Pro Audio Engineering

PAE-Kx22 Heatsink

for the Elecraft™ KX2 Transceiver

Installation and Owner's Manual

Rev 4.2
June 11, 2025

Thank you for purchasing the PAE-Kx22 Heatsink for the Elecraft™ KX2 Transceiver.

We designed this heatsink to allow extended transmit time at the KX2's full-power settings, which is especially useful while using digital modes. And while no passive heatsink can allow unlimited key-down time on the KX2, the PAE-Kx22 has been engineered using thermal CAD modeling techniques as well as KX2 transmit testing for maximum performance. The heatsink fins only protrude as far as the BNC on the stock KX2, which means no increase in overall size!

The PAE-Kx22 at more than twice the surface area of stock is the absolute maximum surface area possible without increasing KX2 volume. The Kx22 adds only 22 g of additional mass compared to the stock Elecraft end panel, or 16 g more than the SideKX end panel. The Kx22 allows the KX2 user to retain the portability which is the prime reason Elecraft designed the KX2. With this in mind it has been engineered to be fully compatible with the GEMS products mobile mount and matching the GEMS KX2 End Panels.

For more information on this heatsink and its design and performance capabilities, please visit: www.proaudioeng.com

Howard Hoyt - WA4PSC
www.proaudioeng.com

IMPORTANT NOTES:

1. Please read the entire Installation manual BEFORE picking up any tools or attempting installation of the PAE-Kx22 Heatsink. There are important differences between KX2 versions, and you will need to determine which version you have.

2. The KX2 owner is responsible for all modifications and by installing this heatsink agrees to hold Howard Hoyt and Pro Audio Group, LLC blameless and harmless for any issues which arise as a result.

Installation:

Tools required: #1 Phillips screwdriver, small needle-nose pliers or tweezers, a 12 MM or adjustable wrench, 1/16” (1.6 mm) wide or smaller jeweler’s screwdriver and single-edge blade or X-acto knife.

Although the Kx22 can be installed with the KXAT2 ATU in place, it is easier with the KXAT2 removed. If you choose to do this, please download and study the KXAT2 Builder’s Alert.pdf from Elecraft or the download tab on our Kx22 webpage. You must be very careful when you remove and reinstall it, as the edge of the KXAT2 can catch on and damage some of the components on the band pass filter board standing vertically very close to it.

► Step 1 - Remove the Bottom Panel.

Loosen the two thumbscrews on each side panel a few turns and remove the bottom cover.
Remove the battery, disconnect external power!
Unplug the speaker lead and set the bottom panel aside.

