

# ELECRAFT® K3

## HIGH-PERFORMANCE 160 – 6 METER TRANSCEIVER

### KXV3B INTERFACE OPTION INSTALLATION INSTRUCTIONS

Revision C3, September 22, 2016

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E740263

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# Introduction

The KXV3B Interface provides a separate receive antenna input and output, an input and output for use with an external transverter, and a buffered I.F. output. These inputs and outputs are via rear-panel BNC connectors. The KXV3B also contains transverter I.F. in/out connectors for use with the K3 internal K144XV 2-meter option module.

The KXV3B also adds a 20 dB ultra low-noise preamplifier for use on 12, 10 and 6 meters in addition to the basic preamplifier available on the lower frequency bands. With this new preamplifier, the use of a PR6 or PR6-10 external preamplifier is not recommended.

Complete details for using the KXV3B are included in your K3 Owner's manual. This manual covers the installation of the KXV3B Interface option in your K3 transceiver.

Only a few basic hand tools are needed (see page 5) to perform the installation. No soldering or wiring is required.

Calibration of the K3 1 mW transmit gain will be required after installing the KXV3B if your K3 is equipped with the optional K144XV 2 meter transverter or if you wish to use an external transverter. You can do this manually as described in the K3 Owner's Manual or have the K3 Utility Program do it automatically using a computer as described on page 17. If you want to use the Utility Program to calibrate the transmit gain automatically, you will need a suitable interface cable as follows:

- If your K3 has the original KIO3A interface (you will find a DB-9 connector on the K3 rear panel marked RS232) you will need an RS232 cable connected between the RS232 port on your K3 and an RS232 port on your computer (or to a USB port through a suitable RS232-USB adapter such as the Elecraft KUSB).
- If your K3 has been upgraded with the KIO3B interface (you will find an RJ-45 and USB-B connector on the rear panel) and your computer has an RS232 interface, you will need the RJ-45 to DE-9S cable (order E980297). If your computer has a USB interface, you will need the USB A-B cable (order E980720).

## Customer Service and Support

### *Technical Assistance*

You can send e-mail to [k3support@elecraft.com](mailto:k3support@elecraft.com) and we will respond quickly - typically the same day Monday through Friday. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-763-4211. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

### *Repair / Alignment Service (We want to make sure everyone succeeds!)*

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support to get your kit running, so please try that route first as we can usually help you find the problem quickly.)

**IMPORTANT: You must contact Elecraft before mailing your product** to obtain authorization for the return, what address to ship it to and current information on repair fees and turn around times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Elecraft without authorization will incur an additional shipping charge for reshipment to our repair depot.*

## Elecraft's 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase (or if shipped from factory, date product is shipped to customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

**Who is covered:** This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided to Elecraft at time of order to insure warranty coverage.

**What is covered:** During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to Elecraft for warranty repair, Elecraft will pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

**What is not covered:** This warranty does not cover correction of kit assembly errors. It also does not cover 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.

## Preventing Electrostatic Discharge Damage

Sensitive components may be damaged by Electrostatic Discharge (ESD) simply by touching them or a circuit board containing them unless you take specific steps to prevent such damage. Damage may occur with static discharges far too little for you to notice.

A damaged component may not fail completely at first. Instead, the damage may result in below-normal performance for an extended period of time before you experience a total failure.

Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.

We strongly recommend you take the following anti-static precautions (listed in order of importance) to ensure there is no voltage difference between the components and any object that touches them:

- Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag that allow static charges to flow harmlessly over their surface, or a component's leads may be inserted in conductive foam that keep them at the same potential.
- Wear a conductive wrist strap with a series 1-megohm resistor that will constantly drain off any static charge that accumulates on your body. If you do not have a wrist strap, touch a ground briefly before touching any sensitive parts to discharge your body. Do this frequently while you are working. You can collect a destructive static charge on your body just sitting at the work bench.

### **WARNING**

**DO NOT attach a ground directly to yourself without a current-limiting resistor as this poses a serious shock hazard. A wrist strap must include a 1-megohm resistor to limit the current flow. If you choose to touch an unpainted, metal ground to discharge yourself, do it only when you are not touching live circuits with any part of your body.**

- Use a grounded anti-static mat on your work bench (see below).
- If you pick up a pc board that was not placed on an anti-static mat or in an anti-static package, touch first a ground plane connection on the board such as a connector shell or mounting point.
- If you use a soldering iron to work on a circuit board, be sure your iron has an ESD-safe grounded tip tied to the same common ground used by your mat and wrist strap.

## Choosing an Anti-Static Mat

An anti-static mat must bleed off any charge that comes in contact with it at a rate slow enough to avoid a shock or short circuit hazard but fast enough to ensure dangerous charges cannot accumulate. Typically, a mat will have a resistance of up to 1 Gigaohm ( $10^9$  ohms). Testing a mat requires specialized equipment, so we recommend that you choose an anti-static mat that comes with published resistance specifications and clean it as recommended by the manufacturer. Testing has shown that many inexpensive mats that do not specify their resistance have resistance values much too high to provide adequate protection, even after they were cleaned and treated with special anti-static mat solutions.

