ELECRAFT KRC2
BAND DECODER and CONTROLLER

Assembly and Operating Instructions
For firmware Version 1.5 and later

Introduction

The KRC2 is a universal, programmable station control unit that can switch any combination of antennas, filters, amplifiers, or other equipment. It supports analog, digital, and RS232 control inputs, so it's compatible with transceivers from Elecraft as well as other manufacturers. Decoded outputs are provided for all HF bands (including WARC bands and 60m), three transverter bands, and general accessories. High-side (source) and low-side (sink) relay drivers are included. All signal lines are RF bypassed to minimize RFI and noise pickup.

Individual driver outputs can be wire-ORed. However, the KRC2 also provides a PC-based command interface, allowing the user to configure the unit. New firmware can even be downloaded via the Internet.

Additional features are available when the KRC2 is used with our K2, K2/100, K3 and K3/100 transceivers. The ACC menu entry can be used to directly control the KRC2's accessory outputs. Four buttons on the top of the KRC2 can be used as "hot keys" for instant access to CW message buffers, fast switching of the RXANT jack, or other functions.

Specifications

Outputs	32 (16 sink, 16 source)
Output Driver Ratings	500 mA max, 50 V max (sink and source)
Analog Inputs	0-5 V (1 input), 0-10 V (2 inputs)
Band Decode Formats	Elecraft, Icom, Yaesu, Kenwood[1]
Internal Current Drain	Approx. 20 mA (excludes output driver current)
Size	5.5" (L) x 3.5" (D) x 1.5" (H) (14 x 11.4 x 4 cm)

Caution: Some parts in this kit can be damaged by static discharge. Before handling any transistors or ICs, put on an anti-static wrist strap, or touch a grounded, unpainted metal surface.

[1] Refer to our web site for a complete listing of compatible formats and transceivers.

Table of Contents

Parts Inventory

☐ 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
C1, C2	Capacitor, 33 pF ("33" or "330")	E530064	2
C3 - C6, C8-C11	Capacitor, .001 µF (“102”), **0.2" lead spacing**	E530001	8
C7	Capacitor, .001 µF (“102”), **0.1" lead spacing**	E530129	1
C16, C17, C21-C24, C28-C59	Capacitor, .01 µF ("103"), **0.1" lead spacing**	E530019	39
C12	Capacitor, electrolytic, 220 µF	E530062	1
C13, C14, C20, C26, C27	Capacitor, .1 µF ("104"), **0.2" lead spacing**	E530011	5
C15	Capacitor, electrolytic, 10 µF	E530045	1
C18	Capacitor, 120 pF ("121")	E530077	1
C19	Capacitor, 56 pF ("56" or "560")	E530015	1
C25, C60	Capacitor, .1µF (“104”), **0.1" lead spacing**	E530020	2
D6-D10	Diode, 1N4148	E560002	5
D2-D5	Diode, 1N4007	E560001	4
DS1	LED, green, rectangular	E570008	1
J1	PC-Mount Connector, DB9 Female	E620058	1
J2	PC-Mount Connector, DB9 Male	E620068	1
J3	Connector, DC barrel power 2.1mm	E620026	1
J4-J13	Connector, screw terminal	E700079	10
L1-L3	Inductor, 100 µH mini (brn-blk-brn)	E690013	3
L4	Inductor, 15 µH mini (brn-grn-blk)	E690012	1
Q1	Transistor, J310 JFET	E580012	1
R1	Resistor, 47 k, 1/4 watt, 5% (yel-vio-org)	E500067	1
R2, R6-R8, R10, R11	Resistor, 10 k, 1/4 watt, 5% (brn-blk-org)	E500015	6
R3	Resistor, 1 k, 1/4 watt, 5% (brn-blk-red)	E500013	1
R4	Resistor, 470 ohms, 1/4 watt, 5% (yel-vio-brn)	E500003	1
R9	Resistor, 100 ohms, 1/4 watt, 5% (brn-blk-brn)	E500010	1
R12	Resistor, 4.7 k, 1/4 watt, 5% (yel-vio-red)	E500047	1
R13	Resistor, 47 ohms, 1/4 watt, 5% (yel-vio-blk)	E500019	1
R14	Resistor, 4.7 k, 1/8 watt (yel-vio-red)		1
RP1	Resistor network, 390 ohms, 4 resistors, 8 pins (391)	E510021	1
RP2	Resistor network, 47 k, 7 resistors, 8 pins (473)	E510022	1
S1- S4	Momentary push button switch	E640005	4
S5	Miniature slide switch, DPDT	E640009	1

U1	IC, programmed microcontroller, PIC16F877A-I/P	E610013	1
U2	IC, MAX1406 or LT1039	E600036	1
U3	IC, voltage regulator, 5V, 78L05	E600029	1
U4, U5	IC, UCN5891A	E600049	2
U6, U7	IC, TPIC6595	E600048	2
X1	Crystal, 4.0 MHz	E660006	1
X2	Crystal, 16.2 MHz (S162ECSL)	E660014	1
HDWR	2-D Fasteners	E100078	2
HDWR	1/4 x 3/16" round threaded standoff	E700026	1
HDWR	4-40x3/16" flat head Philips machine screw, black oxide	E700025	5
HDWR	4-40x3/16" pan head Philips machine screw, black oxide	E700015	3
HDWR	#4 internal-tooth lock washer	E700010	3
HDWR	#4 Standoff, hex male-female (for DB9 connectors)	E700078	4
MISC	Jumper, 2-pin shorting (for W1-23)	E620055	23
MISC	KRC2 Printed Circuit board	E100163	1
MISC	IC socket (for U1), 40 pins	E620017	1
MISC	Keycap, rectangular, black for pushbuttons	E980000	4
MISC	Rubber foot, self-adhesive	E700024	4
MISC	Connector, dual-row 16-pin male header	E620010	3
MISC	Cable Tie, 3-inch	E980002	2
MISC	8-conductor shielded cable	E760014	2 ft
MISC	9-pin female "D" connector (DB9F)	E620048	1
MISC	9-pin male "D" connector (DB9M)	E620049	1
MISC	DB9 backshell assembly	E620050	2
MISC	Case Top Shell	E100166	1
MISC	Case Bottom Shell	E100167	1
MISC	2.1mm DC Barrel plug	E620032	1
MISC	KRC2 Manual	E740047	1

The following ICs are packed on a piece of black foam for their protection:

E580012	J310
E610013	programmed PIC16F877A microcontroller chip
E600036	MAX1406
E600049	UCN5891A
E600048	TPIC6595
E620017	40 pin socket

Firmware Requirements

To use the KRC2 with a K2 or K2/100 transceiver, you will need K2 main microcontroller firmware revision **2.01** or later and either the KIO2 or KPA100 options.

Note: The main K2 microcontroller is U6 on the K2 Control board. To check your firmware revision, hold any K2 pushbutton when powering up the K2. When you release the pushbutton, the revision will be shown on the LCD (left side).

Assembly

A fine-point, temperature-controlled soldering iron (700-800 degrees F maximum) is required to assemble the printed circuit board. A higher-wattage iron or one with a wide tip may damage components, pads, or traces. We also recommend the use of a Panavise (or equivalent bench vise) and an illuminated magnifying glass to facilitate PCB and connector assembly. Additionally, flush-cut wire cutters are recommended for steps where component leads must be cut close to the circuit board.

To avoid soldering conflicts, install components only in the order described below. Double-check all values before soldering, since removing parts from double-sided printed circuit boards can be difficult.

The leads on small capacitors can be fragile. When handling capacitors in the following steps, do not pull on the leads or bend them excessively.

☐ Locate the KRC2 PCB and identify the top and bottom sides. The side of the board with outlines of ICs U4-U7 and most other components is the **top**; the side with the "KRC2" label is the **bottom**. If an assembly step does not specify top or bottom, the component should be installed on the **top side**.

☐ Install the two 0.1-µF (104) capacitors with 0.1" (2.5 mm) lead spacing on the **top side** of the board:

__C25, __C60

☐ Solder C25 and C60. Trim the leads of C25 as short as possible, using flush-cutters if available. If the leads are not kept very short, they will interfere with installation of J5 on the bottom side of the board.

☐ On the **top side** of the board, install the 0.01 µF (103) capacitors with 0.1" (2.5 mm) lead spacing listed below, beginning with C28 in the upper center of the board and proceeding in a line to the end of the board. After installing each capacitor, bend the leads outward to hold it in place. The capacitors line up so that you can solder them in one step after inserting them into the circuit board. You may solder the components in smaller groups if desired.

Note: When multiple items appear on one line in a component list such as the one below, complete all items on one line before moving on to the next, as indicated by the small arrow. (In other words, install C28 first, then C29, C30 and C31, then go to the second line.)

