



# ELECRAFT® K3S

HIGH-PERFORMANCE

160 – 6 METER TRANSCEIVER

KPA3A 100-WATT AMPLIFIER OPTION  
INSTALLATION INSTRUCTIONS

Rev B, September 30, 2015  
Copyright © 2015, Elecraft, Inc.

All Rights Reserved

E740267

# Contents

Introduction.....	3
Customer Service and Support.....	3
Technical Assistance.....	3
Repair / Alignment Service.....	3
Preventing Electrostatic Discharge Damage.....	4
Choosing an Anti-Static Mat.....	4
Preparing for Installation.....	5
Tools Required.....	5
Parts Included.....	5
Installation Procedure.....	8
Removing the KRX3A/KRX3 Sub Receiver Module.....	10
Removing the KNB3 Module.....	11
Installing the KPA3A Shield.....	12
Installing the KPAIO3A Interface Module.....	13
Assembling the Fan Panel.....	15
Installing the KPA3A Amplifier Module.....	17
Installing the Fan Panel.....	17
Replacing the KNB3 Module.....	19
Replacing the KRX3A/KRX3 Module.....	19
Replacing the Covers.....	20
Configuring and Calibrating the KPA3A.....	21
Circuit Description.....	22
KPAIO3A.....	22
KPA3A Fan Panel.....	22
KPA3A Power Amplifier.....	22

 Elecraft manuals with color images may be downloaded from [www.elecraft.com](http://www.elecraft.com).

## Introduction

This manual covers the installation of the KPA3A 100-watt amplifier option in your K3S or K3 transceiver. Only a few basic hand tools are needed (see page 5) to perform the installation. No soldering or wiring is required.

The KPA3A option consists of three subassemblies: the KPA3A power amplifier, a fan panel, and the KPAIO3A interface module. More details about the KPA3A are provided under *Circuit Description* on page 22.

## Customer Service and Support

### **Technical Assistance**

You can send e-mail to [support@elecraft.com](mailto:support@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 in Aptos. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Aptos without authorization will incur an additional shipping charge for reshipment from Aptos 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. Small diagonal cutters.
3. Needle-nose pliers.
4. 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.

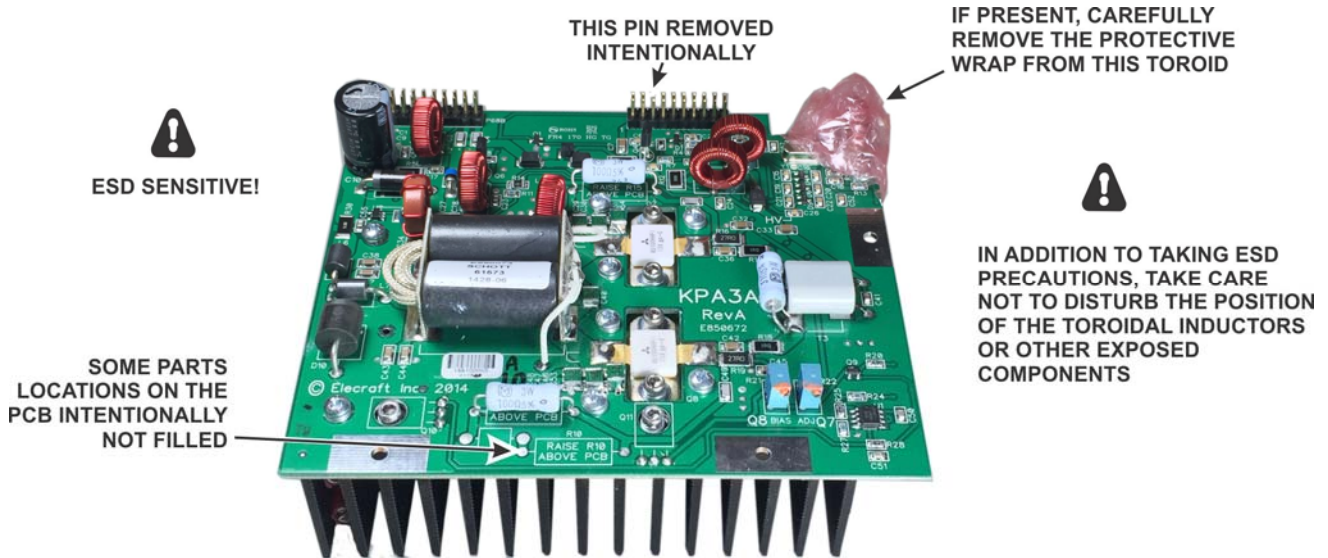
## Parts Included

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).

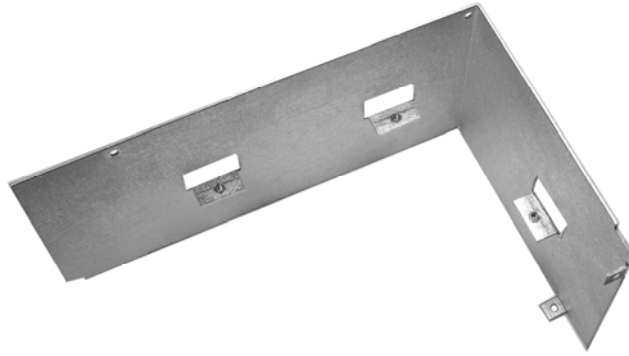
### CAUTION

**In addition to taking ESD precautions, be careful not to damage components on either side of the circuit boards when handling them. This is especially true of the KPA3 module because of the weight of the heat sink.**







### *Ei50673 KPA3A Module*



***E100217 KPA3A Shield***



***E850299 K3/100 Hardware for KPA3 (Envelope)***

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	Screw, 4-40, 1/4" (6.4 mm) Zinc, Pan Head	8	E700005
	Screw, 4-40, 3/8" (9.5 mm) Black, Flat Head	1	E700176
	Screw, 4-40, 1/4" (6.4 mm) Black, Pan Head	1	E700174
	Lock Washer, #4 Internal Tooth	8	E700183
	Lock Washer, #4 Split	4	E700004
	Nut, 4-40	1	E700011

**KPAIO3A Interface Module, E850679**



**E850320 KPAIO3 Envelope**







ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	Screw, 4-40, 1/4" (6.4 mm) Zinc, Pan Head	1	E700005
	Standoff, 4-40, 5/16" (7.9 mm) long	1	E700121
	Lock Washer, #4 Split	2	E700004

