ELECRAFT KX3 PHYSICAL DESCRIPTION AND AUDIO-MORSE USER INTERFACE

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Rev. E3, 10-18-2012
Applies to firmware revision 1.24 or later.

Change History

Rev. E2, 7-7-2012
- NTCH switch (Autonotch or manual notch) sends "AN".

Rev. E3, 10-18-2012
- NR (Noise reduction) switch sends "NR".
- You can now hold in the CWT switch in during radio power-on to enable the Morse interface and set the code speed to 20 WPM. This is useful for a blind op who is using a KX3 for the first time, since the menus are not yet Morse-accessible. The SW TONE menu entry must be used to select the other speeds.
- Activating a switch function will truncate any audio-Morse output already in progress. This greatly speeds things up when you're making multiple changes quickly.
- In audio-Morse messages, 'T' is substituted for '0', and 'R' substituted for '.'.   Example: a VFO freq of 14.005 would be sent as 14RTT5. The operator gets used to this pretty quickly, and it saves time.
- Following any TUNE or ATU TUNE, "SWRnn.n" is sent in audio Morse, where "nn.n" is the SWR at the end of the operation, from 1.0 to 24.9.
- All audio-Morse output now mutes the receiver. Previously, some knob settings were reported with the receiver not muted.

INTRODUCTION

This document is intended to familiarize blind operators with basic operation of the Elecraft KX3. Locations of controls and connectors are described. Control descriptions include the associated audio Morse code characters and/or switch tones.

The user should also read the KX3 owner's manual, which covers operation in detail. (A Braille version of the owner's manual is in progress.)

Note: At present, some controls may not include audio Morse feedback, making them difficult or impossible to use without the display. Our goal is to eventually provide access to all KX3 functions via the audio interface.

PHYSICAL OVERVIEW OF THE KX3

The KX3's enclosure, not counting knobs, etc., is 1.7" high, 3.5" deep, and 7.4" wide. The enclosure is made up of a top and bottom cover. The covers are held together by four thumb screws at each of the four lower corners.

During normal operation, the KX3 is used in a trail-friendly orientation, nearly parallel to the operating surface (table, etc.), but with its rear edge tilted upward. There are two tilt feet in the rear that serve this purpose, in a manner similar to the rear tilt feet on a computer keyboard. To deploy the tilt feet, loosen (but do nor remove) the two rear-most thumbscrews, fold down the feet completely, then tighten the thumscrews again. Do not go beyond finger-tight as this may make the thumb screws difficult to loosen later.

To gain access to the interior of the KX3 for changing batteries, all four thumb screws must be loosened (but not removed). The top and bottom covers can then be separated. Note: The KX3 will put out more power when running from an external supply. Batteries are recommended as a backup, or when using the radio hand-held. If you use NiMH batteries, you can recharge them with the optional KXBC3 battery charger/real-time clock module, reducing the need to periodically change batteries.

The rear edge of the enclosure includes a heat sink, a thin plate about 7 x 1 inches that is secured to the bottom cover. The heat sink may become quite warm to the touch when the KX3 is operated at high power level or for extended key-down times.

CONNECTORS

On a basic KX3, there's one connector on the right side: a BNC antenna jack, used on 160-6 meters. A future 2-meter module is also planned that will have its own smaller jack, an SMA type. A KX3 without this module installed will have a plastic hole-cover at the SMA jack location.

There are several barrel-style jacks on the left side, in two rows, one above, one below.

The upper row includes (from back to front):

DC IN (9-15 V; 2.1-mm barrel)
ACC1 (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)

The lower row includes, back to front:

ACC2 (external amp keying and accessory I/O; 2.5-mm stereo)
RX I/Q (baseband I.F. I/Q signals for use with a PC soundcard; 2.5-mm stereo)

There's one additional connector, on the front of the enclosure, for use with the KX3's optional attached keyer paddle (KXPD3). This is a custom mechanical paddle with adjustable contact spacing. It is held on by two thumb screws.

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

To the right of the keyer paddle attachment point is a small speaker. It is intended for use in a quiet room only. Headphones or external amplified stereo speakers will provide a much better operating experience, since the KX3 has full audio effects including simulated stereo, pitch mapping, and dual watch.

SWITCHES AND ROTARY CONTROLS – OVERVIEW

All switches and rotary controls are located on the *control panel*, the large surface of the top cover. There are 20 pushbutton switches, each with tap and hold functions. There are five rotary encoders (with knobs), one of which is a high-resolution optical encoder (VFO A). The four small lower-resolution 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.