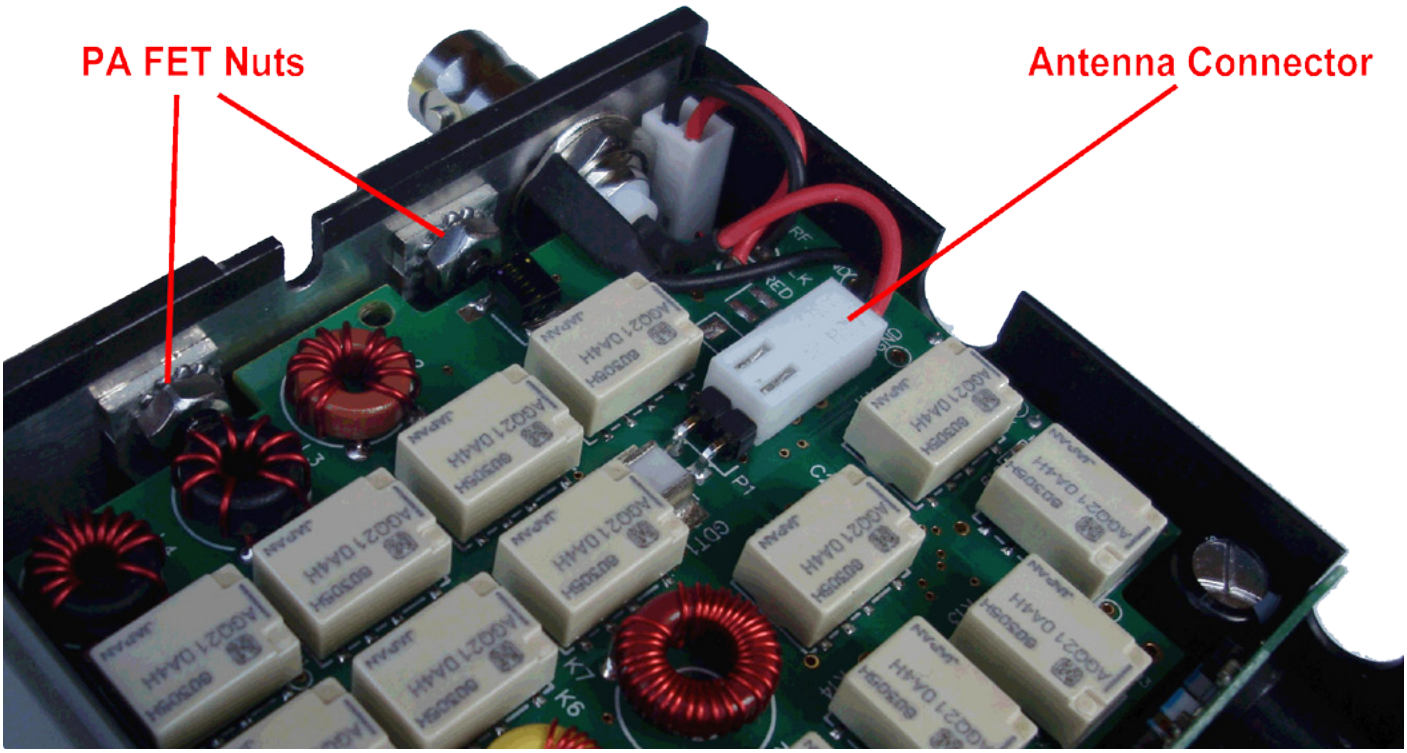
► Step 2 - Determine your PA-FET Revision.

Elecraft has used three different PA FET mounting methods during the KX2’s production run. The procedure for dismounting and the Elecraft end panel and mounting the new PAE Kx22 Heatsink differs slightly between the three revisions. We supply the Kx22 in two versions, the Kx22 is intended for **Rev1** and **Rev2** KX2s, the Kx22b is correct for **Rev3** KX2s. The difference is only the inclusion of the Harmonic Reduction Mod parts on the Kx22.
Once you have determined your revision, turn to the corresponding page to proceed with disassembly.

Rev1: S/N 0000-0900 - Page 3
Rev2: S/N 0900-5416 - Page 4
Rev3: S/N 5417->>>> - Page 5

Rev1 Disassembly: S/N 0000-0900

The picture below is a **Rev1** KX2 which has the PA FETs mounted directly to the panel without grey thermal pads.



Locate the two #4-40 screws which hold the PA-FETs to the Elecraft end panel. The captive lockwasher #4-40 nuts should be held with needle-nose pliers while the screws are removed.

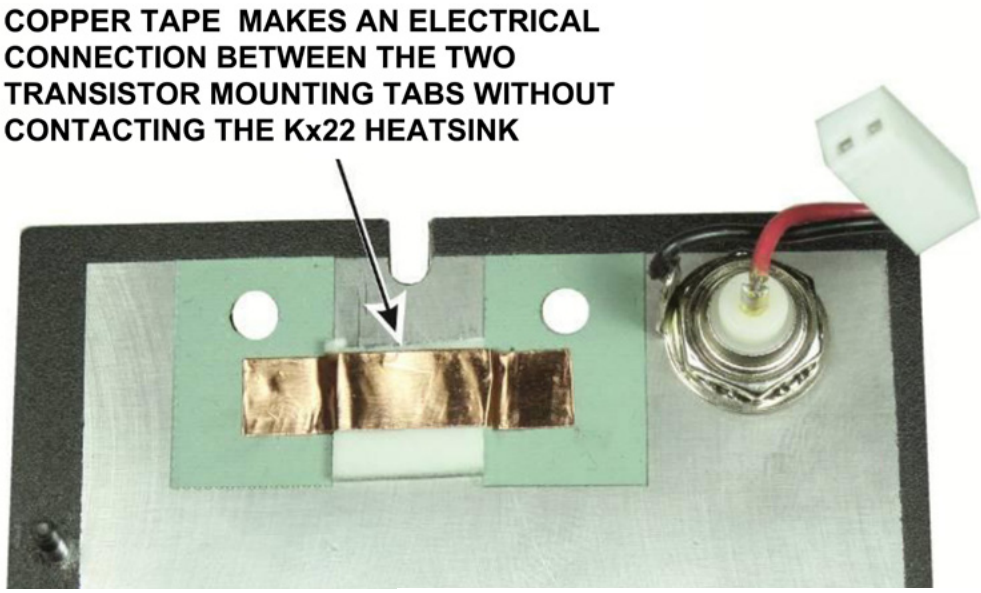
Unbag the new Kx22 Heatsink and examine it. If it has been supplied with any thermal pads, foam block or copper tape, all of these can be kept as they are part of a Harmonic Reduction Modification made by Elecraft to meet international specifications.