Suitable anti-static table mats are available from many sources including:

- U-line (Model 12743 specified at  $10^7$  ohms)
- Desco (Model 66164, specified at  $10^6$  to  $10^8$  ohms)
- 3M™ Portable Service Kit (Model 8505 or 8507, specified at  $10^6$  to  $10^9$  ohms)

## Preparing for Installation

### Tools Required

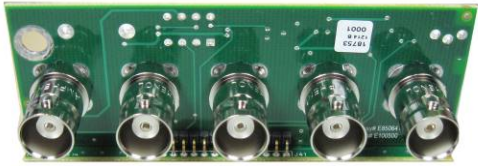
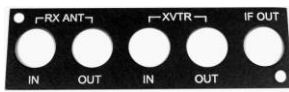




1. #0 and #1 size Phillips screwdrivers. To avoid damaging screws and nuts, a power screwdriver is *not* recommended. Use the screwdriver that best fits the screw in each step.
2. Wrench to remove jack screw nuts on the K3 back panel. 3/16" nut driver recommended.
3. Small diagonal cutters.
4. Small needle-nose pliers or tweezers to position small parts.
5. Soft cloth or clean, soft static dissipating pad to lay cabinet panels on to avoid scratching.

The following tools are strongly recommended:

1. ESD wrist strap.
2. Static dissipating work pad.

## Parts Included

The following parts should be included in your kit. Check to ensure you have them all. If any parts are damaged or missing, contact Elecraft for replacements (see *Customer Service and Support*, page 3).

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	KXV3B Printed Circuit Board Assembly <b>⚠ ESD Sensitive.</b>	1	E850644
	XV3 Connector Panel	1	E100224SS
	KXV3B TMP Cable Assembly	1	E850292
	Screw, 4-40, 1/2" (13 mm)	2	E700030
	Lock Washer, 4-40, inside tooth	2	E700010
	Nut, 4-40	2	E700011

## Installation Procedure

**⚠ SPECIAL NOTE FOR K3 KIT BUILDERS:** If you were directed here by the K3 Kit Assembly Manual to install your KXV3B Module, inventory the parts in this kit against the list under *Parts Included* on page 6 then begin installation at the step indicated on page 10.

### Removing the Top Cover

Disconnect power and all cables from your K3.

Remove the nine screws to free the top cover as shown in Figure 1. After the cover is open, lift it gently to reach the speaker wire connector. Unplug the speaker then set the top cover aside in a safe place.

**⚠ Whenever you remove screws from a panel, if one screw seems too tight to loosen without damaging it, first loosen the other screws then try again. Sometimes one screw binds in its hole when the other screws are tightened.**

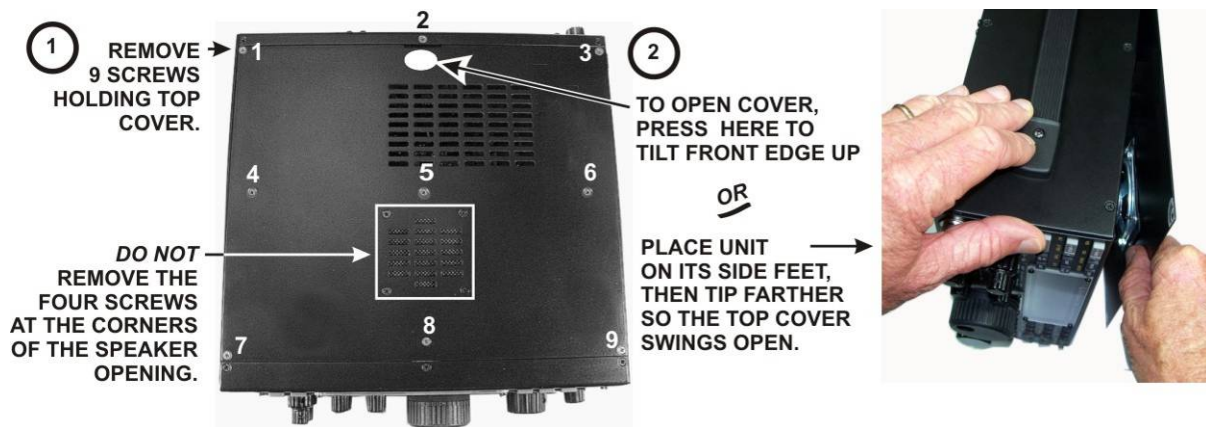


Figure 1. Removing K3 Top Cover.

**⚠ CAUTION:** Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3. See *Preventing Electrostatic Damage Discharge* on page 4 for more information.

## Removing the K144XV 2-Meter Module

If you do not have the K144XV 2-meter option installed, skip this section and go to *Removing the KRX3A or KRX3 Sub Receiver Module* on page 8.

Remove the stiffener bar that runs from side to side across the top of the K3 chassis. This is the bar the three screws across the center of the top cover thread into. The bar is held in place by a single screw at each side and, if the KPA3 100 watt option is installed, by two screws attaching it to the KPA3 shield. Some KPA3 shields have PEM nuts permanently attached to the shield for the screws. Others use ordinary nuts that must be removed with the screws and lock washers.