AUDIO-MORSE INTERFACE ENABLE

To turn on the audio-Morse interface, set MENU:SW TONE to the desired code speed. An alternative method is to hold the CWT switch in during radio power-on. This turns on the Morse interface and sets the speed to 20 WPM. The menu function can be used to select a different speed.

SWITCH FUNCTIONS

At the far left of the control panel is a single vertical column of six switches. These are listed below in top-to-bottom order. Each switch has a pair of functions: TAP and HOLD.

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

Tap: BAND+ ("m FF.FFF"; m is the mode, e.g. C=CW, and FF.FFF is the VFO A freq. in kHz)
Hold: STORE (CW UI TBD)

Tap: BAND- (see BAND+)
Hold: RCL (CW UI TBD)

Tap: FREQ ENT ("F?", then the entered digits or decimal point; see Numeric Keypad below)
Hold: SCAN ("SC"; if 3-second hold, "AF" for non-muted scan, error beep if a memory recall has not been done prior to starting scan)

Tap: MSG (message play; after "N?" user taps 1-6); this is also the numeric keypad 'Enter' key
Hold: REC (message record; after "N?" user taps 1-6 and enters CW or DVR message)

Tap: ATU TUNE ("SWRn.n" at end); this is also the numeric keypad decimal-point key
Hold: ANT ("NA" for now; the external ATU with dual antenna jacks isn't yet available)

Tap: XMIT (low beep); numeric keypad '0'
Hold: TUNE – keydown, not ATU tune (medium+high beep on start tune, "SWRn.n" on exit)

There are six additional switches along the bottom edge of the front panel, just to the right of the XMIT / TUNE switch. Each *pair* of adjacent switches has a knob above them; these are described later. The six switch functions are as follows:

Tap: PRE ("P"); numeric keypad '1'
Hold: NR ("NR")

Tap: ATTN ("A"); numeric keypad '2'
Hold: NB ("NB")

Tap: APF – audio peaking filter ("AP"); numeric keypad '3'
Hold: NOTCH – manual notch ("NT") or auto notch ("AN"); see below for manual pitch adj.

Tap: SPOT (low beep followed by sidetone pitch, RX unmated); numeric keypad '4'

Hold: CWT— CW/data tuning aid) ("CT"); not presently useful for blind operators

Tap: CMP – speech compression ("CP"); numeric keypad '5'; see below for CP adjustment
Hold: PITCH (sidetone in CW mode, Fc for data modes)

Tap: DLY – VOX or QSK delay adjust ("DL"); numeric keypad '6'; see below for delay adjust
Hold: VOX (VOX = "V", PTT = "PT")

At the far right are two columns of 4 switches each. In each of these
columns, three of the switches are grouped together vertically, but
the fourth switch is farther down in that same column, below a small encoder.

The rightmost column's switches have the following functions:

Tap: A/B – VFO swap ("X")
Hold: REVerse (hold to temporarily reverse the VFOs; "X" on release)

Tap: A>B – copy VFO A to B ("2B", as in "from A to B"; tap twice within 5 sec. to copy all)
Hold: SPLIT ("SP")

Tap: XIT ("XI")
Hold: PF2 – programmable function 2 (CW UI TBD)

Tap: DISP – shorthand VFO freq; "m FFF" where m is op mode and FFF is 100/10/1 kHz digits
Hold: MENU ("M"; additional CW UI TBD)

The column of switches to the left of the above:

Tap: MODE ("L"=LSB, "U"=USB, "C"=CW, "D"=DATA, "A"=AM, "F"=FM)
Hold: ALT ("CW"/"REV"=CW norm/reverse; USB and LSB are alternates of each other)

Tap: DATA (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 (below
        this switch group) to select a different data submode
Hold: TEXT ("TD"; text decode is not applicable to CW UI at present)

Tap: RIT ("RI")
Hold: PF1 – programmable function 1 (CW UI TBD)

Tap: RATE ("N"=10 Hz steps for VFO A; "H"=1 Hz steps)
Hold: KHZ ("N"=10 Hz steps; "K"=coarse steps, per-mode, selected using MENU:VFO CRS)

KNOB FUNCTIONS

AF/RF-SQL Knob and Receive Controls Group 1

The left-most knob controls AF gain/RF gain/squelch. It is part of receive controls group 1. Also in this group, below the knob, are the PRE/NR and ATTN/NB switches (the NR and NB functions will eventually use the knob for parameter adjustment). The AF/RF/SQL knob controls AF gain by default. Its secondary function is RF gain in all modes except FM, where it controls squelch.