Alternatively they can be removed, as the rig met US specifications without them and this will give superior thermal performance.

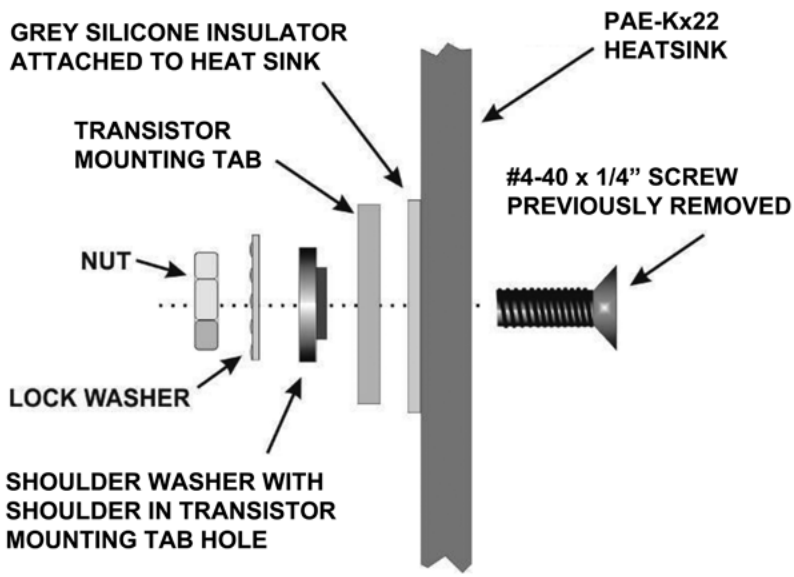
In either case proceed to **Step 3** on page 8.

Rev2 Disassembly: S/N 0900-5441

The picture below is a **Rev2** KX2 end panel which has thermal pads, a foam block and copper tape mounted.



The diagram to the right shows the hardware which holds the PA FETs onto the end panel. Using needle-nose pliers hold the nut and remove the screws.
Try to remove the lockwasher and shoulder washer using tweezers, but if they fall into the KX2 do not worry. You will be able to retrieve them when the panel is removed later.



Your Kx22 Heatsink should have come with the thermal pads, foam block and copper tape pre-mounted on it.

Once all of the hardware holding the PA FETs is removed proceed to **Step 3** on page 8.

It is very important you read this before continuing:

If your KX2 SMD FET PCB assy. is connected with small-gauge yellow (V1) or green (V2) wires similar to the upper picture on page 6 we DO NOT suggest you try to install the Kx22b Heatsink yourself. The PCB traces on these versions can delaminate from the SMD FET PCB when flexed rendering the KX2 non-functional.