The K144XV module is mounted on the left side panel of the K3. Remove the five screws shown in Figure 2 and lift the top cover off of the module. Note: Some units may have a sixth screw in the hole near the Elecraft name on the top cover that must be removed.

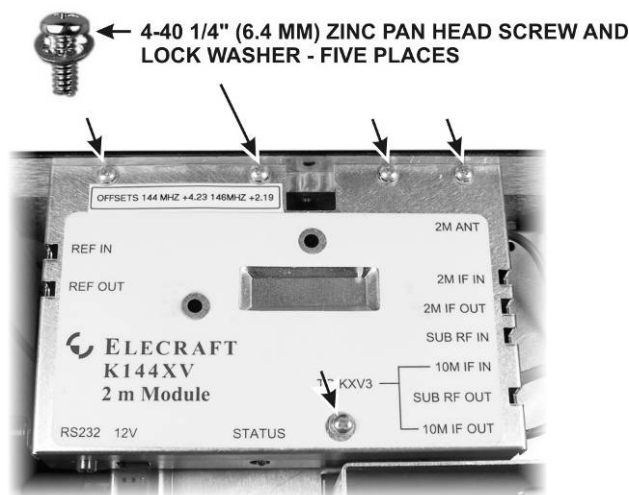


Figure 2. Removing the K144XV Top Cover.

Unplug the coaxial cables and the power connector attached to the K144XV module. Pull on the metal part of the TMP coaxial connectors. Do not pull on the cables.

Remove the three 6-32 screws that secure the K144XV module to the side panel. Hold the module to keep it from falling if the KRX3 sub receiver is not installed. Lift the module out, set the top cover on it to protect it, and set it aside in a safe place.

## Removing the KRX3A or KRX3 Sub Receiver Module

If you do not have the sub receiver installed, go directly to *Removing the Bottom Covers and KIO3A/KIO3 Board* on page 9. The sub receiver module is the “L” shaped metal enclosure (see Figure 3). Remove the sub receiver module as follows:

Remove the chassis stiffener bar that runs across the top of the K3 chassis and is attached to the side panels. If the KPA3A/KPA3 is installed, the stiffener will be attached to the shield by two screws. These screws may have nuts and lock washers or they may thread into permanently-attached PEM nuts on the stiffener bar.

Remove the two 1-1/2” (38 mm) screws and lock washers shown in Figure 3. These screws extend all the way through the sub receiver module and secure it to standoffs mounted on the main RF board that fills the bottom of the K3.

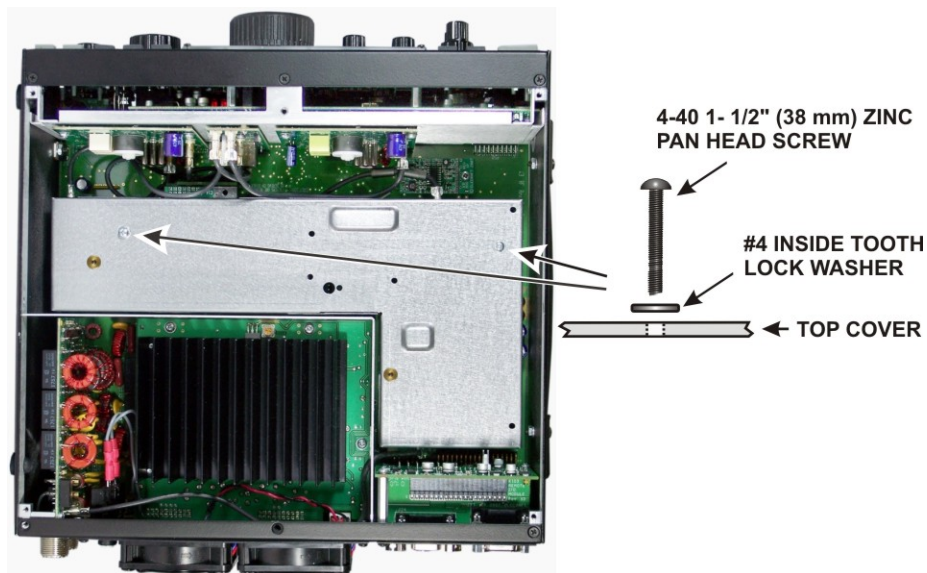


Figure 3. Removing the KRX3A or KRX3 Module.

**⚠** In the following steps you will handle small TMP coaxial connectors. These are friction-fit connectors shown in Figure 4. Handle the connectors by the grips as shown. *Do not pull on the coaxial cable.*



Figure 4. TMP Cable Connectors.



- Hold the sub receiver module by the two brass knurled nuts on the top, and lift it straight up to gain access to the small TMP coaxial connectors plugged into the module. There are two along the front. There may be one at the back as well, depending upon the options installed. As you lift the module, it will unplug from two small interface circuit boards. One is at the front and the other is at the rear. These small boards may come out with the module or they may remain attached to the K3 main RF board.
- Unplug the TMP coaxial cables leading to the sub receiver module, then lift the module free and set it aside.
- Locate the two small interface circuit boards, remove them and put them in a safe place.