In addition to its normal rotary functions, the knob has tap and hold functions, like a switch:

Tap: Selects current knob function—"AF" or "RF" ("SQ" in FM mode)
Hold: Selects temporary knob function—MON (voice monitor or sidetone level)

This knob is also part of the numeric keypad (knob tap = '7'). The switches below it are '1' (PRE) and '2' (ATTN).

PBT I/II Knob and Receive Controls Group 2

The next knob to the right, PBT, is part of receive controls group #2. It controls the receive passband (PBT). Also in this group, below the knob, are the APF/NOTCH and SPOT/CWT switches; the NOTCH function uses the PBT knob for parameter adjustment.

The PBT knob controls two parameters, I and II, which vary with mode. Function I, the default, is passband WIDTH in CW and DATA modes. In voice modes function I is LO CUT. Function II is passband SHIFT in CW and DATA modes, and HI CUT in voice modes.

The PBT knob's tap and hold functions are as follows:

Tap: PBT function I/II (CW/data: "WD"=width, "SH"=shift; voice: "LO"=locut, "HI"=hicut)
Hold: NORMalize the passband ("N"), or revert to previous passband ("UN").

This knob is also part of the numeric keypad (knob tap = '8'). The switches below it are '3' (APF) and '4' (SPOT).

KEYER/MIC Knob and Transmit Controls Group

The next knob to the right is part of the transmit controls group. The knob's normal function is KEYER speed (in CW, FSK-D, and PSK-D modes) or MIC gain (voice modes). Both of these parameters are reported in CW as the knob is turned (in CW mode, "8" to "50" WPM; in voice modes, mic gain ("0" to "40").

Also part of the transmit controls group are the two switches below this knob, CMP/PITCH and DLY/VOX. The knob is used with three of these functions (CMP, PITCH, and DLY) to do parameter adjustment, some with CW feedback. CMP reports the compression level ("0" to "30"). DLY reports the VOX or QSK delay in seconds with 'R' in lieu of a decimal point (the parameter range is "R00" to "2R00" in the QSK delay case, where "R00" is considered full break-in).

The KEYER/MIC knob itself has the following tap and hold functions:

Tap: In voice modes, selects the transmit bargraph mode (no equivalent, yet, for CW UI)
Hold: PWR – power output in watts (e.g. "5R0" for 5 watts)

This knob is also part of the numeric keypad (tap = '9'). The switches below it are '5' (CMP) and '6' (DLY).

VFO A Knob

To the right of the KEYER/MIC knob is the large VFO A knob. It is grouped with a pair of LEDs (TX and DELTA-F). These have no Morse user interface equivalents at present, but generally their states can be inferred from sound cues.

VFO A tuning rate and related settings are configured using switches in the Miscellaneous controls group, described below.

OFS/B Knob and Miscellaneous Controls Group

To the right of the large VFO A knob is the last small knob, OFS/B, part of the miscellaneous controls group. This knob normally has one of two functions: OFS (RIT/XIT offset), or VFO B frequency. Also in this group are the two switches below the OFS/B knob, RATE/KHZ and DISP/MENU, which use the knob for parameter adjustment. Further details on the use of this knob are provided below.

The OFS/B knob has the following tap and hold functions:

Tap: Select RIT/XIT offset ("OF") or VFO B frequency control ("VB")
Hold: Zero the RIT/XIT offset ("CL")

When the audio Morse 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) has no audible equivalent and is not accessible when the Morse UI is 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 (MSG)
DECIMAL POINT (ATU TUNE)
0 (XMIT)
1 (PRE)
2 (ATTN)
3 (APF)
4 (SPOT)
5 (CMP)
6 (DLY)
7 (AF/RF-SQL knob)
8 (PBT I/II knob)
9 (KEYER/MIC knob)

There are usage examples in the owner's manual.

MEMORIES

[to be described]

MENU ACCESS [CW UI NOT YET IMPLEMENTED]

If you hold the DISP/MENU switch, the menu comes up. The OFS/B knob now scrolls through the menu entries. **Planned:** If CW feedback is enabled, menu entries *and* their current parameter values will be sent in Morse. If you rotate the OFS/B knob quickly, the menu read-out will be truncated as required. This allows 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.