ELECRAFT KX2 PHYSICAL DESCRIPTION AND AUDIO-CW USER INTERFACE

Wayne Burdick, N6KR Rev. A4, 5-31-2016 Applies to firmware revision 2.61 or later.

CHANGE HISTORY

Rev. A1, 5-23-2016: Document creation.
Rev. A2, 5-28-2016: Various updates.

INTRODUCTION

This document is intended to familiarize blind operators with basic operation of the Elecraft KX2. First, overall characteristics are presented, including locations of all controls and connectors. Then switch and knob functions are described, including associated audio CW (Morse code) characters and switch tones.

The user should also read the KX2 owner's manual, which covers operation in detail.

Note: At present, some controls may not provide audio-CW feedback, making them difficult or impossible to use without the display. This includes the menu. Our goal is to eventually provide access to all KX2 functions via the audio interface.

PHYSICAL OVERVIEW OF THE KX2

The KX2's enclosure, not counting knobs, etc., is approximately 1.5" high, 2.8" deep, and 5.8" wide. The enclosure is made up of a top and bottom cover. The bottom cover is held on by two thumb nuts.

During normal operation, the KX2 is used in a trail-friendly orientation, nearly parallel to the operating surface (table, etc.), but with its rear edge tilted upward. There is a tilt foot in the rear that serves this purpose, in a manner similar to the rear tilt feet on a computer keyboard. To deploy the tilt foot, loosen (but do nor remove) the rear-most thumbscrew, fold down the foot completely, then tighten the thumbscrew again.

To gain access to the interior of the KX2 for changing batteries, the two thumb nuts on the left and right sides must be loosened about 1 or 2 turns (*not* all the way, as they may be lost). The bottom cover can then be removed. Note: The KX2 will put out more power when running from an external supply. The internal Li-ion battery pack (KXBT2) is recommended as a backup, or for lightweight field use. The battery must be charged external using an Elecraft KXBC2 charger.

CAUTION: BE VERY CAREFUL NOT TO STRESS THE SPEAKER WIRES WHEN REMOVING THE BOTTOM COVER FOR BATTERY ACCESS.

The right edge of the enclosure serves as the heat sink. It may become quite warm to the touch when the KX2 is operated for extended key-down times. The KX2 is rated for 50% duty cycle, which will help keep temperature down. Firmware will reduce power automatically if the temperature gets too high.

CONNECTORS

There's one connector on the right side: a BNC antenna jack.

There are several barrel-style jacks on the left side. These include (from back to front):

DC IN (9-15 V; 2.1-mm barrel)
ACC (RS232 or USB serial I/O to an attached PC; 3.5-mm stereo)
KEY (paddle, hand key, or external keyer; 3.5-mm stereo)
PHONES (stereo or mono headphones or external amplified speakers; 3.5-mm stereo)
MIC (for our MH3 mic, which has PTT and UP/DN functions; 3.5-mm 4-conductor)

There's one additional connector, on the front of the enclosure, for use with the KX2's optional attached keyer paddle (KXPD2). This is a custom mechanical paddle with adjustable contact spacing. It is held on by two thumb screws. A KXPD3 can also be used, though older KXPD3s will require a new, shorter left screw.

Note: Avoid using heavy adapters with the left-side jacks as they can be damaged by the application of excess force or leverage. Elecraft provides an accessory cable kit which utilizes small, molded right-angle plugs that are ideal for this application.

INTERNAL SPEAKER

The KX2's speaker is on the bottom cover. It is sufficiently loud even for outdoor use. Plugging in headphones or external amplified stereo speakers at the PHONES jack will allow use of the KX2's full audio effects including simulated stereo and dual watch.

INTERNAL MIC

The internal mic is just behind the front panel, to the left of the left-most knob. There is a very small hole at this location. The internal mic is selected anytime the KX2 is in SSB mode and there's no external mic plugged in. Use the second knob from the left (KYR/MIC) to set mic gain. See Knob Functions.

SWITCHES AND ROTARY CONTROLS – OVERVIEW

All switches and rotary controls are located on the *control panel*, the large top surface of the radio. There are 12 pushbutton switches, each with tap and hold functions. There are four rotary encoders (with knobs), one of which is larger (VFO A). The three smaller encoders all have built-in pushbutton switch functions of their own. These are activated by pushing down on the knob (tap or hold).

