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Elecraft K3S HF and 6 Meter Transceiver

Even better performance from the latest version of an already high-performing transceiver.

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Let's get it out of the way right off the bat: The K3S is the best-performing transceiver I've ever used — but *not* the easiest to learn. A lot has already been written about the Elecraft K3 transceiver, which took the Amateur Radio world by storm nearly a decade ago for its innovative design and exceptional performance. Earlier incarnations have been reviewed twice in *QST*, most recently in 2009. In addition, we've reviewed a number of add-ons and accessories.[1] This readily transportable transceiver soon became the darling of contest operators and DXpeditions around the globe. Since its introduction, the original K3 transceiver has undergone continuous improvement through both hardware and firmware upgrades.

In 2015, Elecraft upped its game a bit with its "second generation" K3S transceiver. Elecraft says the K3S is the same size and weight as the K3, but that it has redesigned "nearly all" internal modules to improve performance and enhance the feature set. Highlights include a new low-noise synthesizer that dramatically improves receiver reciprocal mixing dynamic range and transmitted phase noise, and inclusion of the previously optional KXV3B module that provides a receive antenna input, a second preamp for 12, 10, and 6 meters, an IF output, and a transverter interface. A USB interface is now standard along with RS-232, and the 630 and 2200 meter bands are supported. Other improvements include more attenuator level choices, faster transmit/receive switching, and a redesigned speaker audio amplifier.

Considering its heritage, it was a given that the K3S would also be a top-tier performer, and — I could be wrong here — more of a CW aficionado's dream radio, although it works quite nicely, thank you, on SSB and on digital modes, which the K3S lets you operate *sans* keyboard or computer. In addition to reviewing how Elecraft has nudged the envelope, I'll discuss what it's like to use the radio.

Bottom Line

The Elecraft K3S is a performer *par excellence* in a compact, convenient form factor.

Our review radio had these options: KAT3A auto tuner; KBPF3A general-coverage receive band-pass filters; and eight-pole roofing filters at 13 kHz (FM), 6 kHz (AM), 2.8 kHz (upgrade from the standard 2.7 kHz, five-pole filter), and 400 Hz. You can have up to five roofing filters — many choices are available. This configuration will run you just over $4000. One beauty of Elecraft's K-Line is its *a la carte* menu of add-ons and accessories — from the popular P3 spectrum scope to the KPA500 amp, 2 meter module, digital voice recorder, sub-receiver with the same performance as the main receiver, and more. Check out the Elecraft website for the full list.

As always, you can cut your outlay a bit if you choose Elecraft's no-solder kit option, instead of letting the factory put your K3S together.

User Interface

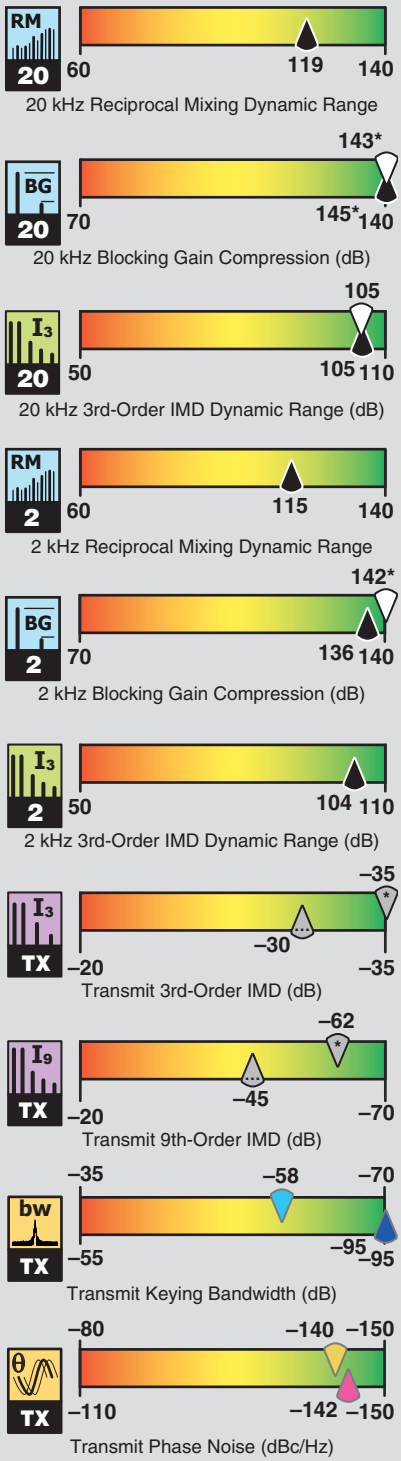
The K3S carries forward the same no-nonsense styling of the K3 with its sturdy square-edged case. There's little in the way of unnecessary adornment. On the outside, nothing immediately remarkable distinguishes the "S" model from the original, save a new display bezel that bears the "Elecraft K3S Transceiver" legend and an improved, soft touch tuning knob.