__C28,	__C29,	__C30,	__C31,
__C32,	__C33,	__C34,	__C35,
__C24,	__C23,	__C22,	__C21,
__C44,	__C45,	__C46,	__C47,
__C48,	__C49,	__C50,	__C51

☐ Solder the fixed capacitors. After soldering the leads of the capacitors, be sure to flush trim the leads so that terminals J6, J8, J10 and J12 will seat properly on the bottom side of the PCB when they are installed later in these instructions.

☐ On the **top side** of the board, install the small 0.01 µF (103) capacitors with 0.1" (2.5 mm) lead spacing listed below, beginning with C36 in the upper right of the board and proceeding to the end of the board. After installing each capacitor, bend the leads outward to hold it in place.

__C36,	__C37,	__C38,	__C39,
__C40,	__C41,	__C42,	__C43,
__C52,	__C53,	__C54,	__C55,
__C56,	__C57,	__C58,	__C59

☐ Solder the small fixed capacitors. After soldering the leads of the capacitors, be sure to flush trim the leads so that terminals J7, J9, J11 and J13 will seat properly on the bottom side of the PCB when they are installed later in these instructions.

☐ Install the three remaining small 0.01 µF (103) capacitors with 0.1” (2.5mm) lead spacing listed below on the **top side** of the PCB:

__C7,	__C16,	__C17

☐ Solder the small fixed capacitors.

Note: For all remaining assembly steps, you should solder then trim component leads after installing each group of components unless otherwise instructed. Leads can be trimmed before or after soldering, but trim them as short as possible.

☐ Install the two 33pF ceramic disk capacitors on the **top side** of the PCB. Note that the lead spacing for C1 and C2 may be too wide for the holes in the PC board. If so, use a pair of needle-nose pliers to crush the ceramic 'flash' which covers the leads up close to the body of the capacitor and then re-bend the leads so they fit the available holes and scrape away the crushed flash debris.

__C1, __C2

☐ Install the following 0.1µF (104) capacitors with 0.2" (5.0mm) lead spacing on the **top side** of the PCB:

__C13, __C14, __C20, __C26, __C27

☐ Install the following 0.001µF (102) capacitors with 0.2" (5.0mm) lead spacing on the **top side** of the PCB:

__C3, __C4, __C5, __C6

☐ Install the following miniature inductors on the **bottom side** of the circuit board. The components should be mounted vertically, with one end resting on the pc board and the lead of the other end bent down into the corresponding solder pad. You should also alternate the orientation of the RF chokes, with L1 and L3 mounted towards the left and L2 mounted to the right. Then solder and trim the leads.

__L1 100µH Inductor, (brn-blk-brn)
__L2 100µH Inductor, (brn-blk-brn)
__L3 100µH Inductor, (brn-blk-brn)

☐ Install L4, a 15µH miniature inductor (brn-grn-blk) on the **top side** of the PCB.

☐ Install C18, a 120pF (121) capacitor, with 0.1" (2.5mm) lead-spacing on the **top side** of the PCB.

☐ Install C19, a 56pF (560) capacitor, with 0.1" (2.5mm) lead-spacing on the **top side** of the PCB.

☐ Install the following 0.001µF (102) capacitors with 0.2" (5.0mm) lead spacing on the **top side** of the PCB:

__C8, __C9, __C10, __C11

☐ Install the following resistors on the **top side** of the circuit board. Be sure to use the 4.7k 1/4 watt resistor at R12. The smaller 1/8 watt resistor will be used later.

__R1	47k, (yel-vio-org)
__R3	1k, (brn-blk-red)
__R4	470 ohms, (yel-vio-brn)
__R6	10K (brn-blk-org)
__R7	10K, (brn-blk-org)
__R8	10K, (brn-blk-org)
__R9	100 ohms, (brn-blk-brn)
__R10	10K, (brn-blk-org)
__R12	4.7K, 1/4 watt (yel-vio-red)
__R13	47 ohms, (yel-vio-blk)

☐ Install two 1N4007 diodes D4 and D5 on the **top side** of the board. Make sure the cathode (banded end) of the diodes follow the same orientation as that silk-screened on the PCB then solder and trim the leads. D5 must be flush-trimmed on the bottom side in order not to interfere with J5. Be sure to save these cut leads for later use as ground jumpers.

__D4, __D5

☐ Install the following 1N4148 diodes on the **top side** of the board. Make sure the cathode (banded end) of each diode follows the same orientation as that silk-screened on the PCB, then solder and trim the leads.

__D6, __D7, __D8, __D9, __D10

Before handling ICs and transistors, touch an unpainted, grounded metal surface.

☐ Install voltage regulator U3 (78L05C) on the **top side** of the board as indicated by its outline. The voltage regulator has a 3-pin TO-92 package, like a transistor. The installed height of the regulator must be no more than 3/8" (9 mm). Use a minimum of soldering time (1-2 seconds per lead).

☐ Locate the four pushbutton switches. One of these will now be installed on the **top side** of the board. Insert the switch into its mounting holes at S1, spreading the legs slightly so they will properly engage the holes. Press the switch down until it is fully seated on the bends in its leads. When the switch is fully seated, there will be a slight gap between the switch body and PCB. This is normal. Solder the switch onto the circuit board from the bottom side.

Note: The pin 1 end of ICs can be identified by a notch or dimple as shown in Figure 1. This end must be oriented toward the notched end of the component outline.

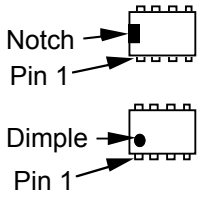


Figure 1

☐ Install the following ICs on the **top side** of the board. Orient the notched or dimpled end toward the notched end of their PCB outline (pin 1 end, to the left). Double-check the orientation before soldering. Be sure to flush-trim the leads of each IC after soldering so as not to interfere with cables on the bottom side of the board.

__U4 UCN5891A
__U5 UCN5891A
__U6 TPIC6595
__U7 TPIC6595

☐ Install the rectangular Green LED at DS1 on the **top side** of the board. Spacing the LED about 1/8" (3 mm) above the board will nicely align the top of the LED with the case top. The dot marked on the PCB next to DS1 indicates the placement for the longest lead of the LED.

☐ **Visual Inspection:** Using a magnifying glass, examine the entire board for unsoldered pins, solder bridges, broken leads, or backward diodes or ICs. Reheat any suspect joints This simple check could save you hours of troubleshooting later.

☐ The following components will be installed on the bottom side of the circuit board. Turn over the circuit board to install the components.

☐ Install 1N4007 diodes at D2 and D3 on the **bottom side** of the PCB. Make sure the cathode (banded end) of the diode matches the silk-screened outline on the PCB.

__D2, __D3

☐ Install a 4.7k, 1/8 watt (yel-vio-red) resistor at D1 on the **bottom side** of the PCB. The resistor replaces a small diode that was previously used in this position.

☐ Install 10k, 1/4 watt resistors (brn-blk-org) at R2 and R11 on the **bottom side** of the PCB.

__R2, __R11

☐ Install the 40-pin IC socket at U1 on the **bottom side** of the board. The notched end should be oriented toward the notched end of the PCB outline (pin 1 end, to the left). Solder just two corner pins. If the socket is not sitting completely flat against the PC board, reheat these two pins one at a time, pushing the socket down until it snaps into position. Then solder the remaining pins of the socket.

☐ Install U2, (MAX1406CPE or LT1039CN16) on the **bottom side** of the PCB. Orient the notched or dimpled end toward the notched end of their PCB outline (pin 1 end, to the left). Double-check the orientation before soldering. There is no need to trim the leads of U2.

☐ Install resistor network RP1, 390 ohms (391), 8 pins, on the **bottom side** of the PCB. This resistor network is symmetrical and can be installed in either orientation, but for consistency you should orient it with the pin 1 end (black dot) toward pin 1 of the PCB outline (round pad, also labeled "1").

☐ Install resistor network RP2, 47k (473), 8 pins, on the **bottom side** of the PCB. This resistor network should be oriented with the pin 1 end (black dot) toward pin 1 of the PCB outline (round pad, also labeled "1").

☐ Install low-profile crystal X2 on the **bottom side** of the PCB. This is a <u>short</u> 16.289 MHz device. Make sure it is flat against the board before soldering. Use a minimum of solder so that it does not wick through and cause a short on the opposite side of the PCB..

☐ Locate the ground pad near X2. Insert a discarded component lead through this pad, then fold it over the top of X2. Solder this lead at the ground pad, then solder it to the crystal can. Avoid overheating the crystal.

☐ Install electrolytic capacitor C15 (10 µF) on the **bottom side** of the PCB. The (+) lead of C15 must be installed in the hole marked "+". The (+) lead is usually longer than the (-) lead. The (-) lead is identified by a stripe on the body of the capacitor.

