

ELECRAFT KRC2 BAND DECODER and CONTROLLER

Accessibility Upgrade and Operating Instructions

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Introduction

The KRC2 Accessibility Upgrade adds the capability of Morse code announcement of K2 functions. Along with this function, the KRC2 is configured to control K2 functions using KRC2 button combinations.

The upgrade kit adds two parts to the KRC2 circuit board, and replaces the KRC2's microcontroller.

If your KRC2 is not yet assembled, make the following changes to the Owner's manual:

On page 13 of the KRC2 Assembly and operations Manual, between the first and second steps, insert the two instructions from page 2 of these instructions for installing R5 and SP1. Use the test procedures from these instructions for testing and initial power-up of the KRC2.

Firmware Requirements

The KRC2 Accessibility Configuration will work with any K2 or K2/100 transceiver with K2 main microcontroller firmware revision **2.01** or later and either the KIO2 or KPA100 options. In order to use the KDSP2 support functions, the K2 is required to use firmware revision **2.04** or later.

Upgrade Kit Parts List

The table below lists all parts in the kit. Typical markings on capacitors, as well as resistor and RF choke color codes, are shown in parentheses.

Ref.	Description	Part No.	Qty
R5	Trimmer Potentiometer, 5K ("502")	E520009	1
SP1	Miniature Piezo Speaker	E980064	1
U1	IC, programmed microcontroller, PIC16F877A-I/P	E610019	1
MISC	KRC2 Accessibility Upgrade Instructions	E740071	1

Assembly

- Disconnect all cables, including power sources, from the KRC2. Remove the two Philips screws from the bottom cover and remove the bottom cover. **CAUTION: Touch an unpainted, grounded metal surface frequently while handling PC boards and ICs.**
- Remove the two flat-head Philips screws holding the “2D” fastener at the end of the case opposite the DB9 connectors, and remove the “2D” fastener.
- Remove the Philips screw and washer that holds the PCB to the case. This screw is located near the end of the PC board opposite the DB9 connectors.
- Remove the four male-female hex standoffs that hold the DB9 connectors to the case.
- Remove the PCB assembly from the case.



The side of the board with IC U1 is the **bottom**; the opposite side is the **top**.

- Install the 5K trimmer potentiometer, R5, on the **bottom side** of the PCB. After soldering the three leads, adjust the pot to its full clockwise position. R5 is used for setting the volume of the CW tones from the speaker.
- Install the piezo speaker, SP1, on the top side of the PCB. The speaker mounting posts must be mounted flush against the PCB to give proper clearance for the case bottom.
- Carefully remove the old microprocessor, U1 using a small screwdriver to pry it gently out of its socket at both ends. Store U1 in a safe place as a backup.



Before handling U1, touch an unpainted, grounded metal surface.

- Carefully straighten the pins on the microcontroller, U1 (PIC16F877A). The two rows of pins must be parallel to each other, with no pins bent. See Figure 4 of the KRC2 Assembly and Operations Manual.
- Orient the notched or dimpled end of the IC with the notched end of its component outline on the PCB, then press the microcontroller into its socket

Case Assembly

Re-install the PCB into the case top following the procedure on page 14 of the KRC2 Assembly and Operations Manual. Use the hardware you previously removed when disassembling the KRC2.

KRC2 Test Procedure

The KRC2 should be powered from its DC barrel jack using a +12 volt supply for its initial power-up. No other connections should be made to the unit.

Connect the power source to the unit. After a short delay while the KRC2 performs diagnostics, the front-panel LED should turn on to its dim level. If this does not happen, turn power off to the unit and refer to the troubleshooting section.

Driver Relay Test: You will need a DC voltmeter for this procedure. Connect the BLACK lead (common) to the ground jumper located near J1 on the KRC2. The RED lead should be used to measure the voltage on each terminal of J6, J7, J8 and J9. Be sure to check the voltage at the side connector of each terminal. The initial readings should be 0 volts on each terminal.

The Tap/Hold Rule: Each of the pushbutton switches on the top of the KRC2 has two functions, one activated by a TAP (short press) and the other activated by a HOLD (long press, about 1/2 second). To highlight this in the text, we use two different typographical styles to identify switches: **TAP** and **HOLD**. Shift functions require a key to be held, then a second key to be pressed. These are indicated by **HOLD TAP**.