The compact form factor is a real plus, but, as with many modern transceivers, the consequent smallish front-panel controls might not suit someone with large fingers.

[1]Go online to **www.arrl.org/product-review**, then select Reviews Listed by Manufacturer and look for Elecraft in the "E" section.

Key Measurements Summary

Elecraft K3S HF and 6 Meter Transceiver



Elecraft conserves front-panel buttons and knobs by extensive implementation of multi-use controls — quick press or press and hold for ½ second. The buttons are not illuminated, and it can be difficult to distinguish one from the other on the fly if the lighting is not good. In due course a user will become familiar with all of the controls, but they presented me with a bit of a learning curve.

There is a MAIN menu and a CONFIG menu. The MAIN menu includes parameters you'd need to adjust more often, while the CONFIG menu digs down a few levels. These are not entirely "plain language" menus, so you may want to keep the manual handy — especially if you're a first-time K-Line user.

The monochrome display, which uses seven-segment characters for frequency readout and other functions, is adequate in showing everything you might want — or need — to know about the transceiver's settings. The main frequency readout is quite prominent, but the display window itself is small.

I really appreciated being able to have the SWR and RF output indicators displayed simultaneously, rather than having to switch or step through several other metering functions to reach the one I want. Some may want a more precise display than the bar-graph style S meter offers, although this style of meter is common on today's transceivers and I don't pay a lot of attention to S meters in general. Note that if you have the CWT (CW tuning) feature turned on, the right half of the S meter becomes a tuning aid. Also note that the accessory P3 spectrum scope offers very high resolution transmit power and S-meter bar graphs.

The VFO B display can show time, date, RIT/XIT offset, power supply voltage, PA current drain or heatsink temperature, and front panel temperature (FP). Tapping DISP turns the selected display on or off, and rotating the VFO B knob scrolls through the choices.

The user interface has not changed much over the 8 years since the first K3 showed up on the market. The K3S continues to eschew such niceties as a color display, touchscreen, fully plain text menus, or a built-in spectrum scope that have become common on other transceivers. *But*…top-tier radio performance is certainly what attracts most operators to the K3S. Maybe swanking up the K3S would broaden its appeal, but not if it's to the detriment of a proven design.

Interfacing

The rear panel of the K3S (see Figure 1) gives you access to an array of communication ports and connections, including a new USB port. You can use the USB connection to control the radio and to handle audio I/O, as well as PTT and CW keying. The RS-232 serial port (also used for connecting the P3 panadapter) is now an RJ45 connector, but an accessory adapter (included) brings that out to a female DE9 connector. You can set the menu to assert RTS and/or DTR via USB or RS-232 to activate PTT or to key the radio.

In addition, there are 3.5 mm stereo speaker and headphone jacks, a mic jack (you can set low or high mic input level via the MAIN menu), a mono line-in jack, and a stereo line-out jack. Our K3S has the

Figure 1 — The Elecraft K3S rear panel. See the text for a discussion of the various jacks and connections.

KAT3A auto tuner option installed, which adds a second SO-239 antenna jack.

Below the RX ANT in/out, XVTR in/out, and IF out connectors are separate quarter-inch (*thank you!*) paddle and key connectors, plus PTT IN (phono) for using a foot switch, KEY OUT (phono) for amplifier TR switching, and REF IN (SMA) jacks. The last provides for use with the K3EXREF option module, which locks the K3S synthesizer to an external 10 MHz reference.

A 12 V dc out jack (RCA) provides up to 1 A (switched) for use with accessories.

If you own a KPA500 linear or a P3 panadapter, you won't have to change a thing in terms of connections, but using the USB port *and* the P3 at the same time requires a CBLP3Y cable assembly (supplied with the P3 panadapter).