☐ Install transistor Q1 (J310) as indicated by its outline on the **bottom side** of the PCB. The installed height of the transistors must be no more than 3/8" (9 mm). The top of Q1 must be no higher than the top of C15. Use a minimum of soldering time (1-2 seconds per lead).

☐ Install the subminiature DPDT slide switch S5 on the **bottom side** of the PCB. Make sure the switch is firmly seated against the board when soldering. After installing the switch, move its handle to the position closest to J2.

☐ Install a 16-pin dual-row header at W1-W8 on the **bottom side** of the PCB. The short pins are inserted into the PCB. The header must be firmly seated against the board when soldering.

☐ Install a 16-pin dual-row header at W12-W19 on the **bottom side** of the PCB. The short pins are inserted into the PCB. The header must be firmly seated against the board when soldering.

☐ Locate the remaining 16-pin dual-row header. Cut the header into three pieces so that you have one 8-pin dual row header, a six-pin header and a 2-pin header. This is best done using diagonal cutters. Cut the header on the side, then bend the portion to be cut off away from the rest of the header. The two pieces should snap apart somewhat cleanly. Discard the 2-pin header.

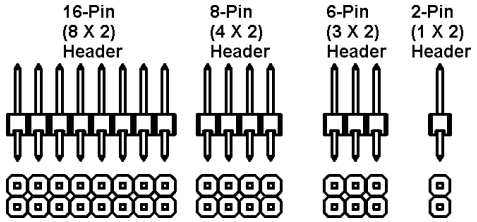


Figure 2

☐ Install the 8-pin dual-row header at W20-W23 on the bottom side of the PCB. The short pins are inserted into the PCB. The header must be firmly seated against the board when soldering.

☐ Install the 6-pin dual-row header at W9-W11 on the **bottom side** of the PCB. The short pins are inserted into the PCB. The header must be firmly seated against the board when soldering.

☐ Locate the shorting headers. Install 14 shorting headers on the dual-row headers W9-W19 and W21-W23 by plugging them onto the header pins. Do not install a jumper at W20 at this time.

☐ Install electrolytic capacitor C12 (220 µF) on the **bottom side** of the PCB. The (+) lead of C10 must be installed in the hole marked "+". The (+) lead is usually longer than the (-) lead. The (-) lead is identified by a stripe on the body of the capacitor.

☐ Install the DC barrel jack (J3) on the **bottom side** of the PCB.

☐ Install J2, a male PC-mount DB9 connector on the **bottom side** of the PCB. This position is next to the side of the PCB. The connector will “snap” into the board as its mounting tabs “grab” the board. Be sure you have installed the MALE connector (with pins) before soldering the connector pins onto the board.

☐ Install J1, a female PC-mount DB9 connector on the **bottom side** of the PCB. This position is approximately in the center at the end of the PCB. The connector will "snap" into the board as its mounting tabs "grab" the board. Be sure you have installed the FEMALE connector (with sockets) before soldering the connector pins onto the board.

☐ Refer to Figure 3, and install screw terminal connectors at J4 and J5 on the **bottom side** of the PCB. The opening between the connectors forms a "trough" for control cables to external devices. The terminals must be mounted so their side openings face this trough. Make sure the feet of the terminals are firmly seated against the board, leaving a very slight gap between the body of the terminal and the PCB.

__J4, __J5

☐ Connect two terminals together end-to end by sliding the tab of one connector into the slot of another. This forms a single 8-pin connector. Form three other eight-pin terminals following the same procedure, then install the screw terminals at the locations indicated in Figure 3 on the **bottom side** of the PCB. Make sure the terminals are mounted so their side openings face the trough. Also make sure the feet of the terminals are firmly seated against the board, leaving a very slight gap between the body of the terminal and the PCB.

__J6/J8 __J7/J9,
__J10/J12, __J11/J13

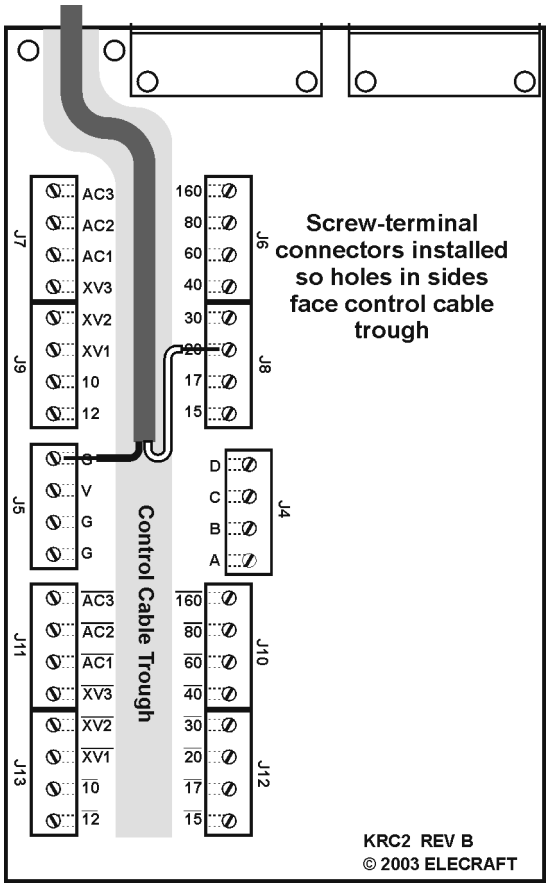


Figure 3

☐ Install crystal X1, a tall, 4.000 MHz device, on the **bottom side** of the PCB. Make sure it is flat against the board before soldering. Use a minimum of solder to avoid the solder wicking through to the other side, causing a short.

☐ Locate the ground pad near X1. Insert a discarded component lead through this pad, then fold it over the top of X1. Solder this lead at the ground pad, then solder it to the crystal can. Avoid overheating the crystal.

☐ Adjacent to J1, on the **bottom side** of the board, you will find two pads connected by a white line. Using one of the 1N4007 diode leads previously saved, install a 1/4" (6 mm) tall U-shaped ground jumper between these two pads, on the **bottom side** of the board. This jumper can be used as a ground point for test instruments.

☐ Locate the remaining three pushbutton switches. These will now be installed on the **top side** of the board. Insert the switches into their mounting holes at S2, S3 and S4, spreading the legs slightly so they will properly engage the holes. Press the switch down until it is fully seated on the bends in its leads. There will be a slight gap between the switch body and PCB. Solder the switches onto the circuit board from the **top side**.

__S2, __S3 __S4

☐ Locate the four pushbutton key caps. Making sure the key caps are oriented from end-to-end across the board, press the key caps onto the pushbutton switch stems until they lock into place.

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

When you install the IC in the following step, always straighten the leads of the IC first as shown in Figure 4. The two rows of pins must be straight and parallel to each other to establish the proper pin spacing for insertion into the PC board or socket. To straighten the pins, rest one entire row of pins against a hard, flat surface. Press down gently on the other row of pins and rock the IC forward to bend the pins into position as shown below.

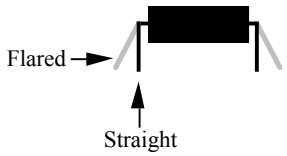


Figure 4

☐ Carefully straighten the pins on the microcontroller, U1 (PIC16F877A). The two rows of pins must be parallel to each other, with no pins bent.

☐ Press the microcontroller into its socket, orienting the notched or dimpled end of the IC with the notched end of its component outline. The labeling on the microcontroller should read from left to right.

This completes assembly of the KRC2 circuit board. There are two remaining parts locations, R5 and SP1, which are used with the accessibility speaker option. All other component locations should now be filled.

☐ **Visual Inspection:** Using a magnifying glass, examine the entire board for unsoldered pins, solder bridges, broken leads, or backward diodes or ICs. Reheat any suspect joints This simple check could save you hours of troubleshooting later.

Case Assembly

☐ Locate the case top cover. This piece has three rectangular holes punched into the face.

☐ Locate a 4-40 x 3/16" flat head screw. Push it through the hole on the top of the case, holding it in place with a finger as you turn the case over. Locate two #4 internal-tooth lock washers. Slide both lock washers onto the screw shaft inside the case. Locate the 1/4 x 3/16" round threaded standoff. While holding the screw with a Philips screwdriver, screw the standoff onto the screw. Tighten the assembly.

☐ Insert the circuit board assembly into the case with the pushbutton switches and LED passing through the rectangular holes in the case. Secure the circuit board to the case with a single 4-40 x 3/16" pan head Philips screw and #4 lock washer.

☐ Locate the four #4 male-female hex standoffs. These are used to secure the DB9 connectors to the case. Screw each standoff through one of the mounting holes next to the DB9 connectors in the end of the case into the threaded DB9 assemblies.