## Removing the Bottom Covers and KIO3A/KIO3 Board

**⚠** If you are replacing a previously-installed KXV3 with the KXV3B, you will not need to remove the bottom covers and install a new TMP cable or cut jumpers W1 and W2 as described in the following steps. Simply remove the existing KXV3 board and replace it with the KXV3B using the existing TMP cable.

- Remove the Digital I/O module from the KIO3A or KIO3 Board at the rear of the K3 as shown in Figure 5.

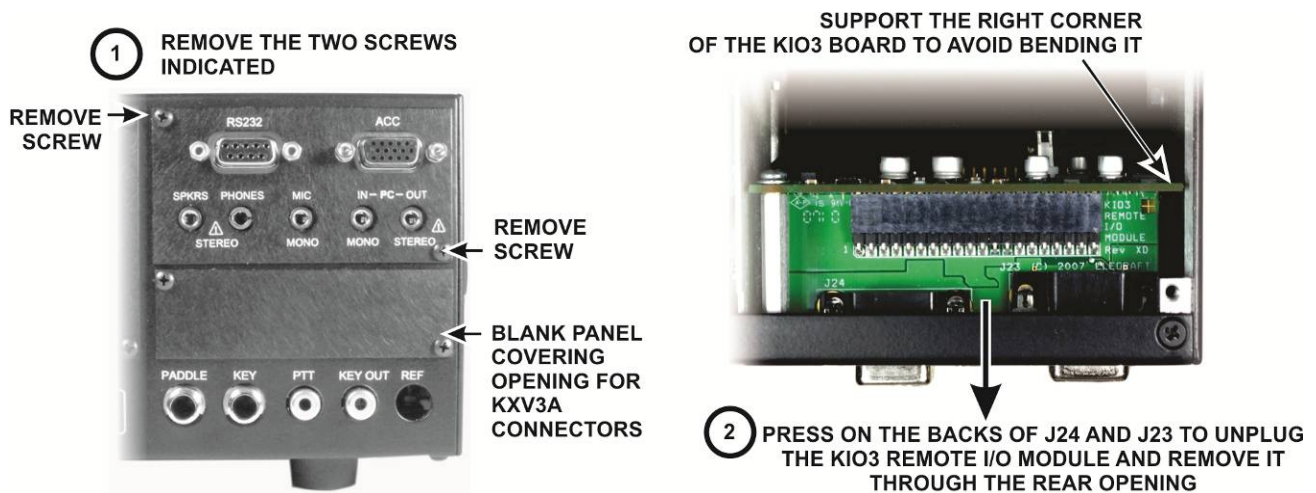


Figure 5. Removing the Digital I/O Module.

- Tilt the top of the KIO3 or KIO3A Main board toward the front panel gently so the standoff at the top clears the lip on the rear panel, then use the standoff at the top to lift up on the board while rocking it from side to side to unplug the connector.
- Remove the blank panel covering the space for the KXV3B module (see Figure 5). This panel will not be replaced.
- Turn the K3 upside down and remove the bottom covers (see Figure 6).

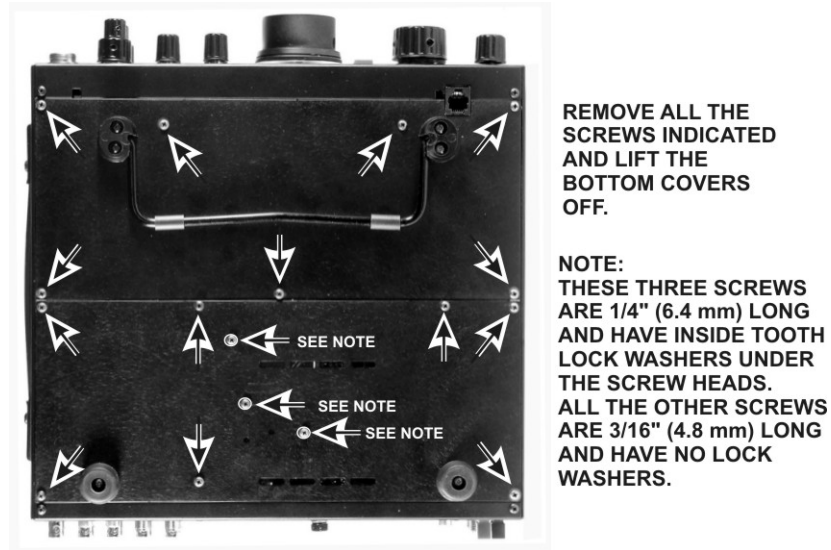


Figure 6. Removing the Bottom Covers.

## Installing the KXV3B Board

**⚠ SPECIAL NOTE TO KIT BUILDERS:** If you were directed here to install your KXV3B module as part of the overall kit assembly, begin with the following step.