Nixing Noise

Noise reduction (NR) in the Elecraft K3S is to die for, although the number of choices is akin to standing in the supermarket breakfast cereal aisle. The manufacturer recommends NR menu settings F1-1 through F4-4, and those often will be adequate for whatever noise is plaguing you. Elecraft explains that NR settings F5-1 through F8-4 use another noise-reduction algorithm altogether, and these can get plenty aggressive. Mixed (M) settings combine processed and unprocessed signals (from 50 to 100 percent processed). The downside here is that there is no simple 0-to-10 linear NR adjustment. The upside is that you're very likely to find that one (or more) of the settings will do the trick, and you can adjust on the fly as circumstances demand. Sure, it's a little more complicated than the typical NR system, but the extra effort pays off!

Noise reduction is set by mode. The same setting will apply to that mode when you switch bands. The effects of any noise reduction do not show up on the S meter, by the way. You'll have to trust your ears.

I discovered that the radio's fine noise reduction system does *not* function when you're in DATA mode, but the twin-peak (or "dual-tone," as Elecraft calls it) filter and adjustable bandwidth got me clean copy during the North American QSO Party RTTY event, with the exception of very noisy conditions on 80 meters related to a weather system. This wouldn't help PSK or other digital modes, however.

The noise blanker (NB) in many transceivers can be more of a detriment to reception than an enhancement. Not so in the K3S, which has a very effective NB that, in some cases, can make certain types of pulse and power line noise disappear like magic! There are both IF and DSP noise blankers, and these may be used in concert for maximum effect. You can adjust the IF NB, which is in the 1st IF, to optimize its performance for narrow, medium, or wide pulse noise widths. The NB icon lets you know if you have the IF noise blanker set too high for conditions. According to Elecraft, the DSP noise blanker is in the 2nd IF, so it can't be activated by signals falling outside the passband of the crystal filter. Elecraft thought outside the box here, though; these are not necessarily just for pulse-type noise such as vehicle ignition noise but can even be effective at trimming back atmospheric or other noise. It's like having another line of defense in tempering troublesome noise.

Each noise blanker is user-adjustable from subtle to extremely aggressive, with a lot of intermediate possibilities. As most operators know, too much of a good thing like noise blanking can end up becoming signal blanking. Use with caution! Less often can be more. You can set the NB to be on or off per band, and NB characteristics are saved per band. If, for example, you were using one setting on 80 meters and find you need noise blanking on 10, you'll have to set it up for that band separately.

Flexibility in Filters

The K3S offers *extensive* flexibility in adjusting the IF passband. On CW, you can crank it down to a teensy 50 Hz with minimal ringing with good copy. For filters of 100 Hz or less, you can select either FIR (Finite Impulse Response) or IIR (Infinite Impulse Response) curves.

The SHIFT and WIDTH controls may take a little practice, and the passband graphic helps to keep things straight. When you change the DSP bandwidth, the new value shows up in the VFO B frequency area but after a few seconds the display returns to whatever function you've chosen to display there. I often found myself tweaking the WIDTH control just to see where I had set the passband.

On CW, the audio peak filter (APF) is an extremely useful feature. Its peak is about 30 Hz wide but it has broader skirts. APF can be an alternative to a very narrow DSP filter setting, and it can be incredibly effective in bringing signals to the fore. On SSB, you can adjust high and low cut separately and on the fly for optimal readability. In RTTY mode, the same button brings up the twin-peak filter.

Enabling the APF on the K3S is a secondary feature of the XFIL/6 button on the keypad. This means that you have to press and hold the APF button to turn it on, and press and hold it again to turn it off. I found the APF to be terrific when digging out weak CW signals, and would have preferred that it be the primary function. The CONFIG menu lets you select to have the APF button turn on dual-passband filtering instead.

We had the optional 2.8 kHz and 400 Hz crystal roofing filters, which can be set per mode and work in concert with the DSP to offer exceptional protection from nearby (loud) stations you may encounter, especially in contests.

Using the I & II settings made swift work of switching between wide and narrow filters, *but* you must remember to press and hold the HI CUT/WIDTH control. If you adjust the "I" filter setting, it will "stick" after you go back to "II" setting.

