Operated(0) and Carrier Operated(1).	0/1	0	40
13	Memory channel scan switches between all memory channels(ON)or only the desired channel group(OFF).	ON/OFF	OFF	37
14	RF meter sensitivity switches between X4 scale (ON) or normal(OFF). Only available with 10 W selected.	ON/OFF	OFF	20
15	Subaudible tone frequency. OFF may not allow repeater access.	ON/OFF	ON	20, 29
16	Frequency step size from microphone (SSB and CW modes only) switches through five step sizes.	10/100/1k/5k/10kHz	10kHz	49
17	Frequency step size from microphone (FM and AM modes only) switches through five step sizes.	10/100/1k/5k/10kHz	10kHz	49

Table I- MENU A is shown here. This will give the reader some idea of the various mode changes available.

menu number and the UP/DOWN mic buttons for the functions. I have included the tables for MENU A and B to give you an idea of all the function changes available.

The actual tuning control bears some explanation. The tuning knob covers an increased tuning range as the knob is rotated faster. The range varies from 5 to 200 Hz steps. In other words, the faster you turn the knob the faster the tuning rate. Also, the UP or DOWN buttons on the panel and mic can be used for tuning, plus there is a one MHz

switch on the panel that will increase the tuning rate greatly. To change bands you turn off the MHz switch and use the UP/DOWN buttons. RIT (Receiver Incremental Tuning) is also available. When switched on, the RIT shift value is shown on the panel.

As I stated earlier, there are 100 memory channels available. Numbers 00 through 98 store either simplex or split (duplex) frequencies. Number 99 stores SCAN start and end frequencies or simplex frequencies. Several parameters can be stored in channels 00 through



Front view of the matching antenna tuner, Model AT-50.

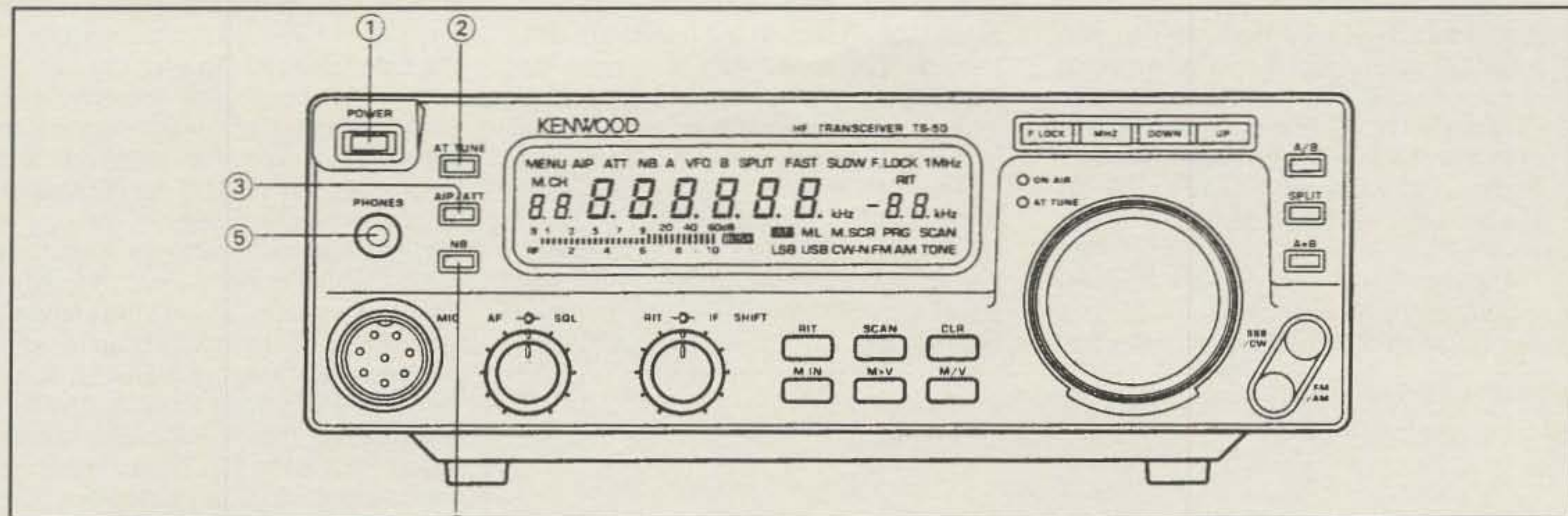


Fig. 2— In this drawing from the manual all the controls on the panel are shown.