In subsequent sections, controls will be described in terms of their location, function, and audio tones. For this purpose, the control panel can be visualized as a flat, vertically oriented surface, as if it were the panel of a traditional forward-facing radio.

NOTE: If you get lost when using a special control mode (such as band change), tap the bottom right-hand switch (DISP/MENU). The first tap of DISP will exit any special mode, reporting with a single beep. A second tap will report mode and frequency in kHz, confirming that you've exited any special mode.

TURNING THE KX2 ON/OFF and ENABLING CW AUDIO TONES

The KX2 is turned on/off by holding two switches at the same time: the switch to the lower left of the VFO A knob, and the switch to the lower right of the VFO A knob (RATE and A/B, respectively.) If the FIL/AFP-AN switch is also held in at power-up, the CW audio interface will be activated and set to 20 WPM. *Release RATE and A/B first, then release APF ~2 seconds later.* To set other code speeds, use MENU:SW TONE.

SWITCH FUNCTIONS

There are 12 pushbutton switches total. Each switch has a pair of functions: TAP and HOLD. Unless otherwise specified, characters are sent at a low pitch when a function is turned OFF, and high pitch when turned ON.

The switches are organized into five groups, from left to right:

Group 1: A row of two switches under the left-most small knob (AF GAIN/MON).

Group 2: A row of two switches under the next knob to the right (KYR/MIC).

Group 3: A column of three switches to the left of the large knob in the middle (VFO A).

Group 4: A column of three switches to the right of the large knob in the middle (VFO A).

Group 5: A row of two switches under the right-most small knob (OFS/VFO B).

Some of the switches, as well as some knob tap functions, are also used as a numeric keypad for direct frequency entry.

Audio-CW characters that are heard on switch activation are shown in double quotes in the descriptions that follow.

Switch Group 1

This is a row of two switches under the left-most small knob (AF GAIN/MON). The switch on the left is PRE/NR. The switch on the right is FIL/APF-AN. Here are the tap and hold functions of these two switches:

PRE, tap: PREamp on/off (“PR”), then ATTenuator on (“AT”). This is also numeric keypad digit 1.

NR, hold: Noise Reduction (“NR”). When NR is turned ON, about 2 seconds are allowed in which to change the NR setting with the knob above the switch. See Knob Functions.

FIL, tap: Filter Adjust mode on/off (“FA”). Also see Knob Functions. Also keypad digit 2. In Filter Adjust mode, rotating AF GAIN/MON sets the filter bandwidth, and rotating KYR/MIC shifts the filter passband. Tapping AF GAIN/MON normalizes the passband to a per-mode value and sends “NM” (norm). Tapping KEY/MIC centers the passband and sends “CT” (center). To exit FIL ADJ mode, tap any other switch or rotate VFO A.

APF-AN, hold: In CW mode, turns APF (audio peaking filter) on/off (“AP”). In SSB mode, turns on auto-notch (“AN”).

Switch Group 2

This is a row of two switches under the second knob from the left (KYR/MIC). The switch on the left is ATU/PFn. The switch on the right is XMIT/TUNE. Here are the tap and hold functions of these two switches:

ATU, tap: ATU TUNE (“SWRn.n” at end). Requires KXAT2 option. Also numeric keypad digit 3.

PFn, hold: Programmable function switch (CW UI TBD; set up using menu—see manual).

XMIT, tap: Transmit (low beep). Also numeric keypad digit 4.

TUNE, hold: Keydown (medium+high beep on start tune, “SWRn.n” on exit). Not same as ATU tune.

Switch Group 3

This is a column of three switches to the left of the VFO A knob. The switch at the top is DATA/TEXT. The middle switch is MSG/REC. The bottom switch is RATE/FREQ. Here are the tap and hold functions of these three switches (top to bottom):

DATA, tap: DATA mode. 1st tap selects data mode (“DT”). 2nd tap reports data submode: “DA”=DATA-A, “AF”=AFSK-A, “FS”=FSK-D, “PS”=PSK-D). Rotate OFS/B knob (far right) to select a different data submode, then tap DATA a 3rd time to exit (low tone).

TEXT, hold: Text Decode on/off (“TD”). **Note 1:** Text displayed on the KX2’s LCD is not directly usable by blind operators, but the text can be captured using the **Terminal** function of *KX2 Utility*. A generic screen reader can then be used to access the text. **Note 2:** When the audio-tone CW interface is in use, text decode is only applicable to RTTY and PSK modes, not CW, though CW may be added in a future release.