**E850277 KPA3 Fan Panel Assy (Bag)**

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	Fan with short lead	1	E850293
	Fan with long lead	1	E850294
	Fan Panel	1	E100288
	Circuit Breaker, 20A	1	E980128



## E850318 KPA3 Hardware Envelope

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	Finger Guard	2	E980143
	Screw, 4-40, 1/4" (6.4 mm) Black, Pan Head	1	E700174
	Screw, 4-40, 1/4" (6.4 mm) Zinc, Pan Head	9	E700005
	Screw, 4-40, 3/8" (9.5 mm) Black, Flat Head	1	E700176
	Screw, 4-40, 7/8" (22 mm) Black, Flat Head	8	E700179
	Acorn Nut, 4-40	8	E700160

## Installation Procedure

**⚠ K3S/K3 KIT BUILDERS:** If you were directed here to install the KPA3A module as part of the initial assembly, begin here to complete the installation. Skip over the steps indicated.

- Disconnect power and all cables from your K3S/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 and set the top cover aside in a safe place.

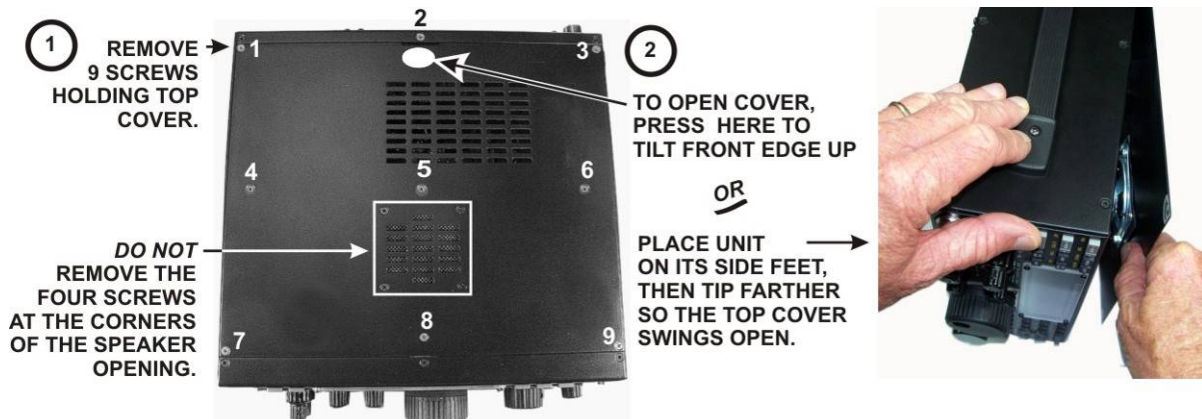


Figure 1. Removing K3S/K3 Top Cover.



**⚠ CAUTION:** Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3S/K3. See *Preventing Electrostatic Discharge Damage* on page 4 for more information.

□ On the rear of the K3S/K3, remove the large blank panel above the GND screw. This panel will not be used again, but the screws will be needed to mount the cooling fans. (If you are installing the KPA3A as part of building your K3S/K3 kit, this panel may not be installed.) The panel has a hole marked ANT3 for the antenna connection to the optional K144XV 2-meter module. If you do not have the K144XV option, a plastic plug will fill this hole. Remove the plug or the antenna connector. To prevent accidental short circuits, either tape the metal end of the BNC connector or unplug the cable from the K144XV module and remove it entirely for now.

□ Turn the K3S/K3 upside down and remove the bottom cover(s) as shown in Figure 2. Note that, if you are finishing the KPA3A installation after assembling your K3S/K3 kit, only the rear portion of the bottom cover needs to be removed.

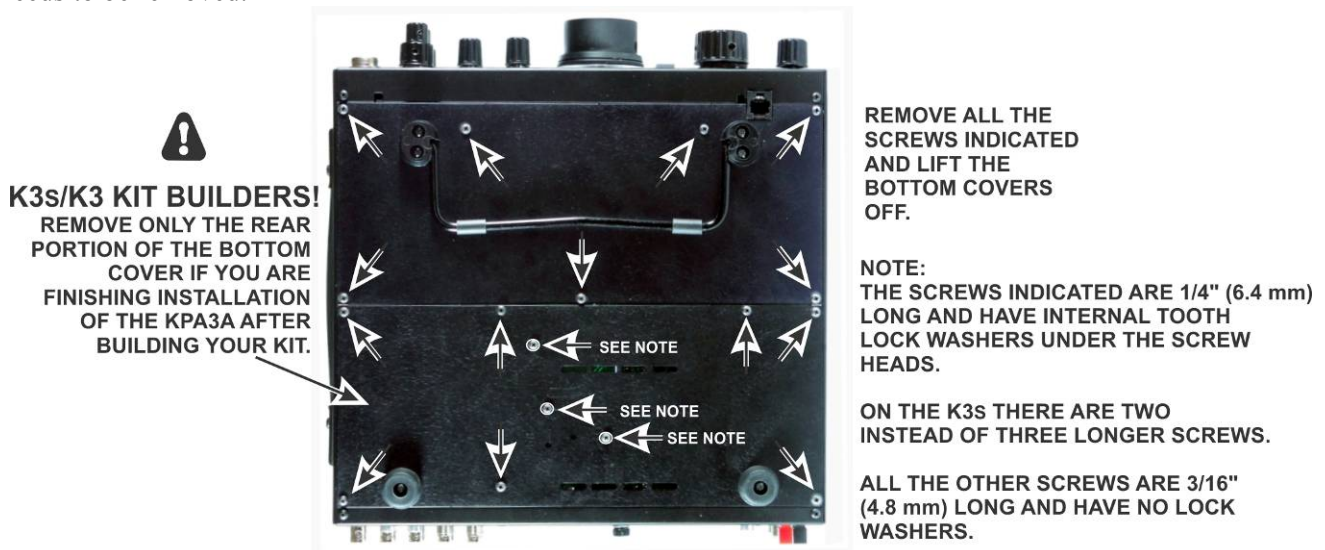


Figure 2. Removing the K3S/K3 Bottom Covers.