No-Fuss, No-Muss Digital

The K3S is capable of RTTY (45 and 75 baud) and PSK (31 and 63) without a computer — or even without a keyboard! The K3S does not have provisions to plug in a keyboard, but, like the original-flavor K3, the K3S lets you transmit on digital modes by using your CW paddle; the radio's software does the cross-mode "translating." Decoded text appears via the running stream of 13-segment characters on the display (the space available for decoding accommodates seven characters or spaces). I found it easy to miss the decoded text stream as it flows past, but it might just snag you a new one in a pinch. This works for RTTY or PSK.

Alternatively, you can employ the M1 – M4 memories to store your call sign and some boilerplate text. This works very nicely,

although in the default mode, the radio continues to idle (diddle) for 4 seconds after your transmission ends. Sending "IM" at the end of the string you're putting into memory makes it stop transmitting immediately, and the IM is not transmitted — but promptly returning to receive ought to be the default.

Following the instructions in the *Owner's Manual* to get the K3S going on digital, I used audio in/out cables to set it up for audio frequency shift keying (AFSK) in the *NCJ*-sponsored North American QSO Party (RTTY) in July. It wasn't until afterward that I spotted a very brief discussion of the USB port in the manual under "Control and Audio Connections," indicating that the USB cable already connected for radio control could also handle line-level audio in/out, eliminating the need to use the PC sound card and associated cables.

Once I got my PC set up to handle audio I/O via the USB audio CODEC, it worked beautifully for AFSK RTTY. By far it's the simplest way to go, although with the USB connection you may have to do some configuring on the logger/PC side.

For either quick-and-dirty method — audio cables or USB — you will not require any sort of external interface for digital modes. Handling audio I/O either way puts you on AFSK RTTY, although FSK (direct keying) is available via the rear-apron accessory connector.

Working Around Getting Around

From my perspective, the K3S's major missing front-panel feature is individual band buttons with band stacking registers, although this may be a higher priority for the more casual operator than for contesters or DXers. There are workarounds. For example, you can set up a memory for each band using one of the keys on the keypad. Then, to change bands, press M>V plus the assigned key (for example, M>V then 1 for 160 meters, 2 for 80 meters, and so on). The "scratch pad" memories accessed by the M1 – M4 keys retain their contents by band so they can be set up to act like band stacking registers. So, for example, you could set up M1 with phone settings for each band, M2 with CW settings, M3 with RTTY settings, and M4 with PSK31 settings. You'll have to remember

Table 1
Elecraft K3S, firmware V 5.50, serial number 10158

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 0.1 – 30, 44 – 54 MHz; transmit, 160 – 6 meter amateur bands.	Receive and transmit, as specified; (5.15 – 5.42 MHz for 60 meters).
Power requirement: 11 – 15 V dc, 17 – 22 A typical.	At 13.8 V dc: Transmit, 17 A (typical). Receive: 1.43 A (max volume, max backlights), 1.465 A (max volume, backlights off).
Modes of operation: SSB, CW, AM, Data, AM, FM, RTTY, PSK.	As specified.

Receiver	Receiver Dynamic Testing
MDS: –133 dBm (HF, preamp off); –138 dBm (preamp 1); –145 dBm (preamp 2 for 12, 10, 6 meters).	Noise floor (MDS), 400 Hz DSP BW, 400 Hz roofing filter:
	Preamp / *Off (dBm)* / *1 (dBm)* / *2 (dBm)* 0.137 MHz† / –113 / — / — 0.475 MHz† / –134 / –134 / — 1.0 MHz† / –135 / –139 / — 3.5 MHz / –135 / –139 / — 14 MHz / –135 / –139 / — 28 MHz / –131 / –137 / –145 50 MHz / –131 / –135 / –145
Noise figure: Not specified.	14 MHz, 8 dB; 50 MHz, 2 dB.
AM sensitivity: Not specified.	10 dB (S+N)/N, 1-kHz, 30% modulation, 6 kHz DSP BW, 6 kHz roofing filter:
	Preamp / *Off (µV)* / *1 (µV)* / *2 (µV)* 1.0 MHz / 1.19 / 0.87 / — 3.8 MHz / 1.15 / 0.87 / — 29 MHz / 2.11 / 1.35 / 0.47 50.4 MHz / 2.24 / 1.41 / 0.39
FM sensitivity: Not specified.	For 12 dB SINAD (13 kHz roofing filter):
	Preamp / *Off (µV)* / *1 (µV)* / *2 (µV)* 29 MHz / 0.65 / 0.42 / 0.14 52 MHz / 0.20 / 0.49 / 0.12
Blocking gain compression dynamic range: 140 dB.	Blocking gain compression dynamic range, 400 Hz DSP BW, 400 Hz roofing filter:
	20 kHz offset, Preamp off/1/2 / *5/2 kHz offset, Preamp off* 3.5 MHz: 143/134/— dB / 142/142 dB 14 MHz: 145/137/— dB / 145/136 dB 50 MHz: >141/136/133 dB / 141/137 dB
Reciprocal mixing dynamic range: Not specified.	14 MHz, 20/5/2 kHz offset: 119/116/115 dB