Menu No.	Description	Selection	Default	Reference page
50	Beep sounds when any button is pressed.	ON/OFF	ON	43, 54
51	Modulation mode select switches between Morse(ON) or beep(OFF).	ON/OFF	ON	43
52	Alarm output switches between Morse(ON) or beep(OFF).	ON/OFF	ON	44
53	Tone frequency select for repeater access (39 tones)	67.0~250.3Hz, 1750Hz	88.5Hz	20, 29
54	Tone frequency type for repeater access (b: burst, c: continuous)	b/c	c	20, 29
55	Peak Meter Hold.	ON/OFF	ON	20
56	Memory channel automatic increment after data is stored.	ON/OFF	OFF	—
57	Tuning control able to change frequency in Memory Channel mode.	ON/OFF	OFF	—
58	Program Scan Hold.	ON/OFF	OFF	39
59	Memory Protect 1. ON prevents writing to or clearing any memory channel.	ON/OFF	OFF	14, 35
60	Memory Protect 2. ON prevents overwriting or clearing memory channels containing data.	ON/OFF	OFF	14, 35
61	AM Broadcast band(522 to 1620 kHz) frequency step size switches between two sizes in AM only. (U.S.A./Canada: 522 to 1710 kHz)	9/10kHz	9kHz*	49
62	1 MHz button frequency step size switches between 1 MHz and 500 kHz.	1000/500kHz	1000kHz	15, 36, 41
63	RIT maximum frequency shift switches between two values.	1.1/2.2kHz	1.1kHz	41
64	Automatic Power Off.	ON/OFF	OFF	42
65	PTT switch disable. ON prevents PTT from functioning.	ON/OFF	OFF	49
66	Microphone gain switches between high(H) or low(L).	H/L	L	22, 26
67	Microphone PF1 key assignment.	00~99	83(Menu A)	49, 50
68	Microphone PF2 key assignment.	00~99	00(Power Select)	49, 50
69	Microphone PF3 key assignment.	00~99	36(TF-SET)	49, 50
70	Microphone PF4 key assignment.	00~99	82(Monitor)	49, 50
71	LSB transmit carrier point shift. (10 Hz steps)	-100~+200	000	44
72	USB transmit carrier point shift. (10 Hz steps)	-100~+200	000	44

U.S.A./Canada: 10 kHz(Use Menu A, No.17 to vary step size)

Table II— Here is MENU B, showing available function changes.

99. These include transmit-receive frequencies, modulation mode, filter bandwidth, lock-out on or off, AGC fast or slow, and tone frequencies. There is a built-in tone generator for repeater access which is set via MENU B.

An important feature in this day and age is that the TS-50S has two complete VFOs—VFO A and VFO B—and of course split-frequency operation is possible. This is very important for DX work and other amateur activities. They are

both "full blown" VFOs, and all the features of the transceiver are available for both VFOs.

The S-meter is the digital straight-line type. One thing about using the meter that I liked occurs when checking the signal strength of received signals. A small black bar is moved out with the signal, making it easy to read the "highest" strength received. We old timers have become so ingrained using needle-type meters that it does take a little

getting accustomed to with these newer methods. I personally like the digital readouts.

What is my bottom-line thinking about this latest transceiver? Before I answer that I would like to make a statement. I have been accused by my "friends" of never giving a bad review. That is definitely not true. I may have been guilty of not providing enough details and other items, but when writing reviews, the reader should keep several points in mind. The review is definitely the opinion of the reviewer. In my case, I have all the exotic test equipment one could want to run any test on the equipment. It would be simple, therefore, to write a review that has loads of graphs and charts explaining third-order products, intermodulation distortion, mixer noise, and on and on. Having done this for so many years, however, I don't believe the reader gives a darn, and such material quickly "turns off the reader."