- Remove jumpers W1 and W2. The jumpers may be wires plugged into connector J66, or they may be wire jumpers soldered to pads on the RF board (see Figure 7). If soldered to the board, take care not to lose any pieces of wire inside the K3. No more than 1/8" (3mm) of lead length should be left to avoid the possibility of shorting to a nearby circuit. **Take care to identify the correct jumpers. Do not cut nearby jumpers W20 or W21!**

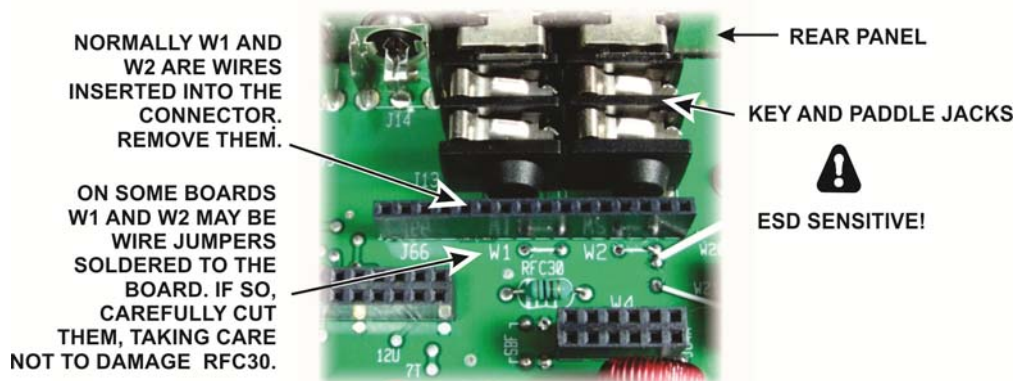


Figure 7. Removing Jumpers W1 and W2.

- Inspect the white connector at the end of the TMP cable. The side nearest the connector holes must be smooth and flat. Use your diagonal cutters or a hobby knife to cut away any bumps or ridges (see Figure 8).



Figure 8. Preparing TMP Cable for Installation.

**⚠ CAUTION:** The KXV3B board is ESD sensitive. Wear a grounded wrist strap or touch an unpainted metal ground before handling it.

- Remove the KXV3B board assembly from its packaging. If the black panel is mounted on the assembly, remove it. Set the screws and washers aside to be installed later.
- Fit the TMP coaxial connector onto J87 on the KXV3B board assembly (see Figure 9).
- Thread the square connector on the TMP cable through the gap between Q3 and the side of the RF board, then plug the KXV3B board assembly into J66 on the RF board with the BNC connectors facing out through the rear panel (see Figure 9). The pins will just clear the top of J66 when the BNC connectors are up against the top of the opening in the rear panel.

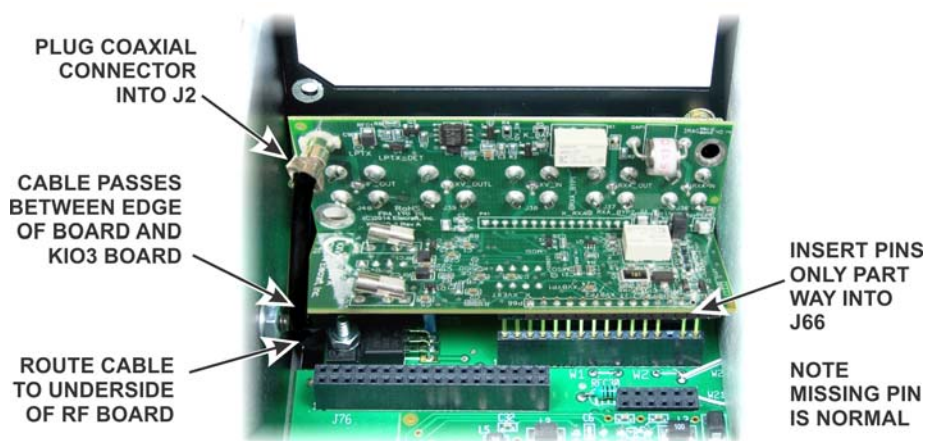


Figure 9. Mounting KXV3B Board.

- Push the connector pins into J66 only as far as needed so the holes in the KXV3B connector bushings are aligned with the holes in the back panel as shown. These connectors do not fully mate and the bushings hold the board away from the rear panel.

**⚠ As you install components and reassemble your K3, be sure all the screws are in place and secure, but do not over tighten them. Failure to tighten all screws may result in poor shielding of sensitive components, resulting in possible noise or birdies in the receiver as well as other difficult-to-trace problems.**

Mount the KXV3B rear panel over the BNC connectors using two 4-40 1/2" (13mm) black pan head screws through the corner holes with #4 inside tooth lock washers and 4-40 nuts on the inside as shown in Figure 10. Do not fully tighten the nuts yet.