☐ Locate the two "2-D" fasteners. These are used to secure the case top and bottom. Note that on the side of the fastener with two screw holes, there is more space to one side of the holes than the other. The side with the most space will face away from the circuit board.

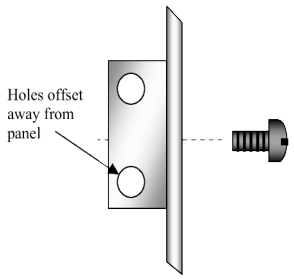


Figure 5

☐ Using two 4-40 x 3/16" flat-head screws, attach one "2-D" fastener to the case top just above the J1 DB9 connector. Make sure the wide side of the fastener side faces away from the circuit board.

☐ Attach the second "2-D" fastener, using two 4-40 x 3/16" flat head screws, to the end of the top case away from the DB9 connectors. Follow the same procedure as in the previous step. Again, the wide side of the fastener should face away from the circuit board.

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 front panel 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**.

☐ Holding **F1** should cause the KRC2 to change the driven band terminal. Only the 60m source terminal should indicate 12 volts. The LED should be alternating between dim and bright.

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

☐ Continue this procedure, actuating the **F1** command until all HF source terminals have been checked.

☐ The **F4** function is used to switch the AC1-AC3 outputs. First, hold **F4**, then tap **F1**. The AC1 source terminal should now indicate +12V and AC2 and AC3 source terminals indicate 0V.

☐ Hold **F4**, then tap **F2**. The AC2 source terminal should now indicate 12V with AC1 and AC3 at 0 V.

☐ Hold **F4**, then tap **F3**. The AC3 source terminal should now indicate 12V with AC1 and AC2 at 0 V.

☐ Hold **F4**, then tap **F4**. All three AC source terminals should now indicate 0 volts.

This completes checkout of the KRC2. Continue to the Final Assembly section.

KRC2 Final Assembly

☐ Place the case bottom onto the case top, aligning the screw holes at each end of the case. The case may be a tight fit, but the two halves should slide into place without difficulty.

☐ Using two 4 x 3/16” pan-head screws, secure the case bottom to the top.

☐ Locate the four rubber stick-on feet. Remove the adhesive backing from each foot, and place the foot securely into place in a corner of the case bottom about 1/8” in from each side.

K2 to KRC2 Control Cable Assembly

☐ Locate the 8-conductor cable. **Note:** A shorter cable may be used as long as it accommodates the physical orientation of the K2 and the KRC2. A longer cable can also be used, but it will have to be tested to ensure that it is not subject to RF interference. A more heavily-shielded control cable may be required. A standard shielded male-female DB9 straight-through cable has been tested and should work well with the KRC2/K2 combination.

☐ Remove 1/2" (12 mm) of the jacket from the cable at each end. Be very careful not to nick the individual wires.

☐ Peel back and cut away the foil shield.

☐ Strip 3/16" (5 mm) of insulation from each insulated wire.

☐ Twist the strands of each wire together. Tin lightly with solder.

☐ Locate the male and female DB9 connectors.

☐ Insert the female DB9 connector (KRC2 end) into the vise, with the solder cups facing up.

☐ Solder the wires to the indicated connector pins at the KRC2 end of the cable as shown in Figure 6. It may be helpful to melt some solder into each solder cup on the connector first.

Pin 1	Bare wire	Pin 2	Orange	Pin 3	Blue
Pin 4	Red w/ Black stripe	Pin 5	White w/ Black stripe	Pin 6	Green
Pin 7	White	Pin 8	Red	Pin 9	Black

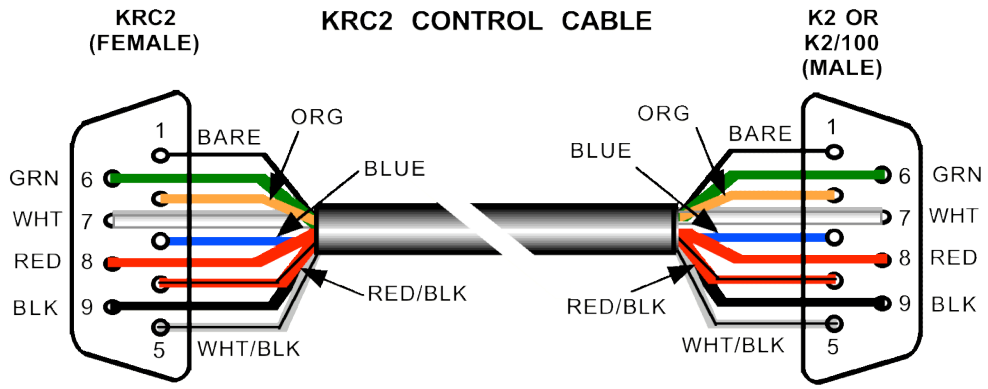


Figure 6

☐ Remove the female connector from the vise (K2 or K2/100 end), and insert the male connector (KRC2 end). Solder the wires to this connector using the same colors and pins as in the previous step.

☐ Locate the connector housing (backshell) and associated hardware.

Note: A single hinged backshell may be provided rather than a two-piece backshell.

☐ Attach a backshell to the male connector at the K2 or K2/100 end of the cable. Figure 7 shows how the backshell appears when assembled. Use the provided cable clamp to hold the cable in position, then secure the clamp with two screws. The jackscrews must be retained by the shells. Secure the backshell halves with the provided hardware (or, if the shell is hinged, snap the backshell closed). **Do not over-tighten** the two screws which secure the cable clamp!

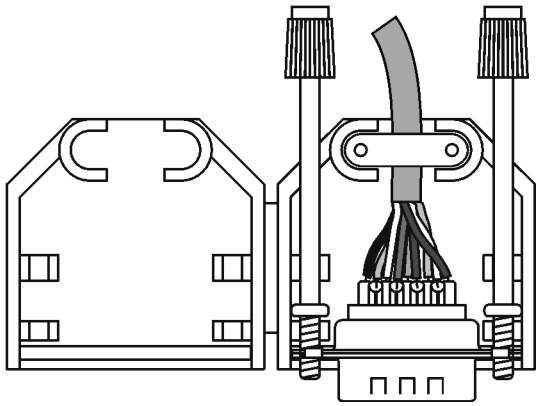


Figure 7

☐ Attach the remaining backshell to the female connector at the KRC2 end using the procedure described above.

Using the KRC2

The features described in this section are available with KRC2 firmware version 1.5 and later. Please see earlier revisions of this manual for operation with previous firmware versions.

KRC2 operation with an Elecraft K2 or K2/100 Transceiver

The KRC2 should be connected to the K2 using the Male/Female DB9 cable assembly described in the previous section. The KRC2 derives its operating power from the K2 in this configuration.

In the KRC2's factory configuration, the per-band outputs (both sink and source) will be turned on or off based on the K2's selected band. This default behavior will suffice for many amateur station applications. However, the correspondence between selected band and output driver states is fully programmable. Band mapping and other configuration changes are accomplished using the KRC2 configuration utility, available from the Elecraft web site (www.elecraft.com). For example, if the station includes a 20/15/10 meter tri-band beam, the 20 m sink output could be programmed to be turned on whenever the K2 is set for 20, 15, or 10 meters. Another alternative for mapping multiple bands to a single antenna or other device is to "wire-OR" the outputs. This is explained in more detail later in the manual.

Switch S5, accessible through a small hole in the side of the KRC2 sets the operational mode of the unit. For normal operation, the **OP** (operate) position of S5 is used. This allows the KRC2 to communicate with the K2 via its AuxBus and RS-232 interfaces. Set S5 to the **DL** (Download) position for downloading firmware upgrades or device configurations to the unit. Firmware upgrades can be downloaded using the KRC2 download utility, available from the Elecraft web site.

Default Key Behavior

There are four buttons on the top of the KRC2, labeled F1, F2, F3 and F4. In the KRC2's factory configuration, the F1-F4 buttons have the following **TAP** and **HOLD** functions:

F1 Sends the contents of K2 CW message buffer #1.
F2 Sends the contents of K2 CW message buffer #2.
F3 Sends the contents of K2 CW message buffer #3.
F4 Sends the contents of K2 CW message buffer #4.

Note: Playing messages using **F1** - **F4** is more convenient than using the K2's FAST PLAY (1-touch) technique.

F1 Selects the next lower HF band's relay driver output in the KRC2.
F2 Selects the next higher HF band's relay driver output in the KRC2.

Note: This is useful in cases where you switch to a K2 band for which no antenna relay has been connected in the KRC2. See next page for details.

F3 Switches the K2 receiver to (or from) the RCV ANT jack. This is a toggle operation.
F4 Holding this button, then tapping any button, will then cause one of the ACC drivers to be turned on or off as shown in the list below. The KRC2 will illuminate the green LED at full brightness while it is awaiting the key tap.