**⚠ K3S/K3 KIT BUILDERS:** If you are installing the KPA3A as part of the initial K3S/K3 kit assembly, skip the following steps and resume with *Installing the KPAIO3A Interface Module* on page 13

Remove the stiffener bar that runs from side to side across the top of the chassis. This is the bar the center three screws in the top cover thread into. The bar is held in place by a single screw at each side.

## Removing the KRX3A/KRX3 Sub Receiver Module

If your K3S/K3 is equipped with the optional sub receiver, you must remove the sub receiver module to install the KPA3A shield. The sub receiver module is the “L” shaped metal enclosure shown in Figure 3. The K3 in the figure has a KPA3A 100 watt amplifier and shield installed showing how it fits next to the sub receiver module.

Remove the sub receiver module as follows:

- Remove the chassis stiffener bar that runs across the top of the chassis and is attached to the side panels.
- 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 K3S/K3.

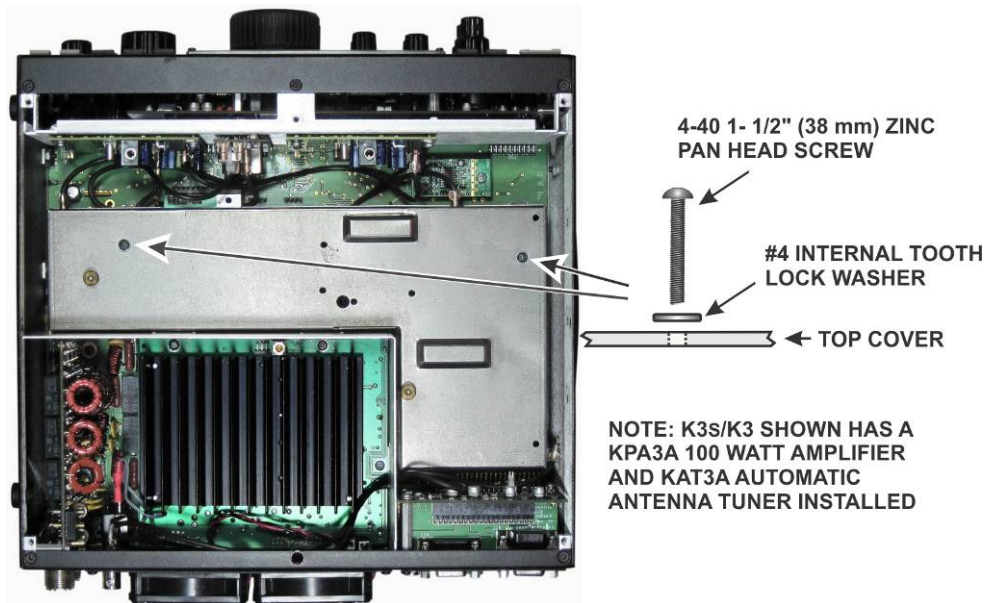


Figure 3. Removing the Sub Receiver Module.

**⚠ 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.**

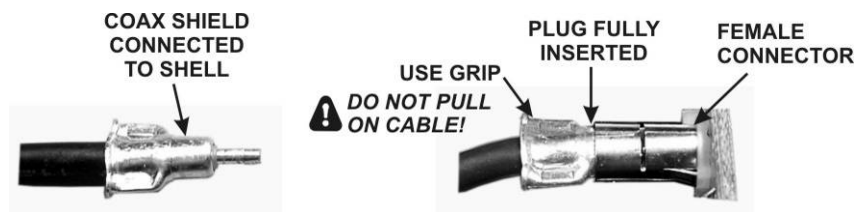


Figure 4. TMP Coaxial Connectors.

- 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 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 that fit between the connectors on the sub receiver module and the connectors on the RF board. Remove them and put them in a safe place.
- Unplug and remove the loose TMP cables that were connected to the sub receiver module. If your K3S/K3 is equipped with a cable connected to a BNC connector at the rear panel AUX RF input, this cable will not unplug. It is permanently attached to the BNC connector. Wrap the metal TMP connector in insulating tape to ensure it cannot short to any circuits.

**⚠ CAUTION:** You will apply power to make tests before reinstalling the sub receiver module again. If the loose cables are not removed or insulated to prevent shorts as described in the previous step, you may destroy circuits in your K3S/K3 when you apply power.

## Removing the KNB3 Module

KNB3 module must be removed to provide clearance needed to install the KPA3A shield in the following section.

- Remove the KNB3 module, the standoff, screw and washers from the RF board (see Figure 5). They will be reinstalled later.

**⚠ CAUTION:** The KNB3 module is ESD sensitive. Put it in a safe place until you reinstall it.

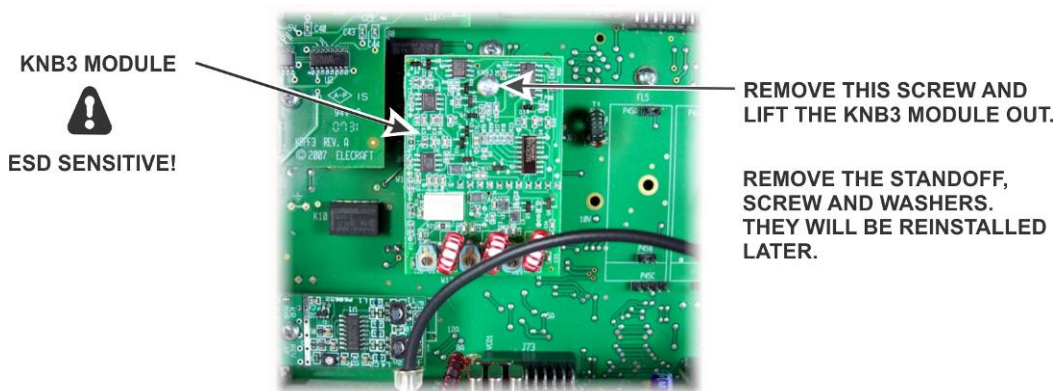


Figure 5. Removing the KNB3 Module.



## Installing the KPA3A Shield

- Remove the three screws, washers and standoffs (on the bottom of the RF) board shown in Figure 6. Save the lock washers and standoffs. The screws will not be reused.

REMOVE THE SCREWS  
WASHERS AND (ON THE  
BOTTOM OF THE RF BOARD)  
THE STANDOFFS.