MSG, tap: Message play. After “N?” user taps 1-2 for DVR play or 1-3 for CW/PSK/RTTY play. Note: Tapping an out-of-range message # or one that isn’t recorded results in “X”.

REC, hold: Message record. After “N?” user taps 1-2 or 1-3 and enters CW or DVR message. Note: Tapping an out-of-range message number results in “X”.

RATE, tap: VFO/RIT tuning rate. Lo pitch “N”=normal steps (10 Hz). Hi pitch “N”=coarse steps in present mode. “H” = 1-Hz tuning (instead of coarse). 1-Hz tuning is only available in DATA modes, or if APF is turned on in CW mode. Note: Coarse steps are per-mode, selected using MENU:VFO CRS.

FREQ, hold: Frequency entry (“F?”). Enter digits or decimal point; see Numeric Keypad, below. Note: Holding FREQ for over 3 seconds locks/unlocks VFO A and B (“LK”).

Switch Group 4

This is a column of three switches to the right of the VFO A knob. The switch at the top is MODE/RCL-SCN. The middle switch is BAND/STORE. The bottom switch is A/B / A>B. Here are the tap and hold functions of these three switches (top to bottom):

MODE, tap: Operating mode (“L” for LSB, “U” for USB, “C” for CW). To select DATA modes, tap DATA (group 3). Also the MHz decimal point switch for direct frequency entry. Note: To change the sideband (LSB/USB) on the present band, use MENU:ALT MD. MENU:ALT MD is also used to select CW reverse and DATA reverse.

RCL, hold: Memory recall. A long hold (> 3 seconds) starts scanning if a scanning memory has been recalled. (CW UI TBD.)

BAND, tap: Enters/exits band-select mode. On entry, “m FF.F” is sent, where m is the mode, e.g. C=CW, and FF.F is the VFO A freq. in MHz. Rotate VFO A CW/CCW to select a new band. Each new band is announced.

STORE, hold: Memory store (CW UI TBD). Also the “return” (enter) function for direct freq. entry.

A/B, tap: VFO A/B swap (“/”). There is no absolute notion of VFO A and VFO B, so after swapping, tap DISP to verify the current mode and frequency of VFO A.

A>B, hold: Copy VFO A frequency to VFO B. Sends “2B”, as in “from A to B”. Tap twice within 5 seconds to also copy VFO A’s mode and filter settings.

Switch Group 5

This is a row of two switches under the OFS/VFO B knob, located on the far right. The left switch of this pair is RIT/SPLIT. The right switch is DISP/MENU. Here are the tap and hold functions of these two switches:

RIT, tap: RIT on/off (“RI”).

SPLIT, hold: SPLIT mode on/off (“SP”).

DISP, tap: Short-hand VFO frequency report; “m FFF” where m is op mode and FFF is 100/10/1 kHz digits. “T” is sent for zero.

MENU, hold: Configuration menu (“M”). At present the menu does not provide CW audio feedback. Menu use should be avoided or assistance obtained, since unwanted settings could result from use without feedback. See proposed menu access section.

KNOB FUNCTIONS

AF GAIN/MON/NB/FIL ADJ Knob

The left-most knob normally controls AF gain. Tapping it switches to voice/CW/data monitor level control. In CW/PSK-D/FSK-D modes this turns on the sidetone. In voice and audio data modes, “MN” is sent in CW, and rotating the knob sends the monitor level in CW. This assignment persists until you tap it again to return to AF gain (“AF”).

Holding this knob turns the noise blanker on/off (“NB”). If the knob is rotated within about 2 seconds of turning on the NB, the NB level can be adjusted, and is sent in CW. It remains in NB level adjust mode until you tap any other switch. (Note: A high noise blanker level, i.e. approaching full clockwise, may cause signal distortion. Use the lowest effective level.)

Below this knob, at left, is the PRE/NR switch. When NR is turned on (“NR”), about 2 seconds are allowed in which to rotate the knob and adjust NR level. The level is sent in CW, and it remains in NR level adjust mode until you tap any other switch. (Note: A high noise reduction level, i.e. approaching full clockwise, can cause loss of weak signals. Use the lowest effective level.)