F1 Turn on AC1 driver.
F2 Turn on AC2 driver.
F3 Turn on AC3 driver.
F4 Turn OFF all ACC drivers.

Note that holding **F4** instead of tapping a key will cancel the function.

The **F1** and **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 hold of **F2** will cause the drivers to go to the 160m setting. Conversely, when the lowest band is selected, the next usage of the **F1** function causes the drivers to go to the highest band. The band map follows the values indicated in Table 5, 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 Jumper Configuration

There are 21 jumpers in the KRC2 allowing for a wide range of device options. The W1-8 block, located near the front of the case, controls device configuration for different radio setups and driver output logic. Table 1, Table 2 and Table 3 show the different settings.

Jmpr	Jumper Out (default)	Jumper In
W1	Use digital band decoding	Use analog band decoding
W2	Band decode option bit 1 - see Table 2	Band decode option bit 1 - see Table 2
W3	Band decode option bit 2 - see Table 2	Band decode option bit 2 - see Table 2
W4	ACn drivers use 1 of 3 decoding	ACn drivers use binary coding
W5	Xvtr drivers use 1 of 3 decoding	Xvtr drivers use binary decoding
W6	No auto-report mode	Place XCVR in auto-report mode
W7	Data Rate bit 0 – see Table 3	Data Rate bit 0 – see Table 3
W8	Data Rate bit 1 – see Table 3	Data Rate bit 1 – see Table 3

Table 1

W1	W2	W3	Band decode source
Out	Out	Out	AuxBus Mode – K2 operation
Out	Out	In	Serial Port Mode – K2 or Kenwood operation
Out	In	Out	Digital Input through J4
Out	In	In	Not used
In	Out	Out	Analog input using ALC input (DB9 pin 4)
In	Out	In	Analog input using 8R input (DB9 pin 9)
In	In	Out	Analog input using VRDET input (DB9 Pin 7)
In	In	In	Analog input using 8R input (DB9 pin 9) with reference voltage on ALC input (DB9 pin 4)

Table 2

W8	W7	Data Rate
Out	Out	4800
Out	In	9600
In	Out	19200
In	In	4800

Table 3

Jumpers W4 and W5 determine the bandmap used for outputting band data. For normal use they should be removed. The KRC2 Configuration tool allows the bandmaps to be edited by the user. Jumpers W4 and W5 may be used in conjunction with the Configuration tool remapping in order to allow alternate or extended output configurations. See the KRC2 Configuration Tool documentation for more information.

Jumpers W9-W23 are used to connect or disconnect the DB-9 connectors from the KRC2. Normally these jumpers should be left installed. When used with a K2, the minimum jumpers that must be installed in this block are W16, 18, 19, 21 and 23. DO NOT install jumper W20 when using the KRC2 with the K2. Doing so will cause problems in the K2, including disabling SSB output. If the PC connector (J1) is used to pass K2 information through to a peripheral such as a KAT100, it is important that all jumpers in the W9-W23 block with the exception of W20, be installed.

Jmpr	Connector	Discussion
W9	J1 Pin 2 - PC	Enables Serial Data to PC from KRC2 or XCVR.
W10	J1 Pin 3 - PC	Enables Serial Data from PC to KRC2 or through to XCVR.
W11	J1 Pin 4 - PC	Enables J1 Pin 4
W12	J1 Pin 9 - PC	Enables J1 Pin 9
W13	J1 Pin 8 - PC	Enables J1 Pin 8
W14	J1 Pin 7 - PC	Enables J1 Pin 7
W15	J1 Pin 6 - PC	Enables J1 Pin 6
W16	J2 Pin 6 - XCVR	Enables K2 AuxBus signal into KRC2. Must be installed for KRC2 AuxBus band decode mode operation.
W17	J2 Pin 7 - XCVR	Enables K2 VRDET signal into KRC2.
W18	J2 Pin 8 - XCVR	Enables K2 12CTRL signal into KRC2. This signal normally powers the KRC2.
W19	J2 Pin 9 - XCVR	Enables K2 8R signal into KRC2. Used to determine transmit/receive activity in K2 operating mode.
W20	J2 Pin 4 - XCVR	Enables K2 ALC signal into KRC2. DO NOT insert this jumper when using the KRC2 with the K2!
W21	J2 Pin 3 - XCVR	Enables K2 TxD signal from KRC2 serial port driver.
W22	J2 Pin 3 - XCVR	Enables K2 TxD signal from J1 pin 3 (PC serial port driver).
W23	J2 Pin 2 - XCVR	Enables K2 RxD serial port signal into KRC2.

Table 4

When the KRC2 is set to receive band data in an analog mode, the jumpers associated with the selected input should be removed from the J2 connection. The analog input should then be fed into the KRC2 using the PC connector. Use J1 pin 1 for the ground return connection. These settings and connections are listed in Table 5.

Analog Input	Remove Jumper(s)	J1 Pin for input	Comments
8R / AN1	W19	9	0 - 10 volt input range
VRDET / AN2	W17	7	0 - 5 volt input range
ALC / AN3	W20	4	0 - 10 volt input range

Table 5

Important! Do NOT use the jumper connections to bridge external RS-232 serial port signals. This may cause serious damage to your radio when moving the KRC2 from one radio to another. The preferred method is to provide the bridging in the cable used with the radio needing it. This specifically applies to Kenwood transceivers.

Rig-Specific Setup

The following settings are suggested for each radio. Note that these are suggested that have been successful for users. Other setups are possible and may be preferred. Note that W4 and W5 should be set as required for the desired bandmap configuration.

Elecraft K2.

- K2 AuxBus used for band, serial port for control and data. PC logging program in use:

Installed	Removed
	W1, W2, W3, W6, W7, W8
W9, W10, W16-W19, W21-W23	W11-W15, W20

- K2 AuxBus used for band, serial port for control and data. Stand-alone (no PC):

Installed	Removed
W6	W1, W2, W3, W7, W8
W9 -W19, W21-W23	W20

- K2 serial port used for band, data and control communications. PC logging program in use:
  The KRC2ACC may use this setup for communications with the K2.

Installed	Removed
W3	W1, W2, W6, W7, W8
W9, W10, W16-W19, W21-W23	W11 – W15, W20

- K2 serial port used for band, data and control communications. Stand-alone (no PC): The KRC2ACC may use this setup for communications with the K2.

Installed	Removed
W3, W6	W1, W2, W7, W8
W9 -W19, W21-W23	W20

Elecraft K3. The preferred setup for the K3 uses the AuxBus for band communications. This mode uses the K3's AuxBus for band communications.. Connect J1/J2 pin 6 to pin 2 of the K3's AuxIO connector. J1/J2 pin 1 (Ch Gnd) should be connected to K3 Aux IO pin 5. The KRC2 may also be connected to the K3's serial port to determine bands. In this configuration control and data communications will be functional, however not all K3 commands or data may be recognized by the KRC2.

- AuxBus. Control and data transfers are not available.

Installed	Removed
	W1, W2, W3, W6, W7, W8
W9 -W23	

- Serial port, PC Logging in use, data rate set to 19200 bps:

Installed	Removed
W3, W8	W1, W2, W6, W7
W9, W10, W21-W23	W11-W20

- Serial port, (no PC), data rate set to 19200 bps:

Installed	Removed
W3, W6, W8	W1, W2, W7
W9, W10, W21-W23	W11-W20

Kenwood. This mode uses Kenwood's serial port for control and data communications. The data rate may be set using the W7 and W8 jumpers as required. See Table 3 for this information. Some Kenwood radios require the use of RTS/CTS handshaking in order to enable communications. If this is required with your radio, connect a jumper wire from W14 to W17. The wire should be connected to the jumper pins nearest the DB-9 connectors.

- PC Log program in use, data rate of 19200 bps

Installed	Removed
W3, W6, W8	W1,W2, W7
W9, W10, W21-W23	W11-W20

- Stand-alone (no PC) operation, data rate of 19200 bps

Installed	Removed
W3, W6, W8	W1, W2, W7
W9, W10, W21-W23	W11-W20

Icom using analog band data. Here we use the radio's analog band output for band information. Control and data transfers are not available. Some Icom radios have shown a tendency for the band output to drift with increased transmit output power. For this reason it is recommended that the reference input setup be used. In this configuration, the band data is connected to pin 9 and the 8 volt reference is connected to pin 4. This mode is set with jumpers W1, W2 and W3 installed.