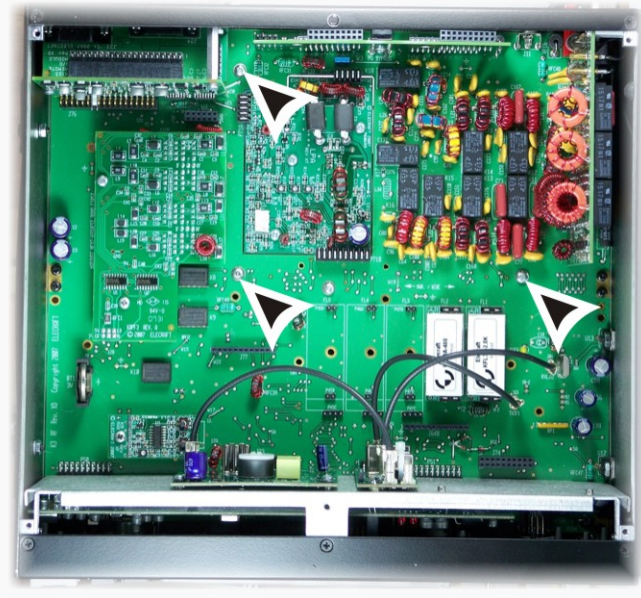


Figure 6. Rear Shield Mounting Screw Locations.

- Set the rear shield in place as shown in Figure 7.



SET THE SHIELD ON THE RF BOARD WITH  
THE REAR FOOT ABOVE THE LPA BOARD  
CONNECTOR, THEN MOVE IT BACK UNTIL  
THE REAR FOOT SITS ON THE THE  
RF BOARD AND THE SHIELD IS AGAINST  
THE REAR PANEL.

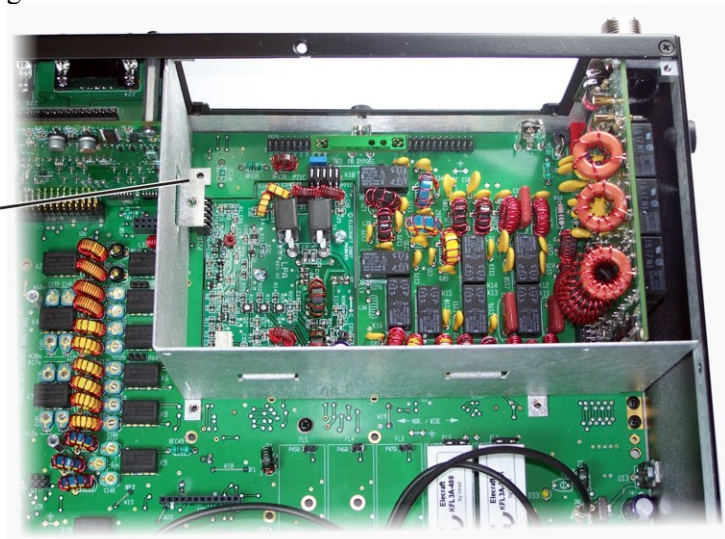


Figure 7. Positioning the Rear Shield.

- Loosely secure the rear shield with three 1/4" (6.4 mm) zinc pan head screws, the lock washers and standoffs you removed earlier as shown in Figure 8.

Place a black 4-40 3/8" (9.5 mm) flat head screw through the hole in the back panel and the tab at the top edge of the shield as shown in Figure 8. Secure it with a #4 inside tooth lock washer and 4-40 nut.

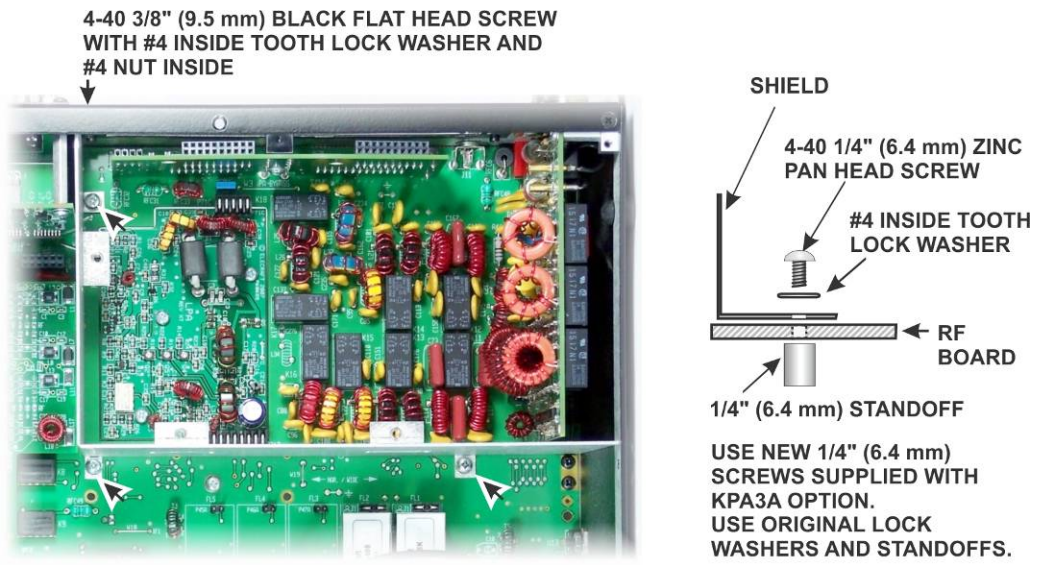


Figure 8. Rear Shield Installed.

Tighten the three screws holding the bottom of the shield and the screw at the top on the back panel. Do not over-tighten but *be sure all four screws are tight. Good contact is essential for the shield to perform correctly.*

### Installing the KPAIO3A Interface Module

**⚠ K3S/K3 KIT BUILDERS:** Resume the installation with the following step.

Locate PA Jumper block mounted on RF board connectors P67A and P67B just inside the opening for the fans. Unplug the Jumper Block. Put the Jumper Block in a safe place. You'll need it if you ever want to operate the K3S/K3 without the KPA3A module installed.