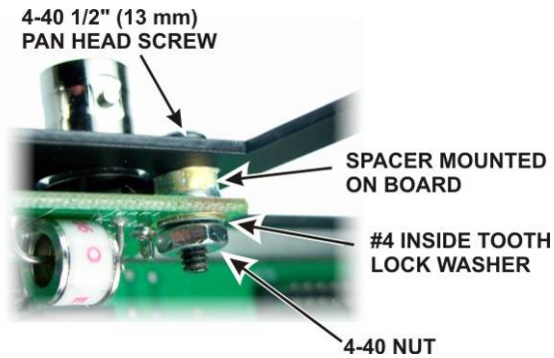


Figure 10. Mounting Hardware.

Adjust the depth the KXV3B board connector mates J66 on the RF board so the KXV3B connector panel is parallel with the back panel. The pins on the KXV3B board connector do not go all the way into J66 as shown in Figure 11.

  
ESD SENSITIVE!

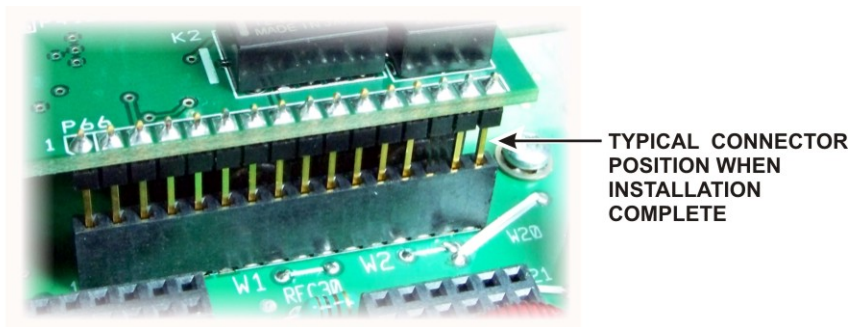


Figure 11. Typical Connector Fit.

Tighten the screws and nuts holding the KXV3B to the back panel that you installed earlier (See Figure 10)

Route the coaxial cable from the KXV3B board to connector P86 on the bottom of the RF board as shown in Figure 12. Mate the connector to P86 as shown. If the connector does not appear to fit, check to make sure there are no plastic ridges on the side toward the RF board (see Figure 8).

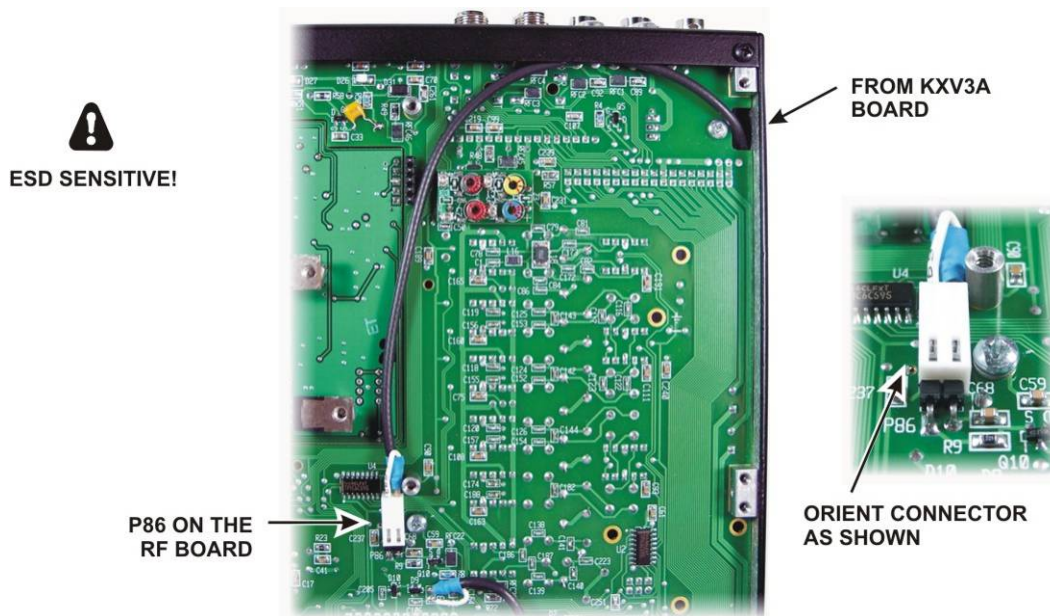


Figure 12. Routing KXV3B Cable to P86.

**⚠ SPECIAL NOTE TO KIT BUILDERS:** If you were directed here to install your KXV3B module as part of the overall kit assembly, installation of the KXV3B module is complete. Return to the K3 Kit Assembly Manual where you left off.

## Reinstalling the KIO3A/KIO3 Board

Replace both bottom covers using the 4-40 black pan head screws you removed earlier. Note that three locations take the 4-40 1/4" (6.4 mm) black pan head screws with lock washers as shown in Figure 6, while the remainder are 4-40 3/16" (4.8 mm) screws. Be sure to replace these screws in the correct locations. Make sure all the screws are secure, but do not over tighten them/

### CAUTION!

**Failure to replace the three 1/4" (6.4 mm) screws with their lock washers in the locations shown in Figure 6 may destroy the power transistors in your K3!**

☐ Check the KIO3A/KIO3 board and ensure the screws holding the two standoffs are tight. Also check to ensure the connector on the audio I/O daughter board is fully mated with J91 on the KIO3A/KIO3 Main board (see Figure 13).