Holding **F3** should cause the KRC2 to announce a Morse 'I' from the speaker, and brighten the LED. Now tap **F1** to change the driven band terminal. The KRC2 should emit a CW 'D'. Only the 60m source terminal should indicate 12 volts. The LED should be alternating between dim and bright.

Holding **F3** and tapping **F1** again should cause the 10m source terminal to indicate 12 volts, and all others to remain off.

Continue this procedure, Holding **F3** and tapping **F1** until all HF source terminals have been checked.

This completes checkout of the KRC2. Continue to the Final Assembly section on page 16 of the KRC2 Assembly and Operations Manual.

KRC2 Accessibility Configuration Operation

The KRC2 with the Accessibility Configuration gives the K2 a Morse code voice to announce its status and operational characteristics. The KRC2 may be set up to automatically announce changes in the K2's settings, including the announcement of the operating frequency whenever it changes. The user may control the amount of chatter generated by the KRC2 by setting it to one of four 'verbosity' levels. The lowest level requires the user to press the KRC2's keys in order to announce K2 information, while the highest sends out Morse text whenever almost any parameter changes on the K2, including the frequency. Additional button combinations allow the user to control K2 operations and also those of the KRC2 itself.

Accessibility Configuration Key Behavior

There are four buttons in a row on the top of the KRC2, labeled, from left to right, F1, F2, F3 and F4. In the accessibility configuration, the F1-F4 buttons have the following TAP, **HOLD** and **HOLD TAP** (shift) functions:

- F1** Announce the kilohertz portion of the current K2 frequency.
- F2** Announce the K2 LCD display text.
- F3** Announce the K2 S-Meter level.
- F4** Place K2 in direct frequency entry mode.

F1 Holding this button will cause a Morse 'I' to be announced and the KRC2 to enter shift-1 condition. Tapping a button will then cause one of the functions listed below to be performed.

- F1** Announce the megahertz portion of the current K2 frequency.
- F2** Toggle Fine RIT mode.
- F3** Announce RIT status.
- F4** Announce XIT status.

Holding **F1** instead of tapping a key will again announce a Morse 'I', but will cancel the shift-1 condition.

F2 Holding this button will cause a Morse 'I' to be announced and the KRC2 to enter shift-2 condition. Tapping a button will then cause one of the functions listed below to be performed.

- F1** Announce AGC status.
- F2** Toggle RxAnt on/off.
- F3** Toggle KDSP2 Noise Reduction on/off.
- F4** Toggle KDSP2 noise Threshold on/off (USB/LSB modes only).

Holding **F2** instead of tapping a key will again announce a Morse 'I', but will cancel the shift-2 condition.

The KDSP2 control functions require the K2 to have firmware version 2.04 or higher and the KDSP2 to have control firmware version 3.10 or higher.

F3 Holding this button will cause a Morse ‘I’ to be announced and the KRC2 to enter shift-3 condition. Tapping a button will then cause one of the functions listed below to be performed.

F1 Decrease KRC2 selected antenna terminal.

F2 Increase KRC2 selected antenna terminal.

F3 Announce current KRC2 antenna selection.

F4 Announce KRC2 firmware version.

Holding **F3** instead of tapping a key will again announce a Morse ‘I’, but will cancel the shift-3 condition.

F4 Holding this button will cause a Morse ‘I’ to be announced and the KRC2 to enter shift-4 condition. Tapping a button will then cause one of the functions listed below to be performed.

F1 Decrease KRC2 CW announcement speed by about 3 wpm.

F2 Increase KRC2 CW announcement speed by about 3 wpm.

F3 Increase CW tone frequency (500Hz, 600 Hz, 750 Hz, 1000 Hz).

F4 Increase Announcement verbosity level.

Holding **F4** instead of tapping a key will again announce a Morse ‘I’, but will cancel the shift-4 condition.

The **F3 F1** and **F3 F2** functions change the output terminal for the relay drivers up or down in single band increments. When the highest band is selected, the next **F3 F2** sequence will cause the drivers to go to the 160m setting. Conversely, when the lowest band is selected, the next usage of the **F3 F2** function causes the drivers to go to the highest band. The band map follows the values indicated in Table 5 of the KRC2 Assembly and Operations Manual, which places the 60m band above the 10m band. Thus the sequence will be:

...12m<->10m<->60m<->160m<->80m<->40m... While the selected driver is different from the current band indicated by the transceiver, the green LED will flash between dim and bright states. The XVT drivers do not participate in the sequence, and when the transceiver selects a transverter these buttons will not change the driver selection.