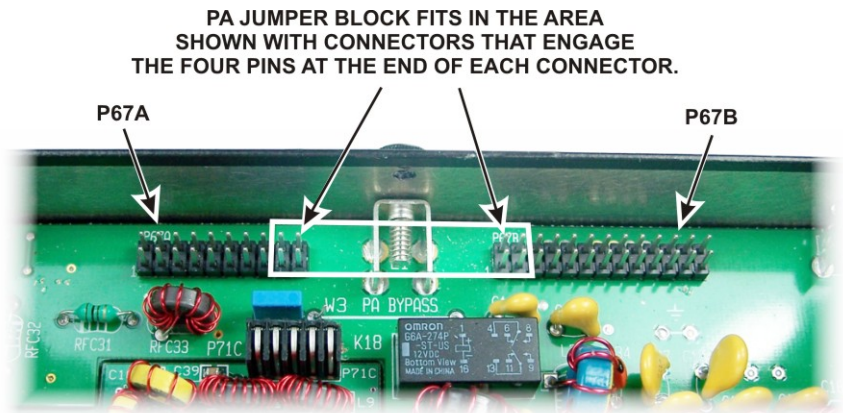


Figure 9. Removing PA Jumper Block.

□ On the KPAIO3A board, install a 5/16" (7.9 mm) 4-40 standoff near K1 as shown in Figure 10. Use the exact hardware shown from the KPAIO3 envelope. This is important so that the height of the standoff is correct when it is mounted in the K3S/K3.

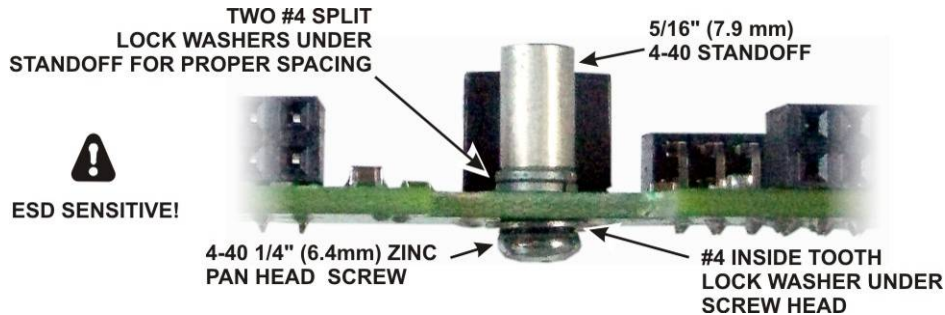


Figure 10. Installing Standoff on the KPAIO3A Board.

**⚠** As you install components and reassemble your K3S/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.

□ If you are adding the KPA3A after assembling your K3S/K3 from a kit, remove the rear section of the bottom cover (see Figure 2 on page 8) in order to properly support the RF board in the following step.

□ Install the KPAIO3A board just inside the opening in the rear panel as shown in Figure 11. Connector J67A on the KPAIO3A mates with P67A on the RF board, and J67B on the KPAIO3A mates with P67B on the RF board. These connectors may fit very tightly. **Press one side then the other as needed to fully mate the connectors while supporting the RF board from below with your fingers.** When the connectors are fully mated, the standoff on the KPAIO3A will line up with the hole in the back panel. Secure the KPAIO3A with a 4-40 1/4" (6.4 mm) black pan head screw. Do not use a washer.

**⚠** If you are installing the KPAIO3A in a K3, you will find there are fewer pins on P67B on the K3 RF board than holes in the mating connector J67B on the KPAIO3A. This is normal. The KPAIO3A is fully compatible with the K3 but these pins are not used by the K3. Install the KPAIO3A so all of the pins of P67A on the K3 RF board mate with J67B on the KPAIO3A board and the screw hole in the K3 rear panel lines up properly with the threaded standoff on the KPAIO3A board.



Figure 11. Installing the KPAIO3A Module.



## Assembling the Fan Panel

□ Locate the fan panel and mount the fans as shown in Figures 12 and 13 using 4-40 7/8" black flat head screws and acorn nuts. Note that the appearance of the fans in your kit may differ slightly from those shown.

1. Orient the fans with the side with the manufacturer's label facing away from the panel.
2. The fans have leads with different lengths. Position them on the panel as shown.
3. As you tighten the acorn nuts, adjust the position of each finger guard so it is straight and aligned with the fan opening.

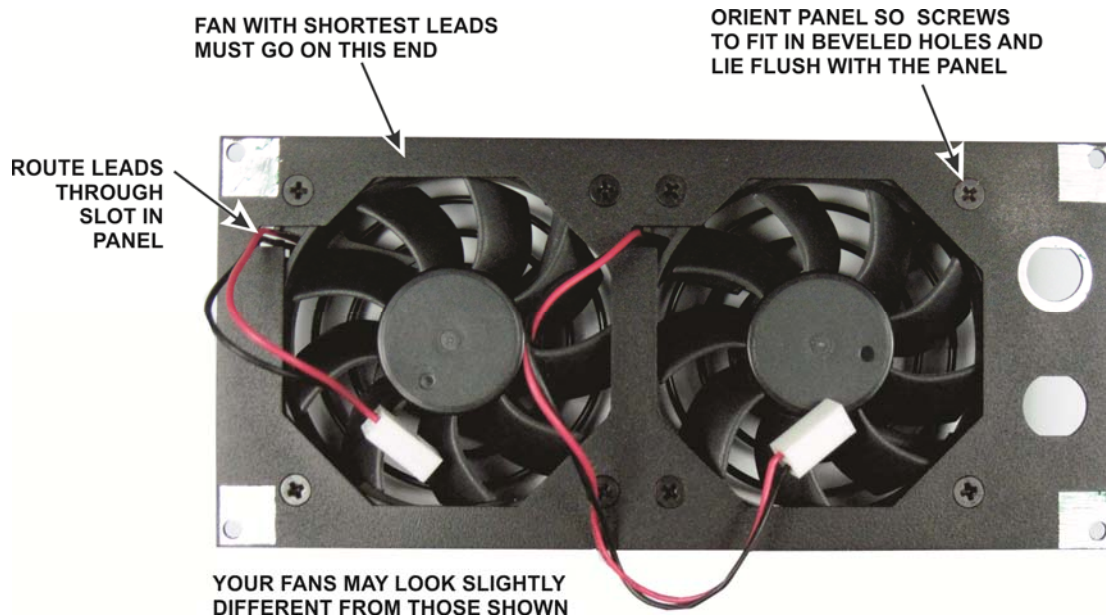


Figure 12. Fan Panel Inside View.