- Analog band input on J1/2 pin 4:

Installed	Removed
W1	W2, W3, W6, W7, W8
W11, W20	W9, W10, W12-19, W21-W23

- Analog band input on J1/2 pin 9:

Installed	Removed
W1,W2	W3, W6, W7, W8
W12, W19	W9 -W11, W13-18, W20-W23

- Analog band input on J1/2 pin 9 with reference voltage on J1/2 pin 4:

Installed	Removed
W1, W2, W3	W6, W7, W8
W11, W12, W19, W20	W9, W10, W13-18, W21-W23

Yaesu FT817 using analog band data. Band is determined from the radio's analog voltage output. Control and data transfers are not available

- Analog input on J1/2 pin 7:

Installed	Removed
W1, W3	W2, W6, W7, W8
W14, W17	W9–W13, W15, W16, W18-W23

Computer parallel printer port. BCDband information is communicated using the parallel data available from some computer's parallel port or parallel BCD data from some radios. Control and data transfers are not available

- Parallel PCB information

Installed	Removed
W2	W1, W3, W6, W7, W8
	W9–W23

For all analog inputs, use J1 or J2 (same connector as the analog input), pin 1 for ground connection.

KRC2 Power Connections

The KRC2 may be powered from one of several sources. The microcontroller and logic are powered either from the K2 through the DB-9 connector, or from the +12V DC barrel jack. The voltage applied at the DC barrel jack must not exceed 15 volts.

Power for the Source drivers can come either from the DC barrel jack or the J5 terminal connector. Voltage applied to the J5 'V' terminal must not exceed +50 volts. Maximum current drain for either source is 1 amp.

Connecting the KRC2's Drivers

There are 36 driver output terminals. The terminals are accessible by removing two access screws on the bottom case. Sixteen of the drivers will source current, and another sixteen will sink current. The remaining four drivers, labeled A, B, C and D, are TTL-compatible inputs or outputs depending on the operating mode. In normal KRC2 or analog modes, the terminals are outputs. In digital parallel input mode, they become inputs, and receive the BCD-encoded band data. An additional four terminals are provided for connecting the KRC2 to ground returns, and to provide a supply voltage for the source drivers as described in the KRC2 Power Connections section. Figure 8 illustrates the connections. A bar over the terminal label indicates the output is a sink driver. Sink driver terminals are located near the front of the box. Source drivers are located toward the rear of the box.

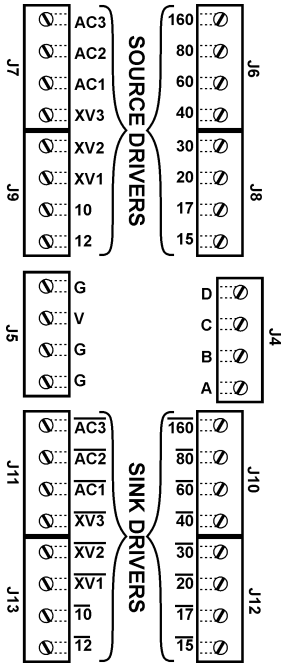


Figure 8

Like-drivers may be wire-ORed (connected together) in order to allow a relay to be selected on more than one band. For example, the control line from a tri-band beam would connect to terminals 20, 15 and 10 for source drivers, or /20, /15 and /10 for sink drivers.

IN NO CASE SHOULD THE SOURCE AND SINK TERMINALS BE CONNECTED TOGETHER IN ANY WAY!

Connecting other Elecraft Peripherals

Additional Elecraft peripherals, such as a KAT-100 or XV-Series transverter, may be connected to the KRC2's PC port in a "daisy-chain" fashion in order to operate with the K2. Simply plug the DB-9 connector from the peripheral into the KRC2's PC port, and use the peripheral as if it were directly connected to the K2. Be sure to follow the rules outlined in the jumper discussion and insert all jumpers in the W9-W23 block with the exception of W20 when using this configuration.

KRC2 PC Connections

A personal computer's RS-232 serial port may be connected to the KRC2's PC port using the PC connector. Normally the K2 does not automatically report its settings to the KRC2. If you have an alternate KRC2 configuration that needs for the K2 to report its settings, install jumper W6 to enable the K2's auto-report mode.

Using the KRC2 with non-Elecraft Radios

The KRC2 is designed to accept band information from radios other than the K2. As discussed in KRC2 Jumper Configuration, setting jumpers W1-3 for Kenwood mode operations allows the KRC2 to interface with those radios in a manner similar to the K2. Other radios that do not use this command set may not be interfaced using this mode.

To use the KRC2 with an ICOM transceiver that has analog (stepped voltage) band output, you should set the W1-3 jumpers for Analog Mode using the desired input (8R/AN1 or ALC/AN3), and connect the transceiver's analog output to the appropriate input pin on J1 or J2. Be sure to remove W19 or W20 as appropriate. Power the KRC2 using an external 12-volt supply connected to the KRC2's DC barrel jack. The KRC2 should now set its band outputs according to the voltage presented by the radio.

The three analog inputs have slightly different characteristics you should consider when choosing which to use. The 8R/AN1 and ALC/AN3 inputs have voltage divider networks on their inputs that divide the input by 2. Thus their input range is from 0 to 10 volts. The VRDET/AN2 input has no divider network, giving it a voltage range of 0 to 5 volts. Each input voltage is filtered through a band selection table that determines the selected band. There are three tables, one for each input. The factory-configured tables are set up for Icom radios with voltage range of 0 to 8 volts for the wide-range inputs, with the third table set for the Yaesu FT-817 transceiver's analog output. These tables are user-configurable using the KRC2 Configuration tool

To use the KRC2 with a Yaesu radio or computer parallel port outputs, set jumpers W1-3 as follows: W1 OUT, W2 IN, W3 OUT as described in Table 2. You may then connect the radio or computer outputs to the KRC2's ABCD terminals, with the return ground connected to one of the terminals labeled 'G'. Power the KRC2 from an external 12-volt supply connected to the DC barrel jack. The unit should now switch the driver outputs in accordance to the digital inputs it sees. Note that in addition to the standard BCD outputs, the KRC2 recognizes additional band codes according to Table 5.

Binary coding	Hex	Band		Binary coding	Hex	BAND
0001	01	160m		1000	08	12m
0010	02	80m		1001	09	10m
0011	03	40m		1010	0A	60m
0100	04	30m		1011	0B	unused
0101	05	20m		1100	0C	XVT1
0110	06	17m		1101	0D	XVT2
0111	07	15m		1110	0E	XVT3

Table 6

Troubleshooting

If you have any difficulty with your KRC2:

Most problems in building the KRC2 are caused by poor or non-existent solder joints. Closely examine the PC board for poor solder joints and incorrect, broken or missing components.

Problem: The KRC2's LED does not turn on.

Make sure the KRC2 is powered, either from the K2 or from the DC barrel jack. The KRC2 must be powered from one of these two sources. The internal controller circuits may not be powered from J5's 'V' terminal.

Problem: Source drivers inoperative.

The source drivers require that a DC supply of up to 15 volts be attached to the KRC2's DC barrel jack, or a DC supply of up to 50 volts be connected to terminal 'V' of J5. The source drivers are not capable of supplying voltage from the K2's power supply.

Problem: KRC2 does not communicate with K2.

Check jumpers W9-W23. All but W20 must be installed for the KRC2 to communicate properly with the K2. If these are properly installed, check the cable connecting the KRC2 and K2. This must be a straight-through Male DB9-Female DB9 cable as constructed in this manual.

Problem: K2 has no transmitter output in voice modes.

Remove jumper W20 from the KRC2. The KRC2 adversely affects the K2's ALC system, causing low voice power output of the transceiver. The K2 works quite well without the external ALC line installed, so simply leave jumper W20 out of the KRC2.

Problem: LED Flashing on and off.

On/off LED flashing indicates that the KRC2's microcontroller has not passed its startup tests, and is waiting for a firmware download. This is not to be confused with the slower bright/dim LED flashing which indicates the driver band selection does not match the K2's band setting. Try turning power off then on to the unit. If the condition persists, contact Elecraft technical support for an upgrade.

Included below are complete **DC Voltage Tables** for all ICs.

DC Voltage Chart

Voltages are approximate and will vary up to +/- 10% due to normal component variation without affecting the operation of the KRC2. Measurements were made under the following conditions: KRC2 powered by K2, K2 powered by a 14.0 V (measured) power supply, K2 powered on, set to 14290.9 MHz. Switch to this band from another after powering on K2/KRC2 combination. Nothing attached to the KRC2's DC barrel jack or PC DB9 connectors. No wires attached to the J4-J13 terminal connectors. Measurements taken with Metex ME-22 Digital Volt Meter.