ARRL Lab Two-Tone IMD Testing (400 Hz DSP BW, 400 Hz roofing filter):

Band (Preamp)	*Spacing*	*Measured IMD Level*	*Measured Input Level*	*IMD DR*
3.5 MHz (off)	20 kHz	–135 dBm	–30 dBm	105 dB
		–97 dBm	–16 dBm	
		0 dBm	–48 dBm	
14 MHz (off)	20 kHz	–135 dBm	–30 dBm	105 dB
		–97 dBm	–15 dBm	
		0 dBm	–52 dBm	
14 MHz (one)	20 kHz	–139 dBm	–39 dBm	100 dB
		–97 dBm	–23 dBm	
14 MHz (off)	5 kHz	–135 dBm	–31 dBm	104 dB
		–97 dBm	–15 dBm	
		0 dBm	–51 dBm	

Manufacturer's Specifications		Measured in the ARRL Lab		
Band (Preamp)	*Spacing*	*Measured IMD Level*	*Measured Input Level*	*IMD DR*
14 MHz (off)	2 kHz	–135 dBm	–31 dBm	104 dB
		–97 dBm	–15 dBm	
		0 dBm	–51 dBm	
50 MHz (off)	20 kHz	–131 dBm	–23 dBm	108 dB
		–97 dBm	–12 dBm	
		0 dBm	–60 dBm	

Second-order intercept point: Not specified.	Preamp off/1/2: 14 MHz, +75/+75 dBm; 21 MHz, + 85/+85 dBm; 50 MHz, +81/+81/+23 dBm.
IF and image rejection: >70 dB.	IF rejection: 7 MHz, 112 dB; 14 MHz, 101 dB; 50 MHz, 91 dB. Image rejection: 14 MHz, 128 dB*, 50 MHz, 62 dB.
DSP noise reduction: Not specified.	10 dB.
Audio output: 2 W (typical) into 4 Ω at 10% THD.	1.74 W into 4 Ω. at 10% THD. THD at 1 V_{RMS}, 0.33%.
FM adjacent channel rejection: Not specified.	29 MHz, 88 dB; 52 MHz, 84 dB.
FM two-tone third-order dynamic range: Not specified.	20 kHz spacing: 29 MHz, 83 dB; 52 MHz, 81 dB. 10 MHz spacing: 29 MHz, 116 dB; 52 MHz, 97 dB.
Squelch sensitivity: Not specified.	29 MHz, 0.11 µV to 129 mV; 52 MHz, 0.08 to 316 mV.
Notch filter depth: Not specified.	Manual notch, 55 dB. Auto-notch, >65 dB. Attack time, 18 ms (single tone), 35 ms (two tones).
S-meter sensitivity: Nominal S-9 = 50 µV, user adjustable.	S-9 signal, (preamp off/1/2): 14 MHz, 112/33 µV; 50 MHz, 206/50/12.9 µV (default settings).
IF/audio response: Not specified.	Range at –6 dB points:‡ CW (400 Hz): 404 – 793 Hz (389 Hz) Equivalent Rectangular BW: 377 Hz USB (2.4 kHz): 306 – 2692 Hz (2386 Hz) LSB (2.4 kHz): 306 – 2693 Hz (2387 Hz) AM (6 kHz): 69 – 2939 Hz (5740 Hz)