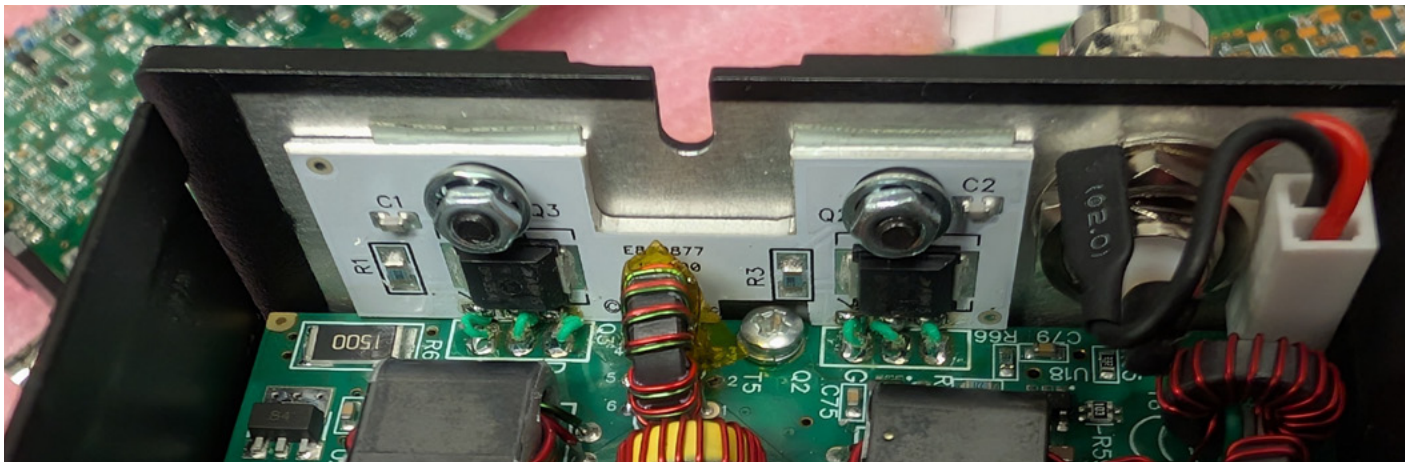
Pro Audio Engineering offers an install service for your Kx22/Kx22b Heatsink at a minimal cost to you.
For more information email: info@proaudioeng.com
and we will give you pricing and lead time information.

If your KX2 requires repair after a Kx22/Kx22b installation contact either:
Pro Audio Engineering - info@proaudioeng.com
Dave Van Wallaghen - info@w8fgu.com

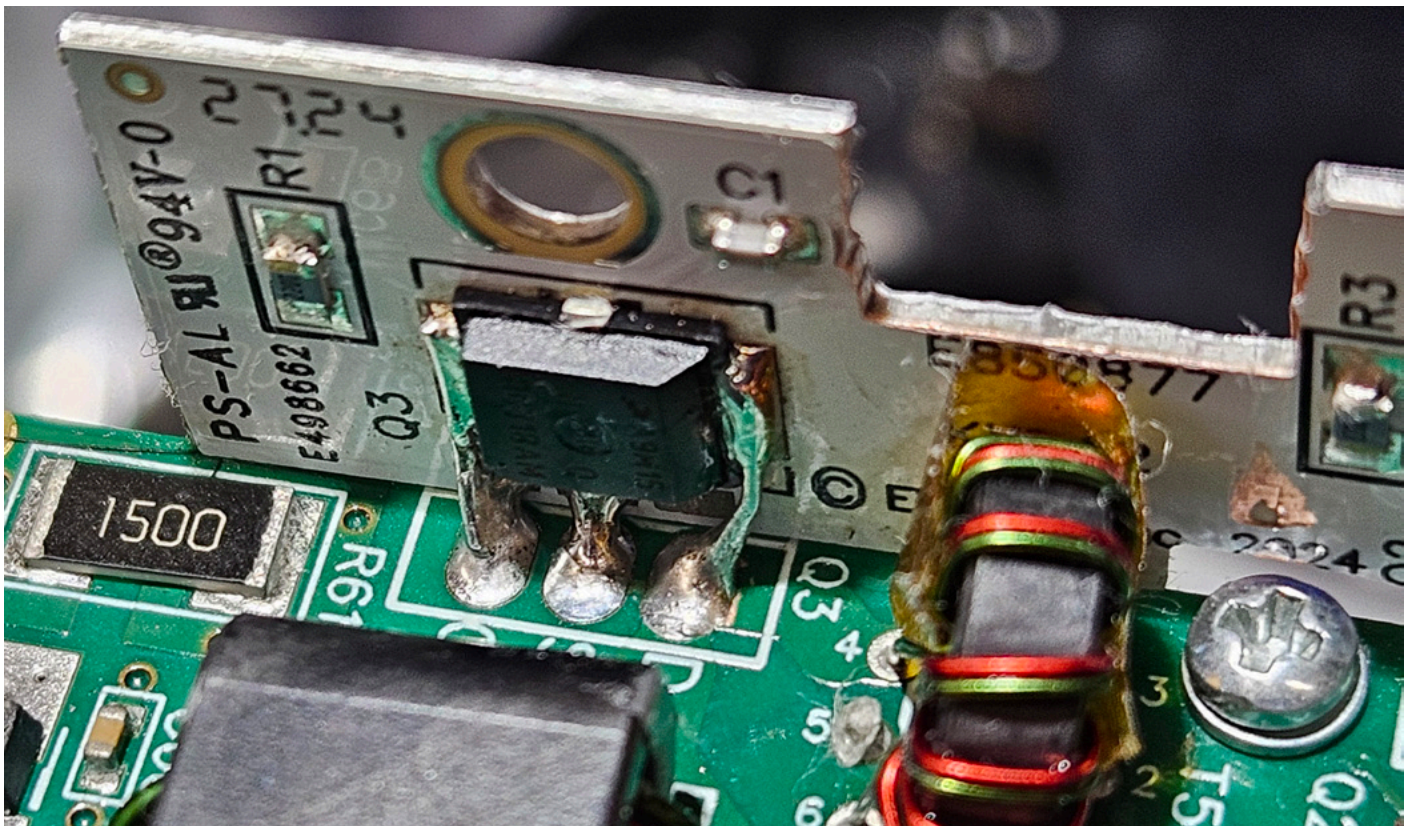
Either facility will help expedite the repair and return of your rig. Although Elecraft will service your KX2 out of warranty, Elecraft does not offer warranty service for issues encountered while installing aftermarket accessories like SideKX or PAE Kx22/Kx22b.