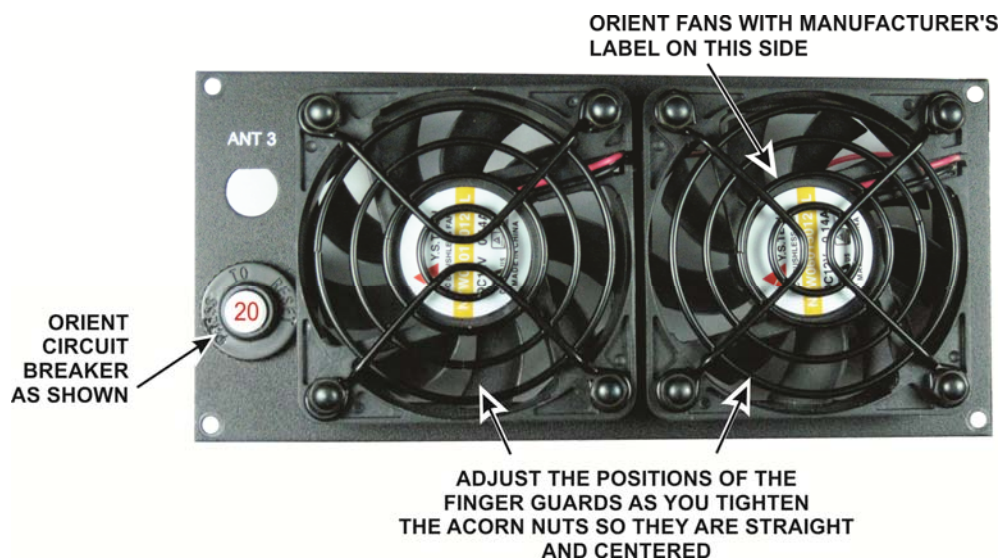


Figure 13, Completed Fan Panel from Rear.

□ Install the 20A circuit breaker in the small hole with the pushbutton on the same side as the fans as shown in Figure 13.



Position the fan panel near the rear opening and plug the fan leads into the connectors in the upper right corner of the KPAIO3 board as shown in Figure 14. Be sure to orient the connectors so the red lead is to the left as indicated on the board. If the connectors don't want to slide onto the pins, check to see if there is any extra plastic on the side facing the board. If so, trim it smooth with a hobby knife or your diagonal cutters.

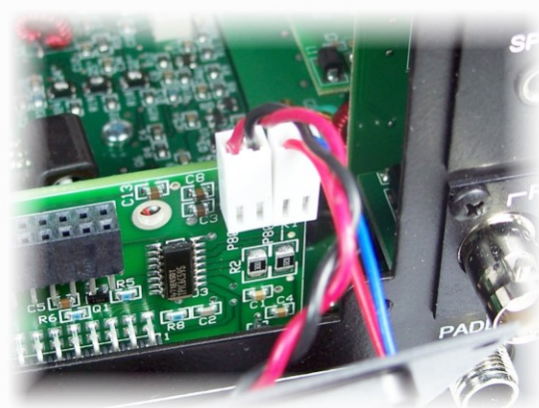


Figure 14. Connecting Fans to the KPAIO3A Board.

**⚠ CAUTION:** If you removed a KRX3A sub receiver module, be sure the loose TMP cables have been removed or the metal TMP connectors are fully insulated with electrical tape before proceeding. Otherwise accidental shorts may destroy circuits in your K3S/K3.

Connect a power supply to your K3S/K3 and test the fans and KPAIO3A interface control as follows:

- Press the POWER button to turn the K3S/K3 on.
- Hold **CONFIG** to select the Configuration menu, then turn VFO B to KPA3A. Normally, the display will indicate *NOT INST* (not installed).
- Turn the VFO A knob to *PAIO ON*, then turn it further to *PAIO TST*. When moving between *ON* and *TST*, you should hear a relay click on the KPAIO3 board. If you don't, press the **POWER** button to switch the K3S/K3 off, then on again and retry the test.
- Turn the VFO A knob on past *TST* to *FN1*, then *FN2*, *FN3* and *FN4*. The fans should start turning at *FN1* and increase speed as you continue to *FN4*.
- Turn the K3S/K3 off and disconnect the power supply.

Unplug the fans and set them aside for now.

## Installing the KPA3A Amplifier Module

**⚠** Your KPA3A module may produce a rattling sound when shaken. This is normal. It is caused by ferrite beads sliding along wire leads in the module.

Carefully remove any packing material from the KPA3A module. A toroid inductor at one corner of the pc board on the component side may have bubble wrap covering it. Carefully remove the bubble wrap. **Be especially careful not to put strain on the toroid while handling and installing the module.**

Place the KPA3A module inside the shield from the top. Mate the two connectors fully with the KPAIO3A board as shown in Figure 15. Like the KPAIO3A to RF board connectors, these connectors may require some force to mate them fully. Place your fingers on the bottom of the RF board, under the connectors to the KPAIO3A board, and squeeze down with your thumbs on the KPA3A board above the connectors until they are fully mated.



Figure 15. Mounting the KPA3A Module.

Secure the KPA3A module to the rear shield tabs with three 4-40, 1/4" (6.4mm) zinc pan head screws. Place a #4 internal tooth lock washer under each screw head.

## Installing the Fan Panel

The KPA3A fan panels have a hole near the circuit breaker marked ANT3 for the antenna connection to the optional K144XV 2-meter module:

- If you are adding the KPA3A to a K3S/K3 that has the K144XV option installed, install the connector and cable you removed from the blank panel earlier in the ANT3 hole in the fan panel. Route the antenna cable along the top of the KPA3A pc board across the opening for the fans and through the opening in the shield near the KIO3/KIO3B board.
- If you do not have the K144XV option, a plastic plug is provided to fill this hole. Use the plug you removed from the hole marked ANT3 in the existing blank panel if you are updating a built K3S/K3. If you are installing the KPA3A while building your kit, the plug will be in the K3S/K3 Miscellaneous Bag.

☐ Position the fan panel you assembled earlier behind the opening at the rear of the K3S/K3 and connect the leads as shown in Figure 16.