Transmitter	Transmitter Dynamic Testing
Power output: 0.1 – 100 W typical.	HF, as specified; 96 W on 50 MHz. Power output at minimum specified dc voltage: 82 W (typ).
Spurious-signal and harmonic suppression: >50 dB (HF); >60 dB (50 MHz).	HF, as specified: 50 MHz, 65 dB. Complies with FCC emission standards.
SSB carrier suppression: >50 dB.	>70 dB.
Undesired sideband suppression: >50 dB.	>70 dB.
Third-order intermodulation distortion (IMD).	3rd/5th/7th/9th order, HF, 100 W PEP: HF, –35/–36/–48/–62 dB (typical) –30/–38/–41/–45 dB (worst case, 12 m) 50 MHz, –35/–41/–52/–60 dB (90 W)
CW keyer speed range: 8 – 50 WPM.	8 – 55 WPM; 8 – 100 WPM (QRQ on). Iambic modes A and B.
CW keying characteristics: Not specified.	See Figure 2.
Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.	S-9 signal, AGC fast: CW, 14 ms; SSB, 33 ms.
Receive-transmit turnaround time (tx delay): Not specified.	SSB, 40 ms; FM, 17 ms (29 MHz), 18 ms (52 MHz).
Composite transmitted noise: Not specified.	See Figures 3 and 4.

Size (height, width, depth, including protrusions): 4.4 × 11.1 × 11.8 inches. Weight: 8.5 lbs.

Price: K3S/100-F transceiver, $2900; KAT3A auto tuner, $380; KBPF3A general coverage receiver band-pass filter, $180; KFL3A-2.8_2.7SW 2.8 kHz roofing filter, $140; KFL3A-400 400 Hz roofing filter, $170; KFL3A-6k 6 kHz roofing filter, $150; KFL3A-FM 13 kHz roofing filter, $150.

Second-order intercept points were determined using S-5 reference.

†MDS measurements made at RX ANT jack, see text.
‡Default values; bandwidth is adjustable via DSP.
*Measurement was noise limited at the value indicated.

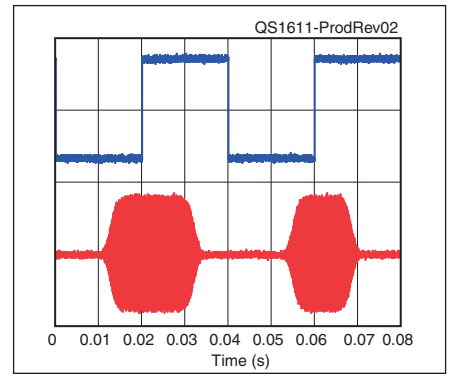


Figure 2 — CW keying waveform for the Elecraft K3S showing the first two dits using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. (Note that the first key closure starts at the left edge of the figure.) Horizontal divisions are 10 ms. The transceiver was being operated at 100 W output on the 14 MHz band.

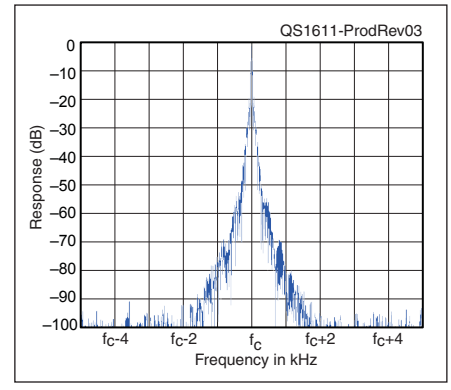


Figure 3 — Spectral display of the Elecraft K3S transmitter during keying sideband testing. Equivalent keying speed is 60 WPM using external keying. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 100 W PEP output on the 14 MHz band, and this plot shows the transmitter output ±5 kHz from the carrier. The reference level is 0 dBc, and the vertical scale is 10 dB/division.

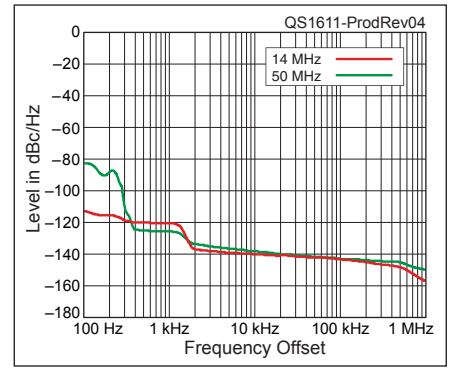


Figure 4 — Spectral display of the Elecraft K3S transmitter output during phase noise testing. Power output is 100 W on the 14 MHz band (red trace) and 50 MHz band (green trace). The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 100 Hz to 1 MHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dBc/Hz.

