

Elecraft KX3

By Thomas Witherspoon K4SWL (All photos courtesy of the author)

You may have noticed that in the past few years, while more and more software defined radios (SDRs) are appearing on the market, fewer and fewer traditional tabletop shortwave receivers are being introduced. Most of the receivers in production, meanwhile, are quite mature, having been in production for years. For those of us who still have an appreciation for the traditional front panel, tuning knob, and portability of an all-in-one tabletop receiver, perhaps we should look to the active ham radio transceiver market.

❖ Introducing the Elecraft KX3

In 2011, Elecraft introduced the KX3, a portable SDR transceiver with a full-featured knob-and-button user interface that doesn't require connection to a computer to operate. At the Dayton Hamvention that year, the KX3 instantly drew crowds, as it was unlike any other transceiver on the market. I was there and like others in the crowd around the Elecraft booth, I was eager to try out this full-featured transceiver, especially upon learning that even the basic, no-options model has a *general coverage* receiver.

A ham transceiver with "general coverage," incidentally, means that its receiver is not limited to the ham bands only; these receivers typically receive between 100 kHz and 30 MHz (i.e., the full shortwave radio spectrum). That morning at the Hamvention, I quickly made my way to one of Elecraft's owners, Wayne Burdick, to ask him, "Would the KX3 make for a good shortwave radio receiver?" Wayne's prompt response: "Yes." I just had to get my hands on one to find out.

❖ A Closer Look

Though the KX3 was introduced in the summer of 2011, it didn't start shipping until



a few months later, and there was a backlog of orders for it. Fortunately, my good friend, Dave Anderson K4SV, was among the first purchasers of the KX3, and he was generous enough (and trusting!) to let me borrow it.

At first glance the KX3 resembles *just the faceplate* of a tabletop radio: it has a large tuning knob, wide, clear amber backlit display, and a traditional set of function buttons and multi-function knobs, but not much else. Or so it appears, as there's no bulky chassis.

Connections for microphones, DC power, headphones, IQ out, key and PC interface are located on the left side panel of the radio, while the RF connection (a female BNC) is on the right side panel. The KX3 has built-in folding feet, quite sturdy, that allow the radio to be tilted at a comfortable angle for tabletop operation.

To best evaluate the KX3, I'll first discuss some of the features that would interest a ham radio operator, and then focus on those best suited to the SWLer.

❖ Everything for the Ham

If you're a ham, you'll love the feature set on the KX3. It must have one of the most comprehensive features sets on any radio I've ever used. At a bare-bones level, meaning without adding any options, the basic KX3 is truly an all-in-one QRP transceiver.

Of course, it will function on any mode: USB, LSB, CW, data, AM and FM. The output power is adjustable from 0 to 10 Watts. You can easily adjust the DSP (Digital Signal Processing) filters, AF, RF, passband, and notch filters all from dedicated buttons and knobs. It even has memory keyers for both CW and voice.

You say you prefer digital modes? Not only will the KX3 natively decode RTTY and PSK31 and display the scrolling text on the display, but you can also send RTTY and PSK31 without a PC. How? Simply set the appropriate data mode and use your key

to tap out your message in CW. Though you will hear the CW side tone, the KX3 will transform your code into RTTY or PSK-31, and send. Hypothetically, armed with only a KX3, you could run a RTTY contest from the field with *no* computer.

The variable DSP filtering is most impressive and the KX3's ability to block adjacent signals is benchmarked. Indeed, if you look at Sherwood Engineering's receiver test data rankings (www.sherweng.com/table.html), which are sorted by third-order dynamic range (narrow spacing), the KX3 is second only to the Hilberling PT-8000A, an \$18,000 transceiver.

With the installation of the \$170 optional internal automatic antenna tuner (the KXAT3), you will be able to tune most any wire antenna on the go, with no need to carry an external ATU. In short, for the ham, the KX3 offers a cornucopia of features, too numerous to list here; but I can at least tell you that I discover something new on this radio almost every day and continue to be amazed by the features on this transceiver, especially considering that it costs only \$1000 (\$900 in no-solder modular kit form).



❖ For the SWLer

I've written about the KX3 as a ham radio transceiver, but how does it stack up if your primary interest is to just sit back and listen to broadcasts? Short answer: *Very, very well.* The KX3 is loaded with features that would please even the most discriminating DXer.

First, on the faceplate, the KX3 has a multi-function knob that controls both the AF and RF gains. It's very simple to use, even though I'm not a fan of switching between the AF/RF gains controls on the same knob. AF gain is what most of us refer to as a volume control and many dedicated shortwave receivers lack an RF gain control even though it's a vital tool for broadcast listening in noisy conditions. By default, the KX3 RF gain is set to zero; turning

the RF pot counter-clockwise will decrease RF gain.

The KX3 also has three different preamp settings, which are useful for amplifying weak stations, as well as an attenuator for local or strong broadcasters. The KX3 has passband and notch filtering, and an auto-notch function that effectively deals with heterodynes from nearby carriers. The KX3 also has DSP noise-reduction (NR) for noisy band conditions (or to help a signal “pop” out from the noise) and noise blanking (NB) for local RFI.

Many automatic gain control (AGC) parameters are adjustable, too, so they can be tweaked for AM fading and weak-signal DXing. The fact is, the KX3 has more built-in receiver controls than the dedicated tabletop shortwave receivers I’ve owned.

❖ Audio

To be clear, however, there is one negative in the architecture of the KX3 when viewed through the eyes of a SWLer. The KX3 is designed around the amateur radio operator and AM bandwidth is narrower than you will find on most dedicated tabletop shortwave receivers. The KX3’s AM bandwidth can only be widened to 4.2 kHz, a figure that almost made me dismiss this radio’s SWLing abilities out of hand.