Study the version identification breakdown on page 6. Once you have identified your KX2 as having the V3 PA-FET assy., you can safely install the Kx22b following the instructions on page 7.

Identifying Rev3 iteration:
Starting with S/N 5417 Elecraft switched to SMD FETs soldered to a thin PCB assembly. There were two short-lived versions: **V1** with yellow wires and **V2** with green wires connecting to the main PCB as seen below:



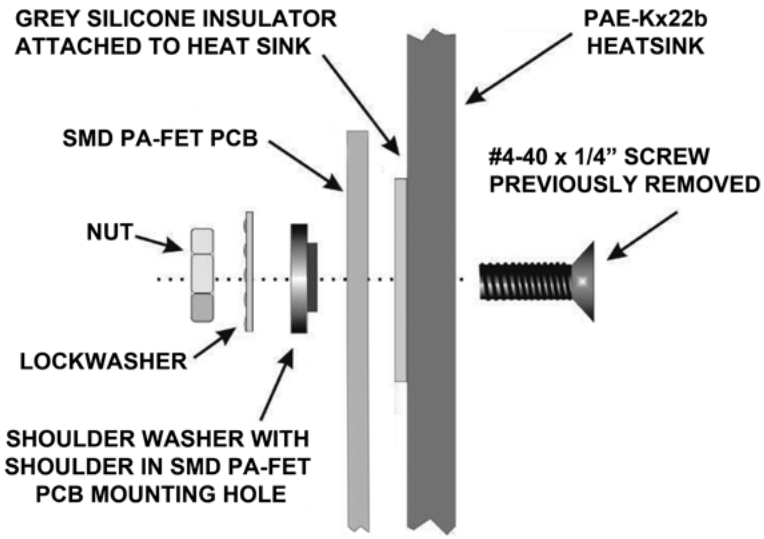
Starting with S/N 5441 and current as of June 2025 Elecraft has switched to a third version **V3** which has unsleeved heavy gauge wires connecting to the main PCB as shown below in a prototype:



Rev3 Disassembly: S/N 5417->>>>

Disassembling the V3 SMD FET assy is much less trouble-prone as the V3 FET leads are more robust.

The diagram to the right shows the hardware which holds the PA FETs onto the end panel. Using needle-nose pliers hold the nut and remove the screws.