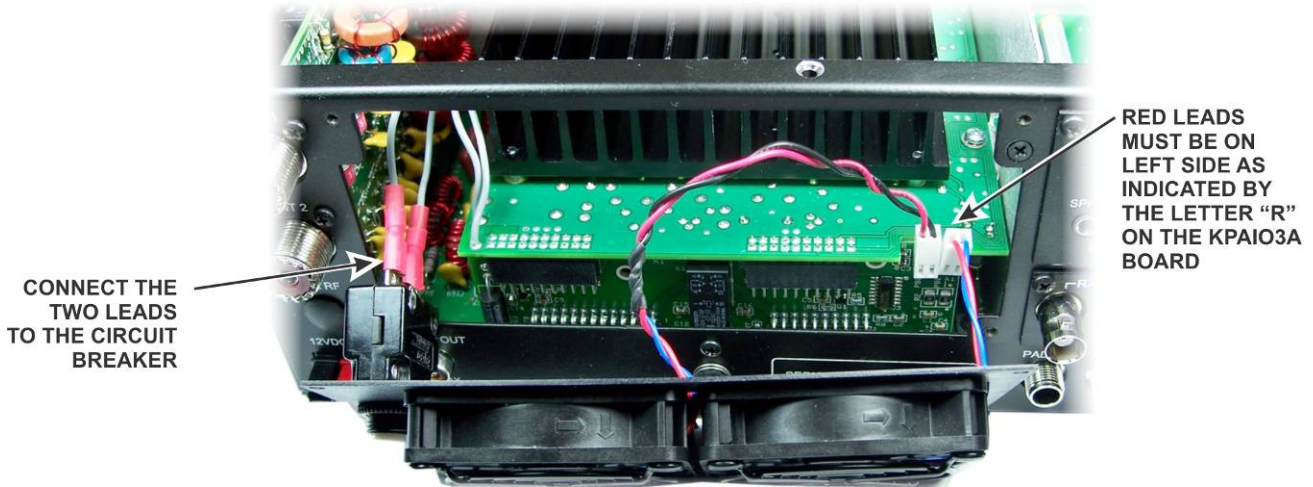


Figure 16. Connecting Fan Panel.

☐ Mount the fan panel on the K3S/K3 using four 3/16" (4.8 mm) black pan head screws as shown in Figure 17. These are the screws you that originally held the blank panel. If you haven't installed the blank panel, the screws are included with basic K3 parts. Do not use washers.



Figure 17. Fan Panel Installed.

- Dress the fan leads so they are well clear of the fan blades. Check to ensure both fans turn freely.

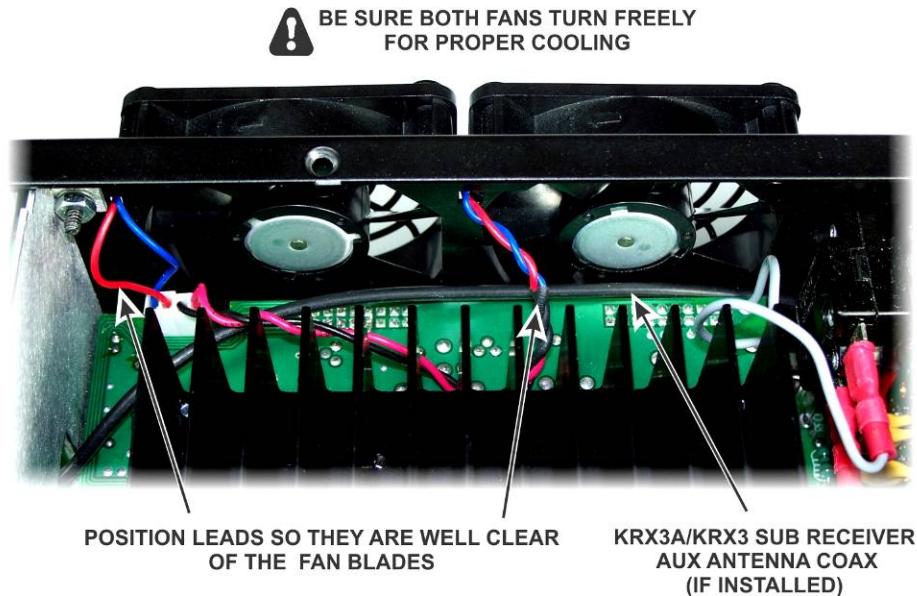


Figure 18. Positioning the Fan Leads.

**! K3S/K3 KIT BUILDERS:** Skip the following steps. Resume with *Replacing the Covers* on page 20.

### Replacing the KNB3 Module

- Replace the standoff and the KNB3 module you removed earlier (see Figure 5). When mounting the standoff on the RF board, be sure to place one lock washer under the screw head on the bottom of the board, and two lock washers between the standoff and the top of the board. A fourth lock washer goes under the screw holding the KNB3 module itself.

### Replacing the KRX3A/KRX3 Module

If your K3S/K3 is not equipped with the sub receiver, go directly to Replacing the Covers below.

- If your sub receiver installation uses the Auxiliary Antenna input, a coaxial cable will be present that runs from the KAT3A/KAT3 or from a connector on the rear panel AUX RF connector. Refer to your *Sub Receiver Installation and Operation* manual, *Auxiliary Antenna Input (Optional)* section for instructions on how to route this cable across the KPA3A enclosure to reach the sub receiver module.
- 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:
  - If you have a K3 (not a K3S), be sure the cover on battery BT1 on the 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 sub receiver enclosure if the cover is not in place. The K3S battery lies flat on the board and needs no protective cover.
  - Be sure all the TMP cables are properly connected or your K3S/K3 will not operate properly.



## Replacing the Covers

### **⚠️ REPLACE ALL THE SCREWS!**

The K3S/K3 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

Replace the bottom cover(s) using the 4-40 black pan head screws you removed earlier. Note that on a K3 three locations take the 4-40 1/4" (6.4 mm) black pan head screws with lock washers while a K3S has only two such screws and lock washers. In both cases the remainder are all 4-40 3/16" (4.8 mm) screws without lock washers (see Figure 2). Be sure to replace all the screws securely, but do not over tighten them!

### **⚠️ CAUTION!**

**Failure to replace the three 1/4" (6.4 mm) screws and lock washers in the locations shown in Figure 2 may destroy power transistors in your K3S/K3!**

If you removed it earlier, replace the stiffener bar and attach it to the KPA3A shield with two 4-40, 1/4" (6.4mm) zinc pan head screws with #4 inside tooth lock washers as shown in Figure 19.