What the KX3 lacks in wide bandwidth is made up for by the 32-bit floating point DSP architecture. I’m not sure how, but the KX3’s audio fidelity “sounds” much wider than 4.2 kHz. When using headphones or amplified speakers, the bass response rivals some of my tube receivers. There are even adjustable 8-band audio equalizer settings to improve this further.

In addition, Elecraft has unique audio effects available in the audio effects menu. One I’ve found very valuable in broadcast listening is called “delay,” a stereo simulation effect that broadens the mono sound in such a way that the audio sounds even richer.

❖ Memories, Scanning and Tuning

The KX3 has 100 general-purpose VFO A/B memories with optional alphanumeric labels. It also supports channel-hopping or scanning within any number of labeled memory groups. Auto scan is simple and works in both muted and (my favorite) non-muted, or continuous, modes.

The KX3 can also use the “K3 Memory” application from Elecraft’s K3 transceiver, which allows for longer labels and the instant selection of desired memories from a PC. The “K3 memory” application is a free software download on Elecraft’s website.

The tuning knob on the KX3 is substantial and of good quality. The drag can be easily adjusted with a supplied hex wrench. The tuning rate can be adjusted to .5 kHz increments, allowing you to quickly tune through the band. The small multi-function knob next to the main tuning knob can also be set for a 1 kHz rate.

At first glance, you might not realize that the KX3 has a direct frequency-entry keypad.

Check out the photo, however. The buttons and multi-function knobs in the lower left quadrant of the KX3 double as number pad, decimal point, and an “enter” button for a keypad. I thought this a bit odd at first, but now find I use this all the time.

❖ Optional ATU: Worth the Cost

As I mentioned earlier, the optional automatic antenna tuner, the KXAT3, makes a lot of sense for the ham who operates portable. If you are a licensed amateur radio operator, the ATU can be a powerful tool for matching random length, or multi-band antennas to your desired broadcast band by tuning to a nearby ham band frequency. Of course, the L and C parameters of the tuner can be manually adjusted to optimize without transmitting.

In addition, if you like medium wave (MW) DXing, the ATU comes with MW (AM broadcast band) filtering that tracks the VFO, improving image rejection between 300-1,000 kHz. I have tested the KX3 on medium wave both with and without the ATU installed and find that it certainly improves reception. The ATU is very easy to install, almost “plug and play.”

❖ Oh, Yes, and it’s an SDR, Too!

As if the KX3 didn’t do just about everything, it also has a quadrature down-sampling mixer compatible with PC-based SDR (software-defined radio) applications. This means, via a shielded stereo audio patch cable and a supplied USB control cable, you can connect the KX3 to your PC and use a freeware SDR application like HSDR to turn your KX3 into a proper software-defined receiver.

SDR functionality is limited to receiver functionality, and depending on the bandwidth and sampling rate, will be dependent on the quality of your sound card. The true benefit is the ability to see a wide – 48 kHz or more – chunk of spectrum.

❖ Summary

Every radio has its pros and cons. When I begin a review of a radio, I take notes from the very beginning so that I don’t forget some of my initial impressions. Here is the list I formed over the time I’ve spent evaluating the KX3. Note that I created this list with the shortwave listener in mind, not necessarily the ham radio operator.

Pros:

- World class, benchmarked receiver performance with high-performance 32-bit floating-point DSP.
- Rich, full audio fidelity on AM despite limited bandwidth (see con below).
- AF and effective RF gain controls.
- Adjustable filters (no optional roofing filters needed for SWLing).
- Auto-notch, which helps eliminate annoying heterodynes, even in AM.
- Internal ATU option brings improved MW filtering and hams have the ability to tune a random length antenna.



Natively decode (170 Hz) 60-WPM RTTY and display it right on the KX3’s VFO B display, which is alphanumeric.

Battery operation via 8 AA batteries.

Lightweight.

Dedicated headphone jack.

For non-ham radio operators, the transceiver can be disabled and re-activated once you have a license with a simple hardware adjustment. No need to fear accidental transmission.

For hams, or those who plan to become one, the KX3 is a QRP transceiver in the top of its class.

Cons:

AM bandwidth limited to 4.2 kHz (see pro).

Hand mic connector is the less standard 3.5 mm audio plug. Built-in speaker is small with limited volume and fidelity, it’s only intended as a back-up when headphones or external powered speakers are unavailable.

AA batteries fit a bit tightly in the internal holder and can present a challenge to remove.

Medium wave reception is mediocre, but with the optional ATU, is improved.

❖ Did I Buy One? Confession time

I must admit, I was appreciating my friend Dave’s KX3 very much. I have three hobbies: shortwave radio listening, ham radio, and traveling. After using the KX3 for a few hours, I knew it would be my perfect companion. Not only is it a top-notch amateur radio transceiver, it’s also an excellent shortwave radio receiver. It’s portable, but also makes an excellent tabletop radio. It’s an all-in-one radio, but can also double as an SDR when connected to a PC.

Needless to say, I bought one. It was only fair to Dave, who needed to discover for himself what his loaned-out rig could do.

The KX3 is a game changer for me. Though I’ve always carried portable transceivers in my travels, I’ve also had to carry a separate tabletop receiver and an SDR or portable radio for my SWLing. *No more.*

Moreover, I like the broadcast audio on the KX3 well enough to record and archive shortwave broadcasts, which I frequently do for my blog, *The SWLing Post*. In my shack, I’m even considering purchasing Elecraft’s 100 watt amplifier and doing away with my 100 watt tabletop transceiver.

As for support, I have absolutely no worries here. I’ve been an Elecraft customer for years and I can tell you that they believe in and stand behind their products.

I encourage you to try on the KX3 as well. It may very well be all the radio you’ll ever need.