KRC2 Accessibility Configuration Jumper Settings

The KRC2’s W1-W8 jumpers should be set for K2 operation. Thus W1, W2 and W3 should be removed in order to allow the K2’s AuxBus to indicate band settings to the KRC2. These jumpers may also be set for Serial Port Mode, which disables AuxBus processing in the KRC2. This setting may be preferred since AuxBus processing tends to disturb the timing of the KRC2’s Morse code characters. With this setting, the KRC2 will automatically set the antenna selector outputs based on serial port frequency information.

The W6 jumper should also be installed for normal use to enable the K2 to automatically report changes. If the K2/KRC2 is used with a computer, you may want to remove this jumper since the automatic status messages may interfere with the operation of software on the computer.

Determination of the proper setting of this jumper when used with third-party software is left to the user to determine.

The following chart summarizes the functions for each key.

Condition	F1	F2	F3	F4
Tap	Announce KHz of frequency	Announce LCD text	Announce S-Meter Value	Set K2 for Direct Frequency Entry
Hold	Set shift-1	Set shift-2	Set shift-3	Set shift-4
Shift-1	Announce MHz of Frequency	Toggle Fine RIT	Announce RIT Status	Announce XIT Status
Shift-2	Cycle AGC	Switch Rx Ant	KDSP2 NR On/Off	KDSP2 NT On/Off
Shift-3	Decrement KRC2 Antenna Selection	Increment KRC2 Antenna Selection	Announce KRC2 Antenna Selection	Announce KRC2 Version
Shift-4	Decrease Morse Announce Speed	Increase Morse Announce Speed	Increment Morse Tone Frequency	Increase Verbosity Level

KRC2 Accessibility Configuration Event Operations

The KRC2 operates by listening for information from the K2 over the serial port or from the keys, then performing some operation. The incoming information creates an event, which causes an operation to be executed. There are four levels of event detection that may be set by the user. In the accessibility configuration, these are used to set the amount of information announced by the KRC2. Thus at level 1, only information requested by the KRC2 is announced. At level 2, this information is extended to include button and knob changes from the KRC2, but does not include frequency QSY changes within a single band. The third and fourth levels add this information, with minimal identification information added at level 3, and full identifiers used at level 4. The listing below shows, for each level, the events that the accessibility configuration recognizes and the action taken.

Status information for on/off parameters is announced with an 'F' for Off, and an 'N' for On. Normal Morse numeric characters are used in values, except for the 0, which is shortened to an extra long 'dah'. The letter 'R' is replaces a decimal point or period.

<u>Level</u>	<u>Event</u>	<u>Operation</u>
All	Hold F1	Set Shift-1, Announce 'I'
All	Hold F2	Set Shift-2, Announce 'I'
All	Hold F3	Set Shift-3, Announce 'I'
All	Hold F3	Set Shift-4, Announce 'I'
All	Tap F1	Announce KHz portion of frequency
All	Tap F2	Get and Announce LCD Text
All	Tap F3	Get and Announce S-meter value
All	Tap F4	Put K2 in direct Freq Entry mode, Announce 'F'
All	Hold F1 & Tap F1	Announce MHz portion of frequency
All	Hold F1 & Tap F2	Toggle K2 Fine RIT, Announce 'E'
All	Hold F1 & Tap F3	Announce RIT status. If on, announce RIT offset
All	Hold F1 & Tap F4	Announce XIT status. If on, announce XIT offset
All	Hold F2 & Tap F1	Increment AGC in Off, fast, slow cycle - note fast indicated by '2', slow indicated by '4'
All	Hold F2 & Tap F2	Toggle K2 RxAnt, announce 'E'
All	Hold F2 & Tap F3	Toggle KDSP2 NR, announce 'E'
All	Hold F2 & Tap F4	Toggle KDSP2 NT, announce 'E'
All	Hold F3 & Tap F1	Decrement KRC2 band selection, announce 'D'
All	Hold F3 & Tap F2	Increment KRC2 band selection, announce 'U'
All	Hold F3 & Tap F3	Announce KRC2 band selection
All	Hold F3 & Tap F4	Announce KRC2 firmware version
All	Hold F4 & Tap F1	Decrease KRC2 Morse speed, announce 'S'
All	Hold F4 & Tap F2	Increase KRC2 Morse speed, announce 'S'
All	Hold F4 & Tap F3	Increment KRC2 Morse tone frequency, announce 'T'
All	Hold F4 & Tap F4	Increment KRC2 verbosity level, announce level
2	K2 Keyer Speed change	Announce Keyer Speed
2	K2 Tx Power Change	Announce 'P', Tx Power
2	K2 Band Change	Announce Rx VFO, Band MHz, 'M'
2	K2 Mode Change	Announce Mode
2	K2 AGC Change	Announce 'G', AGC setting
2	KAT Antenna Change	Announce 'AN', KAT antenna selection
2	K2 Attenuator Change	Announce 'AT', Attenuator status
2	K2 AFIL Change	Announce 'A', AFIL setting
2	K2 XFIL Filter Change	Announce 'F', XFIL setting
2	K2 Noise Blanker Change	Announce 'NB', Noise Blanker status
2	K2 NB Level Change	Announce 'NT', NB Level setting
2	K2 Rx Preamp Change	Announce 'PR', Preamp status
2	K2 RIT Change	Announce 'R', RIT status
2	K2 XIT Change	Announce 'X', XIT status
2	K2 Rx VFO Change	Announce 'R', VFO identifier
2	K2 Tx VFO Change	Announce 'T', VFO identifier