Pin	V	Pin	V	Pin	V	Pin	V	Pin	V
U1 P1	4.75	U1 P27	4.56	U2 P13	4.95	U5 P7	0.00	U6 P17	0.00
U1 P2	2.77	U1 P28	0.00	U2 P14	0.00	U5 P8	0.00	U6 P18	0.00
U1 P3	3.45	U1 P29	4.56	U2 P15	4.95	U5 P9	0.00	U6 P19	0.00
U1 P4	0.00	U1 P30	0.00	U2 P16	4.95	U5 P10	0.00	U6 P20	0.00
U1 P5	0.00	U1 P31	0.00	U4 P1	0.00	U5 P11	0.00	U7 P1	0.00
U1 P6	0.79	U1 P32	4.95	U4 P2	4.95	U5 P12	0.00	U7 P2	4.95
U1 P7	4.93	U1 P33	4.95	U4 P3	4.95	U5 P13	13.35	U7 P3	0.00
U1 P8	5.55	U1 P34	4.95	U4 P4	0.00	U5 P14	0.00	U7 P4	0.00
U1 P9	1.97	U1 P35	4.95	U4 P5	0.00	U5 P15	4.95	U7 P5	0.00
U1 P10	4.63	U1 P36	4.95	U4 P6	0.00	U5 P16	0.00	U7 P6	0.00
U1 P11	4.95	U1 P37	4.95	U4 P7	0.00	U6 P1	0.00	U7 P7	0.00
U1 P12	0.00	U1 P38	4.95	U4 P8	0.00	U6 P2	4.95	U7 P8	4.95
U1 P13	1.77	U1 P39	4.95	U4 P9	0.00	U6 P3	4.95	U7 P9	0.00
U1 P14	2.21	U1 P40	4.95	U4 P10	0.00	U6 P4	0.00	U7 P10	0.00
U1 P15	4.93	U2 P1	12.86	U4 P11	0.00	U6 P5	0.00	U7 P11	0.00
U1 P16	0.00	U2 P2	0.00	U4 P12	0.00	U6 P6	0.00	U7 P12	0.00
U1 P17	4.90	U2 P3	12.42	U4 P13	13.35	U6 P7	0.00	U7 P13	4.95
U1 P18	4.95	U2 P4	-2.52	U4 P14	0.00	U6 P8	4.95	U7 P14	0.00
U1 P19	4.93	U2 P5	-7.56	U4 P15	4.95	U6 P9	0.00	U7 P15	0.00
U1 P20	4.93	U2 P6	-6.80	U4 P16	0.00	U6 P10	0.00	U7 P16	0.00
U1 P21	4.93	U2 P7	12.42	U5 P1	0.00	U6 P11	0.00	U7 P17	0.00
U1 P22	4.93	U2 P8	-7.55	U5 P2	4.95	U6 P12	0.00	U7 P18	0.00
U1 P23	4.93	U2 P9	0.00	U5 P3	0.00	U6 P13	4.95	U7 P19	0.00
U1 P24	4.95	U2 P10	0.00	U5 P4	0.00	U6 P14	0.00	U7 P20	0.00
U1 P25	4.95	U2 P11	4.95	U5 P5	0.00	U6 P15	0.00		
U1 P26	4.95	U2 P12	4.95	U5 P6	11.97	U6 P16	0.00		

Note: U6 Pins 4, 5, 6, 7, 14, 15, 16, 17 and U7 Pins 4, 6, 7, 14, 15, 16, 17 are floating (not driven) with no pullup. U6 pin 5 is driven to zero for 14 MHz as shown in the voltage chart.

Circuit Details

Refer to the schematic diagram, Figure 7 on page 29.

U1 is a PCI 16F877A microcontroller. This device controls the operation of the KRC2. U1 operates at a clock frequency of 4 MHz, as determined by X1. It communicates with relay drivers U4-U7 using its built-in Serial Peripheral Interconnect (SPI) interface, commanding them to turn their outputs on or off. Which outputs should be on or off is determined during execution of the microcontroller's internal program. It uses band input from the attached radio or computer to determine which driver output(s) should be enabled.

The MCU receives band information from the attached radio through one of six input channels. Three channels are analog, using the MCU's built-in analog to digital converters to measure band voltages, while the other three are digital in nature. These consist of a BCD parallel input and two serial inputs. One serial input enables the MCU to participate on the K2's AuxBus channel, while the other uses the MCU's built-in UART serial port to communicate using the Elecraft serial protocol (similar to the Kenwood serial protocol). Selection of the active input method is made by setting the W1-W3 jumpers.

The UART serial port uses industry-standard RS-232 voltages. These are switched in the KRC2 using U2, a MAX1406 (or similar) RS-232 interface. U2 requires a negative power supply for its operation. This is developed using the oscillator and rectifier circuitry of Q1. Q1 and X2 and their associated components form an oscillator running at 18.289 MHz. Output from this oscillator is fed to a voltage-doubling rectifier made up of D6, D7, and C15, then fed to U2's –12V input pin. The circuit typically provides –7.5 volts, well within the range required by the RS-232 specification.

For analog band operation, the input voltage is connected to the microcontroller's AN1, AN2 or AN3 inputs through divider or isolation networks. The AN1 input comes from pin 9 of J1 or J2, depending on jumper selection. It is reduced by the divider network made up of R6 and R10. The values for these resistors provide a division by 2, giving the input a maximum range of 0 to +10 volts. The AN3 input is identical to that of AN1, with RR8 and R11 making up the divide-by-2 network. This input comes from J1 or J2 pin 4. AN2 comes from J1/J2 pin 7, and is fed directly to the MCU input without a voltage divider. Its input range is 0 to +5V.

The KRC2 can communicate with two devices using the RS-232 port, depending on the setting of S5. In S5's normal operation position, the KRC2 listens directly to the transceiver's serial output, and also can send directly to the radio attached to the XVCR port. Additionally, the RS-232 signals from a computer attached to the PC port (J1) are ORed with the KRC2's serial port, allowing it to send, and listen, to the transceiver as well. No protection is provided to keep transmissions from the KRC2 and PC from colliding on this channel, so care must be taken to prevent this in the PC and KRC2 operation. The S5's Download (DL) position enables the microcontroller to communicate directly with a PC. This is used in downloading configuration and firmware upgrades to the KRC2.

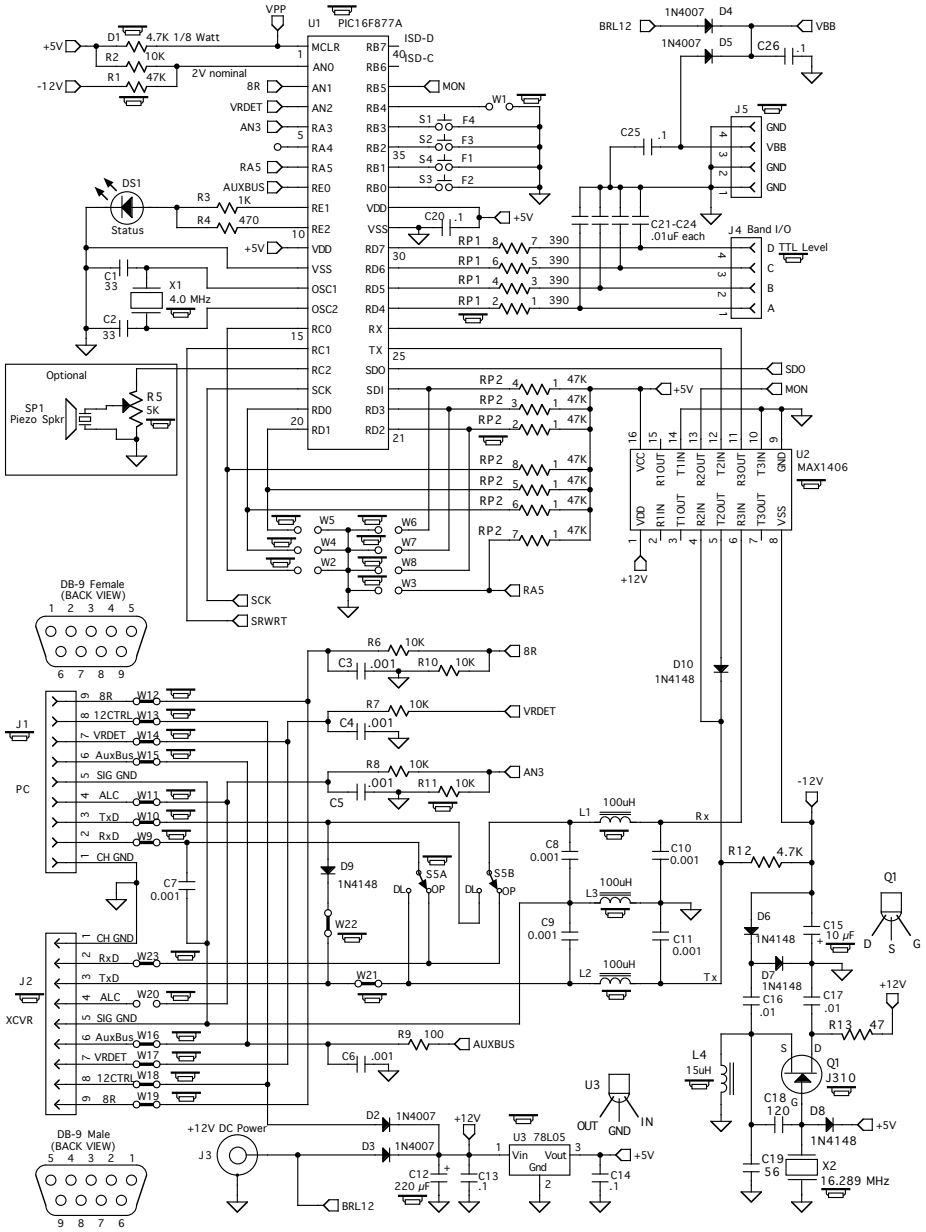
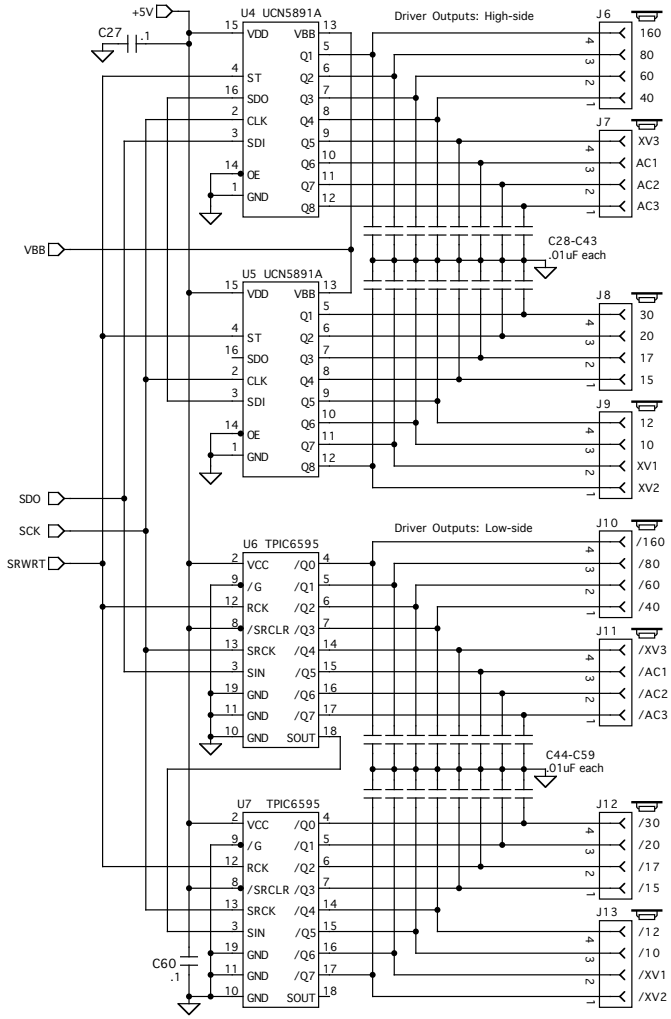