Lab Notes: Elecraft K3S

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The Elecraft K3S is the latest version of highly regarded K3 HF/VHF transceiver. In terms of Lab testing, the big news is its improved synthesizer, which provides significantly lower transmit phase noise and higher reciprocal mixing dynamic range (RMDR) than the original K3. This K3S measured 115 dB RMDR at 2 kHz spacing, a 29 dB improvement over the K3 we reviewed in the January 2009 issue of *QST*. K3 owners who have installed the KSYN3A low noise synthesizer already enjoy these improvements. Every K3 with a serial number of 8801 or higher was delivered with this low noise synthesizer installed at the factory.

Of the three dynamic range measurements we make, RMDR was the limiting dynamic range in the original K3 (blocking gain compression dynamic range and two-tone, third-order, IMD dynamic range were both higher). For the K3S the limiting factor is two-tone, third-order, IMD dynamic range — 104 dB at 2 kHz spacing — as both RMDR and blocking are higher.

It is worth noting that the K3S receiver has the ability to protect its preamps. If a +5 dBm (78 dB/S-9) input signal level or higher is received, the preamps shut off and HI SIG shows up on the display — good insurance when operating in proximity to other transmitters. At 50 MHz, the second-order intercept point indicates the two-tone second-order dynamic range is rather poor with preamp 2 on (it's excellent with preamp 1 on or preamp off). If, by chance, the user hears false signals resulting from the sum of two out-of-band signals, switch to preamp 1.

The receiver performance is certainly very impressive, but what about the K3S's transmit quality? That's excellent as well. Transmit phase noise is significantly better, nearly 30 dBc/Hz lower at 2 kHz away from the carrier as compared to an older K3 we measured in the Lab last year. Keying sidebands are also low. Initial transmit IMD testing of the K3S showed acceptable levels of IMD products, typically –30/–41/–43/–52 dBc (dB below 100 W PEP), if the ALC level was minimal. However, as the ALC level increased, the distortion products increased. The ARRL Laboratory shared this test data with the engineering staff at Elecraft, who then worked to optimize the bias circuitry of both the 10 W and 100 W PA modules. With the new KPA3A, rev C4 and KLPA3 rev B modules installed, tests showed lower TX IMD products, typically –35/–36/–48/–62 dBc, *throughout the entire AGC operating range*. Note that the 7th and 9th order products have the most impact outside of the normal transmit passband.

During initial testing, we found that the second harmonic on 17 meters measured 42 dB below the fundamental, well below the specified >50 dB we measured on the other bands. We returned the transceiver to Elecraft for repair, and they brought it into spec.

Want to learn more about what the terms and numbers mean in QST *Product Reviews? Read* Amateur Radio Transceiver Performance Testing *by Bob Allison, WB1GCM, available at your favorite Amateur Radio dealer, or at the ARRL Store* (**www.arrl.org/shop**). *Bob's book is also available in Kindle format from Amazon.*

what bands/modes you have assigned to which keys, or keep a "cheat sheet" handy.

I did not care for the horizontally mounted BAND and MODE switches, which, like everything else on the front panel, serve other functions. On the plus side, the BAND switch in the upper left corner is convenient. On the minus side, you have to step through all the bands between the one you're leaving and the one you're aiming for, although it's possible to pull individual bands you don't operate from the rotation, as it were, using a menu setting that functions on a per-band basis.

Direct frequency entry is possible too. You need to include the decimal point for a specific frequency, although you can enter, say, "28" to get to 10 meters. You have to first press the FREQ ENT button, then tap the ENTER key. A lot of logging programs, such as *N1MM Logger+* or *Ham Radio Deluxe*, will let you enter an operating frequency on the fly.

Within a band, the menu offers three "count" choices per turn for the VFO knob: 100, 200 (default), and 400. There is a "fast" rate setting. Front-panel buttons let you pick an appropriate tuning rate for rapid excursions or for leisurely tuning through the band.

CW Keying

There's a certain *je ne sais quoi* about the experience of sending CW with this radio. CW keying is available in iambic A ("slap keying") or iambic B ("squeeze keying"). The latter is my personal preference, and adjusting the weighting ever so slightly made sending CW from a paddle nearly effortless! I couldn't get over how much my fist improved while using the K3S.

There is a CW QRQ menu option for operating at up to 100 WPM (*riiight!*) and to get faster break-in keying at all speeds. The thing is, I never noticed that the QSK was not fast enough already. Enabling this *disables* the filter passband SHIFT/LO-CUT-HI function.