As I said at the beginning of this review, the TS-50S is going to open a whole new world of amateur radio to many newcomers. Some new techniques are introduced. For example, we all are accustomed to having a front-panel RF and microphone gain control to adjust. Instantly, my reaction was "What gives?" But on using the transceiver, I quickly realized that a panel-mounted control just wasn't necessary. In my opinion (and I stress *my opinion*) the lack of a panel-mounted control is no big deal.

I mentioned earlier that I have large hands. If I had a complaint, it would be that the main tuning knob would be helped by a "spinner" control knob. Maybe this review will convince someone at Kenwood to add such a device. Frankly, after days of testing and using this transceiver, with it sitting on top of a larger conventional transceiver, I think I will continue to use the larger transceiver simply because of additional and

easier to use controls. However, there is no doubt that I very much want to own a TS-50S. I do a lot of RVing, and mobile homes have little space to spare. Obviously, the TS-50S is a solid answer to this problem, plus its general-coverage receiver comes in mighty handy. So the bottom line: What do I think of the TS-50S?

The receiver is very good. It is quiet, which means more technically, it has a low noise floor. Weak-signal detection

is excellent. The selectivity is more than adequate. However, the bands are getting so crowded that one may be inclined to blame selectivity performance on any transceiver. But if two or more stations are using the same frequency at the same time, forget it. How is the unit in mobile operation? I haven't previously mentioned the noise limiter, but it is excellent. It certainly knocked down ignition noise very well. I should mention that my car has dual air bags.

Be sure when installing a mobile unit such as the TS-50S not to interfere with the safety features in your car.

In mobile operation I liked the mic control buttons for controlling the transceiver. They are handy when one is driving. Also, the TS-50S panel readout is bright and easy to see.

Kenwood manufactures a matching Transmatch (antenna tuner), the AT-50. This tuner is very close to the same size as the TS-50S. Its power requirement is 13.5 volts at 2 amperes, which it obtains from the TS-50S via a cable. The tuner data claims that it will match antenna loads from 20 to 150 ohms. However, I made extensive tests into various antenna loads, the worst of which was an extended 80 meter Zepp using open-wire feeders. These antenna loads varied quite widely from the "20 to 150 ohm" figure.

The Zepp feed line was connected to the 50 ohm output of the tuner via the 4 to 1 balanced to unbalanced transformer I described a few months back. The procedure for tune-up consists of reducing the output power to 10 watts from the transceiver and then pressing the A-T button on the rig. The tuner then goes through its motions, looking for at least a 1.2 to 1 match. Once this is achieved, it shuts down. The action can take as long as 15 seconds. I was impressed by how easily the tuner matched the "crazy" load presented to it by the Zepp antenna on some bands. I also tested the setup mobile using a mobile antenna made by Kenwood. Again, the tuner easily matched the antenna load.

I should emphasize that the tuner is an automatically tuned device in that it senses the load and electronically switches components in and out until it achieves the correct combination for a match. Once the match is achieved at 10 watts, you can increase the transceiver output to 100 watts and the tuner remains matched.

The tuner circuit is quite complex, using a CPU chip to sense the mismatch. Once sensed, the information is fed to the various circuits to change component values to achieve a 1.2 to 1 or better match.

It is obvious from this review that I liked the transceiver. (There go my friends again!) I know I'll figure out a way to make a "spinner" knob, and if I do I'll let you know.

The TS-50S is manufactured by Kenwood Corporation, 2201 E. Dominguez Street, Long Beach, CA 90801-5745. The list price is \$1199.95. The PS-53 AC supply sells for \$249.95, and the matching AT-50 antenna tuner is \$329.95. The optional CW filter, the (YK-107C) is \$98.95.

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