Figure 9 – KRC2 Schematic



Elecraft KRC2 Remote Control/AuxBox			
By J. Brindle W. Burdick	Rev. C	Date 02/12/06	Sht. 1 of 1

PCB Layout

The corrected PCB layout is shown in Figure 10 for the top side and Figure 9 on page 31 for the bottom side.

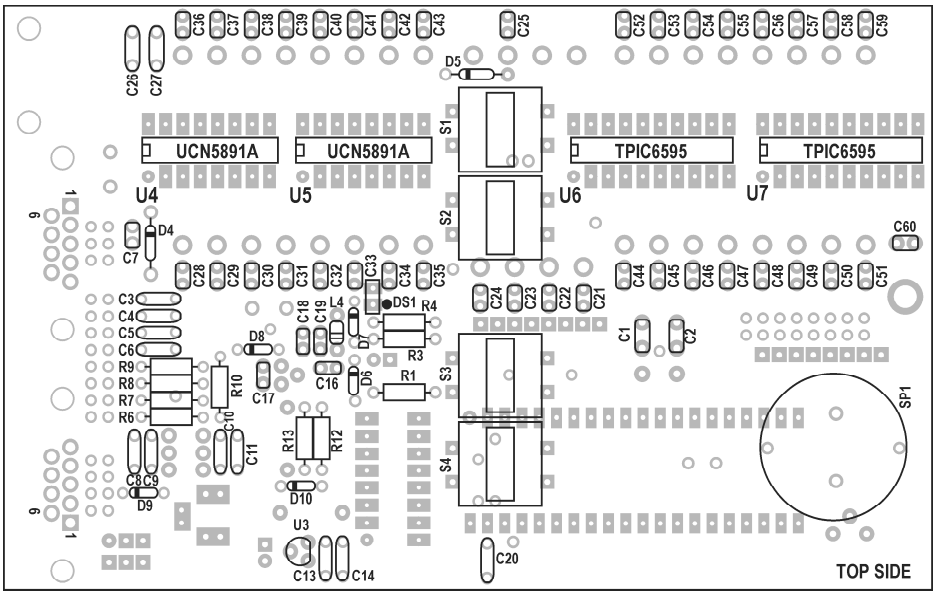


Figure 10 - KRC2 PCB corrected top view / silk screen parts placement

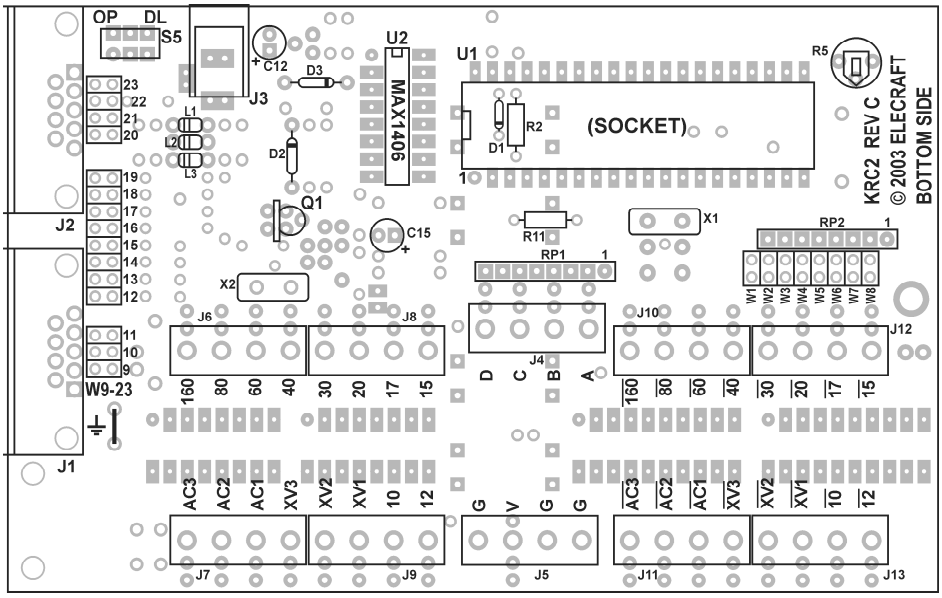


Figure 11 - KRC2 PCB corrected bottom view / silk screen parts placement.

Customer Service Information

Technical Assistance

If you have difficulty with kit construction, operation, or troubleshooting, we're here to help. You may be able to save time by first consulting our web site, www.elecraft.com, or by posting your question on our e-mail forum, elecraft@mailman.qth.net. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays) at 831-662-8345. Via e-mail, use support@elecraft.com for support and parts@elecraft.com to request replacement parts. *Please use e-mail when possible; this gives us a written record of the details of your problem.*

Repair Service

If necessary, you may return your completed kit to us for repair. Contact Elecraft before mailing your kit to obtain current information on repair fees. (Kits that have been soldered using acid core solder, water-soluble flux solder, or other corrosive or conductive fluxes or solvents cannot be accepted for repair.) The following information should be provided to expedite repair: your name, address, and phone number; your e-mail address (if applicable); and a complete description of the problem.

Shipping: First, seal the unit in a plastic bag to protect the finish from dust and abrasion. Use a sturdy packing carton with 3" or more of foam or shredded paper on all sides. Seal the package with reinforced tape. (Neither Elecraft nor the carrier will accept liability for damage due to improper packaging.) Cover the "to" address label with clear tape so it will be weatherproof. Finally, call or send e-mail to obtain the proper shipping address.

Elecraft's 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase. Before requesting warranty service, you should complete the assembly, carefully following all instructions in the manual.

What is covered: During the first year after date of purchase, Elecraft will replace defective parts free of charge (post-paid). We will also correct any malfunction caused by defective parts and materials. You must send the unit at your expense to Elecraft, but we will pay return shipping.

What is not covered: This warranty does not cover correction of assembly errors or misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. *The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety.* Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. *Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.*