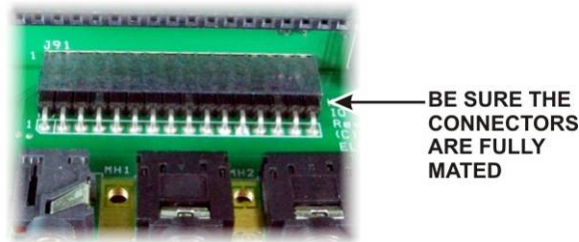


Figure 13. Check KIO3/KIO3A Audio I/O Board Mating.

☐ Replace the KIO3A/KIO3 Main Board with the audio I/O daughter board attached in the K3 as shown in Figure 14. The audio I/O board fits just over the KXV3B board assembly and the TMP cable passes through the space between the edge of the KXV3B board and the KIO3 board. Ensure the KIO3A/KIO3 connectors are fully mated so the standoffs line up with the holes in the rear panel.



Figure 14. Installing KIO3/KIO3A Main Board.

☐ Plug the KIO3A/KIO3 digital I/O daughter board into the KIO3 main board as shown in Figure 15. Be careful to support the KIO3 main board as shown while pressing the daughter board in place.

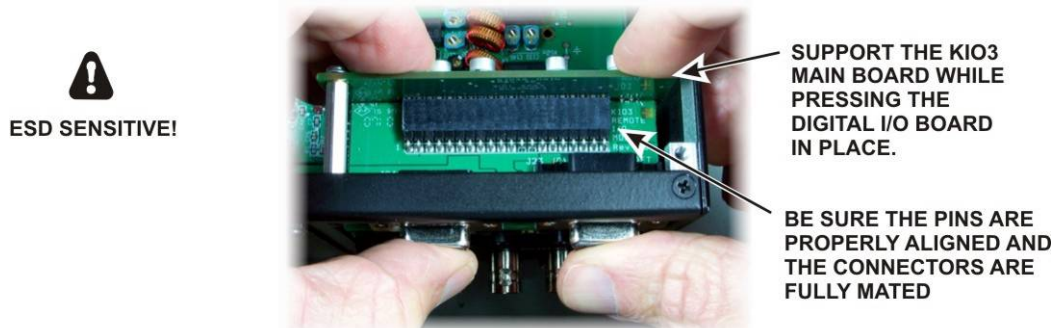


Figure 15. Installing the KIO3A/KIO3 Digital I/O Board.

Replace the screws in the digital I/O daughter board panel as shown in Figure 16. A KIO3 digital I/O daughter board is shown. A KIO3A digital I/O board has only one DB connector.

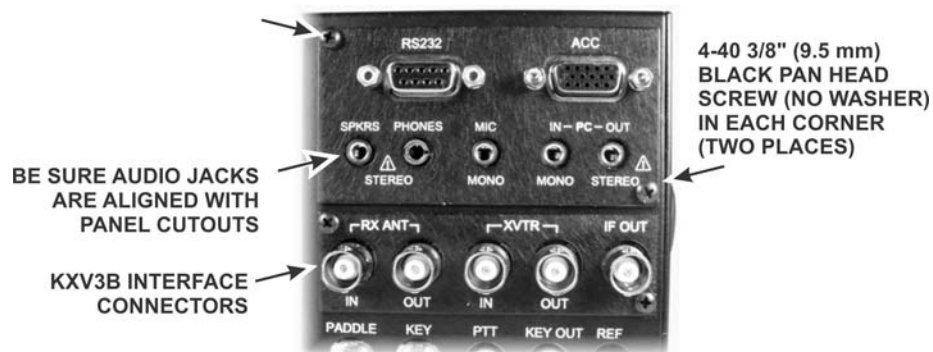


Figure 16. Mounting the Digital I/O Board and Rear Panel.

If your K3 is equipped with the KRX3A or KRX3 sub receiver, turn to your *Sub Receiver Installation and Operation* manual, *Installing the Sub Receiver Module* section to replace the sub receiver module. Be especially careful to do the following as described in that procedure:

- Be sure the cover on battery BT1 on the K3 RF board is in place. The cover is essential to avoid shorting the battery. The outer rim of the battery is the positive terminal, and may come in contact with the grounded bottom of the KRX3 enclosure if the cover is not in place. Note that if you are replacing a KXV3B module in a K3S transceiver the K3S uses a different battery holder that lies flat on the RF board and does not require the cover.
- Be sure all the TMP cables are properly connected or your K3 will not operate properly.
- Be sure the TMP cable to J85 on the sub receiver module is routed as shown to prevent signal leakage between the KRX3 and the K3 main receiver.

If your K3 is equipped with the K144XV option and you removed the K144XV module earlier, replace it and the stiffening bar that runs across the top of the K3 now. Refer to your K144XV manual for instructions for reconnecting the power and coaxial cables and replacing the module cover. If you find more cables than shown in the K144XV manual, your unit has the K144 Reference Oscillator Phase Lock option installed. Refer to that manual to connect the remaining cables.