Below this knob, at right, is the FIL switch. Tapping FIL enters Filter Adjust mode (“FA”). In this mode, rotating AF GAIN/MON sets the filter bandwidth, and rotating KYR/MIC shifts the filter passband. Tapping AF GAIN/MON normalizes the passband to a per-mode value and sends “NM” (norm). Tapping KEY/MIC centers the passband and sends “CT” (center). To exit filter adjust mode, tap any other switch or rotate VFO A.

This knob is also part of the numeric keypad (knob tap = digit 0). This applies during FREQ entry and message play/record. The switches below it are digits 1 (PRE) and 2 (FIL).

KYR/MIC Knob

This is the second knob from the left. In CW, PSK-D, and FSK-D modes, it normally controls keyer speed ("KS"). Keyer speed is reported in CW as the knob is turned ("8" to "50" WPM). Tapping the knob provides a mode-specific spotting function in some modes. In CW mode, this turns on a CW SPOT tone; adjust VFO A to match the pitch of a received signal to your sidetone pitch. In PSK-D mode it does an auto-spot of a PSK31 signal. In FSK-D mode it turns on a tone equal to the FSK-D (RTTY) MARK tone (915 Hz).

In SSB, DATA-A and AFSK-A modes, the KYR/MIC knob normally controls mic gain ("MG"). Gain is reported in CW as the knob is turned ("0" to "40"). However, you can also tap this knob in SSB mode to adjust keyer speed ("KS"), since it is possible to send CW even while in SSB mode (see MENU:CW WGHT in owner's manual). Tapping again selects mic gain ("MG").

Holding this knob allows adjustment of power output in watts (e.g. "5R0" for 5 watts). Tap a second time to exit this mode and return to either keyer speed ("KS") or mic gain ("MG").

This knob is also part of the numeric keypad (knob tap = digit 5). This applies during FREQ entry and message play/record. The switches below it are digits 3 (ATU) and 4 (XMIT).

OFS/VFO B Knob

At far right is the OFS/VFO B knob. This knob normally has one of two functions: OFS (RIT/XIT offset), or VFO B frequency. Below and to the right of the OFS/B knob is the DISP/MENU switch, which uses this knob for parameter adjustment.

Tapping the OFS/VFO B knob selects either RIT/XIT offset control ("OF") or VFO B frequency control ("VB"). Holding the knob zeros the RIT/XIT offset ("CL").

When the audio CW interface is enabled, tapping the DISP switch reports the current operating mode and the 3-digit kHz portion of the VFO A frequency (e.g. "C 040" if you're on 7.040, 14.040, etc.). At present, the normal function of DISP (showing supply voltage, current drain, etc. on VFO B) is not accessible when the CW tones are enabled.

NUMERIC KEYPAD

12 of the knobs and switches have secondary use as a numeric keypad. The keypad is used for direct frequency entry, message record/play, and certain menu operations. Keypad switches and knobs include the following:

ENTER (BAND)
DECIMAL POINT (MODE)
0 (AF GAIN/MON knob)
1 (PRE)
2 (FIL)
3 (ATU)
4 (XMIT)
5 (KYR/MIC)
6 (A/B)
7 (RIT)
8 (DISP)
9 (OFS/VFO B knob)

There are usage examples in the owner's manual.

MEMORIES

The recall (RCL) and store (STORE) switches are used to load and save frequency memories. Until this complex function is supported by CW audio tones, please obtain assistance.

MENU CW TONES (PROPOSED)

If CW tone feedback is enabled, menu entries and their current parameter values will be sent in CW. If you rotate the OFS/B knob quickly, the menu read-out will be truncated as required. This will allow you to quickly converge on the desired menu entry (they are in alphanumeric order). A full listing of menu functions can be found in the manual.

Once a menu entry is selected, rotating VFO A will read out the parameter values as they are changed.

KX3 CONTROLS MOVED TO MENU ENTRIES IN THE KX2

Due to its small size, the KX2 uses menu entries in lieu of some controls represented on the KX3's front panel. These are listed below for reference.

ALT MD (per-band settings for CW normal/reverse and LSB/USB)
ANT.X (KXAT100 ATU antenna selection, if applicable)
DLY (per-mode VOX or QSK delay)
PITCH (CW sidetone pitch)
TX CMP (speech compression in voice modes)
VOX MD (per-mode VOX/PTT selection)
XIT (transmit incremental tuning)

At this time we suggest obtaining assistance to configure these for the desired operation. Later, CW-audio menu access will be provided (see above).