The Great Equalizer

The K3S has both transmit equalization (TX EQ) and receive equalization (RX EQ), and you can set up different receive EQ settings for CW and for voice modes. The TX and RX EQ systems look essentially the same, and while the equalizer offers considerable flexibility in tweaking audio response (±16 dB) over eight octaves (50 Hz to 3.2 kHz), the on-screen display is rather rudimentary.

Some have complained about the K3's audio quality, I understand, but I found that the TX EQ utility will let you tweak your audio so that it sounds excellent. Anyone should be able to sound terrific after spending a little time with the TX EQ. One quibble: The radio will not let you adjust TX EQ while it's in transmit (while you're actually listening to your audio). The K3 offers separate TX EQ screens for SSB and for ESSB (extended SSB). TX EQ and RX EQ are conveniently stowed in the MAIN menu, rather than in the more complex CONFIG menu.

The Big Bullet List (in No Particular Order)

- In anticipation of the new LF and MF bands, the K3S offers coverage from 100 to 550 kHz, including low-level 630 meter (472 – 479 kHz) transmit capability! (You're on your own for the necessary antenna.)
- The updated ATU is lightning fast and matched some antennas that my own transceiver gave up on. The ATU now

includes a BYPASS mode, not available on the original version.

■ The AFX (audio effects) feature is spectacular for SSB! AFX "creates an illusion of greater acoustic space," according to the manual, and it sounds terrific. *All* radios should offer this feature! It's even useful on CW.

■ If there is a + or – RIT offset in effect, one of the yellow LEDs near the RIT will be illuminated. If the offset is 0, the green LED will be illuminated. Thus the operator knows at all times whether there's an offset. Also, there is a special VFO B display mode that allows RIT/XIT offset to be permanently displayed if so desired.

■ The radio's transmit noise gate, accessible via the CONFIG menu, mutes microphone audio below a selected threshold to minimize the transmission of extraneous noise, in a multioperator situation, for example. This is essentially a squelch circuit for the mic input. It works, but seemed to recover slowly after you stop speaking, before shutting down the audio.

■ To keep from blowing out your eardrums, an AF limiter can be used when the AGC is turned off.

■ The *Owner's Manual* is comprehensive, readable, and updated online (as a downloadable PDF).

■ A menu choice lets you leave the speaker on when you plug in headphones.

■ I liked having TUNE, which provides a low-level transmit signal for tuning external antenna tuners or power amplifiers, as a secondary function on the XMIT button. For years now, I've wondered why more manufacturers do not include such a basic feature. Even my 1980s vintage hybrid radio has one, but my own new-ish rig does not.

See the Digital Edition of *QST* for a video overview of the Elecraft K3S HF and 6 meter transceiver.

■ Using the menu, it's possible to set a custom power output level for each band.

■ You can configure BSET to adjust VFO B/sub-receiver independently of VFO A/main.

■ The CWT (CW tuning) display is also used for properly tuning RTTY and PSK signals. AUTO-SPOT also works for CW and PSK.

■ I really liked the little Δf LED right next to the TX indicator. It lets you know that the transmit and receive frequencies differ, such as when you have enabled RIT or XIT or are operating in SPLIT.

■ You can copy CW or digital modes in the display (in the space where the sub-receiver's frequency appears) with the press of a button, assuming you have it set up.

■ For signal-level purists, it's possible to calibrate the S meter, assuming you have access to suitable test equipment, such as a calibrated signal generator. In the CONIFG menu there is a setting to keep the S meter reading "fairly constant" regardless of whether a preamp or attenuator is engaged, but that requires recalibration.

■ Tapping DISP within a menu brings up information about the menu item on the display.

■ The interesting DIGOUT1 feature provides a per-band/per-antenna open-drain output signal on the accessory connector (either floating or pulled to ground) to control external equipment, such as an antenna switch.

■ There are two banks with four message memories each. Whatever you've committed to the message memories (selected with the M1 – M4 buttons) may be used interchangeably on CW or on data modes.

■ The NOTCH filter is extremely effective!

■ The K3S does not offer a video output, but the accessory P3 has an SVGA out option.

All told, this is a high-performance transceiver for HF and 6 meters. Prospective buyers will need to weigh whether this is sufficient to surmount the lack of certain operating conveniences such as a built-in spectrum scope, but for DXpeditioners, contesters, and other performance-oriented operators looking for a conventional transceiver, this is likely a no-brainer.

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