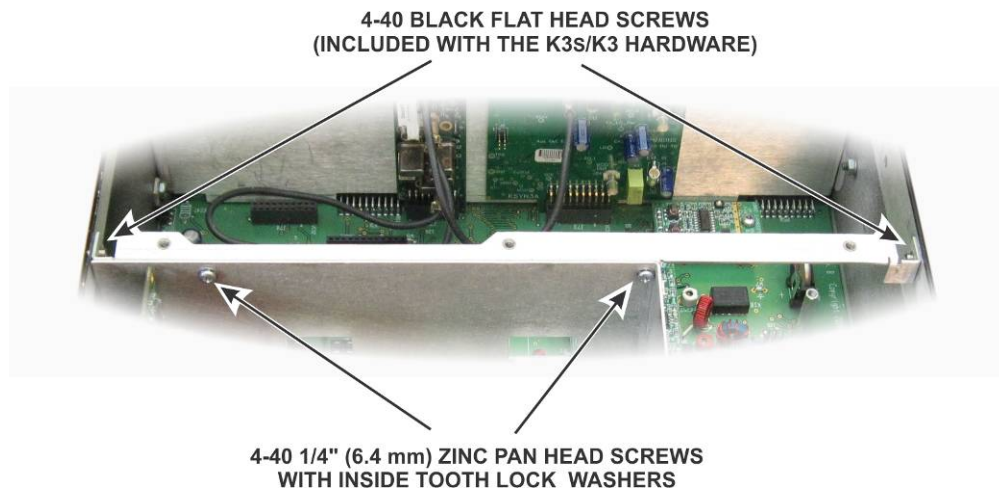


Figure 19. Installing the Chassis Stiffener Bar.

- Hold the top cover above the K3S/K3, route the speaker wire under the stiffener bar and plug it into P25 on the KIO3A/KIO3 board at the left rear as shown in Figure 20.

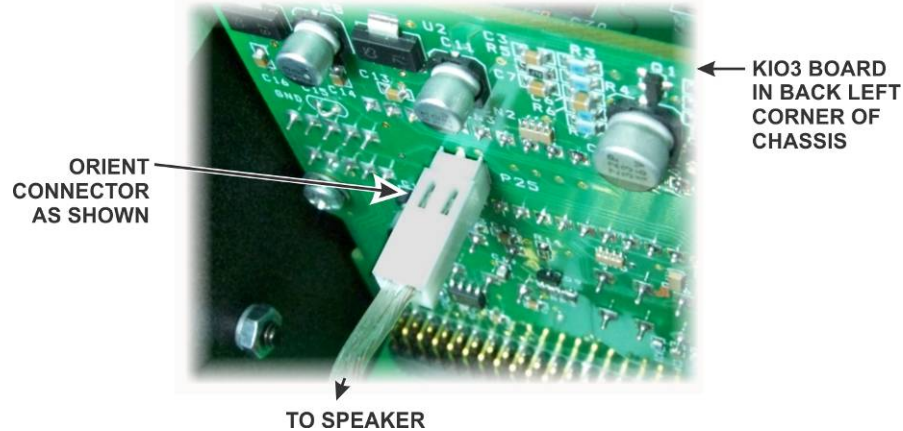


Figure 20. Connecting Speaker Cable.

- Position the top cover on the K3S/K3. Note that the tab on the back center goes under the rear lip of the rear panel. Secure the top cover with the nine 4-40 3/16" (4.8 mm) black flat head screws you removed earlier.

## Configuring and Calibrating the KPA3A

**⚠ Your KPA3A will not operate correctly until the following steps are completed!**

- Reconnect power and a dummy load capable of dissipating 50 watts to your K3S or K3.
- Refer to your Owner's manual, turn on your K3S/K3 and do the following:
  - Enable the KPA3A as described under *Configuration, Option Module Enables*.
  - Perform the *PA Temperature Sensor Calibration* as described under *Calibration Procedures* immediately, while the internal temperature of the K3S/K3 is as close to ambient room temperature as possible.
- Perform the Transmitter Gain Calibration as follows. **This is essential for your KPA3A to operate properly.**

If you do not have a computer, perform the manual *High Power (50W) 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 with an RS232 interface and cable, and an internet connection, perform the automated TX Gain calibration using the K3 Utility program as follows:

- Ensure you have the Elecraft K3 Utility Ver. 1.1.12.28 or later on your computer. The utility is available for downloading from the Elecraft web site: [www.elecraft.com](http://www.elecraft.com)
- Connect your computer to the K3S/K3 RS232 port and start the K3 Utility program.
- Click on the K3 Utility "Configuration" tab, "Calibrate Transmitter Gain..." and follow the instructions to perform the 5-Watt and 50-Watt Transmitter Gain Calibration procedures.

That completes the installation of the KPA3A power amplifier in your K3S or K3 transceiver.

## Circuit Description

The KPA3A option consists of three subassemblies: the KPA3A power amplifier, a fan panel to provide cooling, and the KPAIO3A interface module.

### **KPAIO3A**

The KPAIO3A acts as an interface between the RF board and the KPA3A power amplifier. It includes a relay that allows the KPA3A to be bypassed when it is not needed during low power operation. The cooling fans are also controlled by circuitry on the KPAIO3A. There are four fan speeds, plus OFF, selected automatically based on measurement of the KPA3A heat sink temperature.

### **KPA3A Fan Panel**

Two fans are mounted on this panel, along with a circuit breaker to protect the KPA3A from accidental short circuits. The fan panel is connected to the KPAIO3A fan connectors and to the heavy 12-volt connections of the KPA3A module.

### **KPA3A Power Amplifier**

The KPA3A Power Amplifier consists of two RF power transistors operating as a broadband push-pull amplifier; a PIN diode TR switch; and associated bias and control circuitry. The KPA3A provides the necessary gain to increase the power output of the K3S or K3 from 10 watts to 100 watts from 1.8 MHz and 54 MHz. A heat sink is provided that, together with the cooling fans, provides the necessary cooling to maintain the operating temperature of the output transistors at a safe level.

The KPA3A is mounted in the K3S/K3 with the circuit side of the board down so that only the heat sink is visible after removing the top cover. Each KPA3A is fully tested at the factory and there are no end user adjustments needed during installation.