<u>Level</u>	<u>Event</u>	<u>Operation</u>
3	K2 Keyer Speed change	Announce Keyer Speed
3	K2 Tx Power Change	Announce 'P', Tx Power
3	K2 Band Change	Announce Rx VFO, Band MHz, 'M'
3	K2 Mode Change	Announce Mode (one character only)
3	K2 AGC Change	Announce 'G', AGC setting
3	KAT Antenna Change	Announce 'AN', KAT antenna selection
3	K2 Attenuator Change	Announce 'AT', Attenuator status
3	K2 AFIL Change	Announce 'A', AFIL setting
3	K2 XFIL Filter Change	Announce 'F', XFIL setting
3	K2 Noise Blanker Change	Announce 'NB', Noise Blanker status
3	K2 NB Level Change	Announce 'NT', NB Level setting
3	K2 Rx Preamp Change	Announce 'PR', Preamp status
3	K2 RIT Change	Announce 'R', RIT status
3	K2 XIT Change	Announce 'X', XIT status
3	K2 RIT/XIT Offset Change	Announce 'OF', Offset value
3	K2 Rx VFO Change	Announce 'R', VFO identifier
3	K2 Tx VFO Change	Announce 'T', VFO identifier
3	K2 VFO A QSY	Announce 'A', VFOA KHz portion of frequency
3	K2 VFO B QSY	Announce 'B', VFOA KHz portion of frequency
3	RxAnt Change	Announce 'RX', RxAnt status
4	K2 Keyer Speed change	Announce Keyer Speed
4	K2 Tx Power Change	Announce 'P', Tx Power
4	K2 Band Change	Announce Rx VFO, Band MHz, 'M'
4	K2 Mode Change	Announce Mode (long format)
4	K2 AGC Change	Announce 'G', AGC setting
4	KAT Antenna Change	Announce 'AN', KAT antenna selection
4	K2 Attenuator Change	Announce 'AT', Attenuator status
4	K2 AFIL Change	Announce 'A', AFIL setting
4	K2 XFIL Filter Change	Announce 'F', XFIL setting
4	K2 Noise Blanker Change	Announce 'NB', Noise Blanker status
4	K2 NB Level Change	Announce 'NT', NB Level setting
4	K2 Rx Preamp Change	Announce 'PR', Preamp status
4	K2 RIT Change	Announce 'R', RIT status
4	K2 XIT Change	Announce 'X', XIT status
4	K2 RIT/XIT Offset Change	Announce 'OF', Offset value
4	K2 Rx VFO Change	Announce 'R', VFO identifier
4	K2 Tx VFO Change	Announce 'T', VFO identifier
4	K2 VFO A QSY	Announce 'A', VFOA KHz portion of frequency, 'K'
4	K2 VFO B QSY	Announce 'B', VFOA KHz portion of frequency, 'K'
4	RxAnt Change	Announce 'RX', RxAnt status