## Replacing the Top Cover

Route the speaker wire under the stiffener bar and plug it into the KIO3A or KIO3 board as shown in Figure 17. If your K3 has the K144XV 2-meter option, route the speaker cable under the stiffener bar at the depression in the top of the K144XV module as shown in the figure.

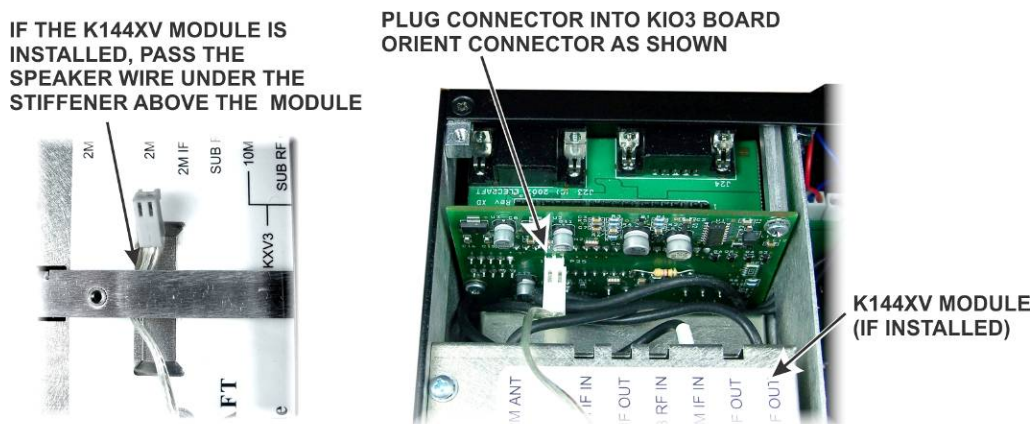


Figure 17. Connecting Speaker Cable.

- Position the top cover on the K3. Note that the tab on the back center goes under the rear lip of the K3 rear panel. Secure the top cover with the nine 4-40 3/16" (4.8 mm) black flat head screws you removed earlier.

### **⚠ REPLACE ALL THE SCREWS!**

**The K3's chassis has excellent rigidity despite its light weight. The screws that hold the top cover in place are an important part of the structural design. Please be sure to replace all the screws and verify they are tight whenever you replace the cover or other panels**

## Enabling the KXV3B Module

**⚠ Your KXV3B will not operate correctly until the following steps are completed.**

- Reconnect power to your K3 and turn it on.
- Check the level of firmware installed in your K3 as described in your K3 Owner's manual. You must have firmware level 05.26 or higher installed before proceeding.
- Enable and test the KXV3B as follows:
  - Hold **CONFIG** to enter the configuration menu.
  - Turn VFO B to display *KXV3* on the LCD. If the display reads *KXV3B* and *nor*, the interface is installed and enabled. Go directly to the next checkbox step to set up Preamplifier 2. If the display reads just *KXV3* (no B), turn VFO A as needed to display *nor*.
  - Tap **9** on the numeric keypad. The B should appear so the display reads *KXV3B*.
  - Exit the menu.
  - Tap **POWER** to cycle the power off, then on again.



After you have completed the previous steps, set up preamplifier 2 as follows. Preamplifier 2 is an ultra-low noise preamplifier that provides an extra 20 dB of gain on the 12, 10 or 6 meter bands. See your K3 Owner's manual, *Preamp and Attenuator Controls*, for more information.

- Tap **BAND** to select the 12, 10 or 6 meter band.
- Hold **CONFIG** to enter the configuration menu.
- Turn VFO B to display *PREAMP2* on the LCD.
- Turn VFO A to select either *On* or *OFF*. This setting is per-band, so repeat the above to set preamp 2 for the remaining bands as desired. You do not need to cycle the power after configuring the preamp 2 settings.

## 1 mW TX Gain Calibration

**⚠ This calibration is essential for your KXV3B to operate properly with the internal K144XV 2 meter option or any equipment using the RF output available at the rear-panel XVTR connector.**

If you do not have a computer, perform the manual *Milliwatt TX Gain Calibration* procedure in the *Calibration Procedures, Transmitter Gain* section of your Owner's manual.

If you have a Windows, Linux or Macintosh computer and an internet connection, perform the automated TX Gain calibration using the K3 Utility program as follows. You will need suitable cables to connect your K3 to your computer as described under Introduction on page 3.

Perform the TX gain procedure as follows:

- Ensure you have the Elecraft K3 Utility Ver. 1.1.12.29 or later on your computer (run the utility and then click on Help/About to check the version). The latest utility is available for downloading from the Elecraft web site: [www.elecraft.com](http://www.elecraft.com)
- Connect your computer to your K3 via the RS232 or USB port and start the K3 Utility program.
- Click on the K3 Utility “Calibration” tab, “Calibrate Transmitter Gain...” and follow the instructions to perform the 1 Milliwatt Transmitter Gain Calibration procedure.

That completes the installation of the KXV3B interface in your K3 transceiver.