Try to remove the lockwasher and shoulder washer using tweezers, but if they fall into the KX2 do not worry.
You will be able to retrieve them when the panel is removed later.

Once all of the hardware holding the PA FETs is removed proceed to **Step 3** on page 8.

► Step 3 - Remove the Right End Plate.

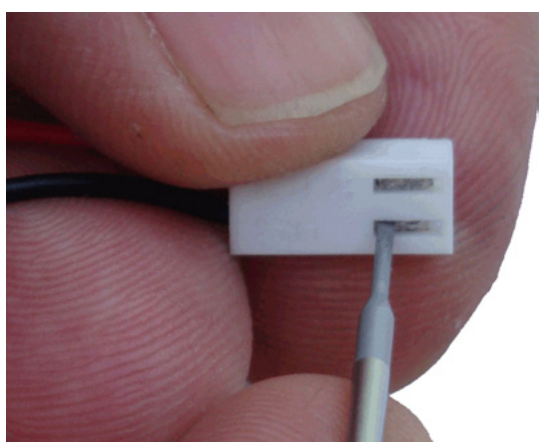
Unplug the antenna connector from the main PCB or from the KXAT2 board if so equipped.

Remove the small #2x1/4” screw near the front edge of the panel and remove the three additional #4-40 x 1/8” flat head screws from the right end panel. The panel should now be free of the KX2. Remove it and set it aside. You will be reusing all of the screws.

► Step 4 - Disassemble the antenna connector.

There are two terminals in the white antenna connector, and the terminal connected to the black wire must be removed to dismount the BNC jack.

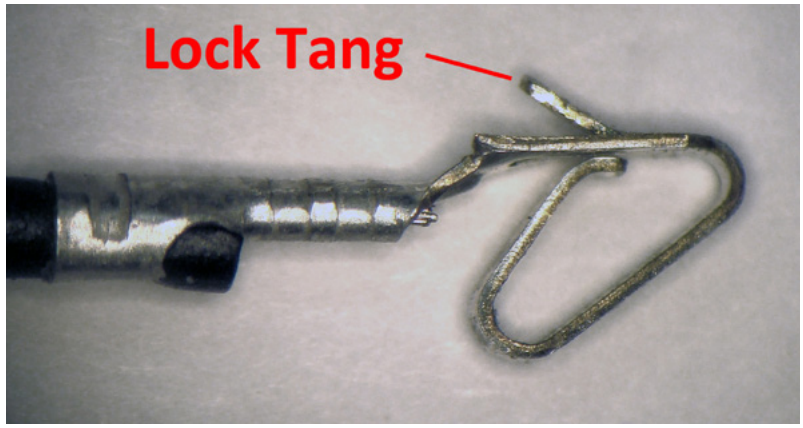
This is easily done using a needle or 1/16” (1.6 mm) jeweler’s screwdriver. Referring to the picture to the right, locate the side of the white plug housing with the two locking tangs.



Depressing the tang of the black wire while ***very gently*** pulling the wire back will allow the wire to be retracted easily. If it does not retract easily, the lock tang is not fully retracted. Depress the tang as close to the bottom of the slot as possible, where the tang is catching.

Once the black wire and terminal are free of the plug housing, closely examine the terminal. While depressing the lock tang it may have been pressed flat with the terminal. The lock tang must be raised slightly in order to regain it’s locking function in the housing. This can be easily done using the corner of a single-edged blade or X-Acto knife from the front or back of the terminal.

Be careful not to bend it back up too far or it may break, the picture to the right shows the maximum angle to which you should bend it back.



If you do not want to attempt this connector disassembly, we do offer the Kx22 with the BNC pre-mounted for a minimum charge, and will happily exchange it for your Kx22.

► Step 5 - Dismount the BNC Jack.

Note the orientation of the ground lug on the BNC jack, you will want to reinstall it in the same orientation. Using a 12 mm open-end or adjustable wrench, remove the nut from the BNC jack. You may have to bend the ground lug down slightly to clear the wrench. Once the nut is removed, disassemble the BNC jack, washer and ground lug from the stock end panel.

► Step 6 - Mount the BNC Jack on the Kx22.

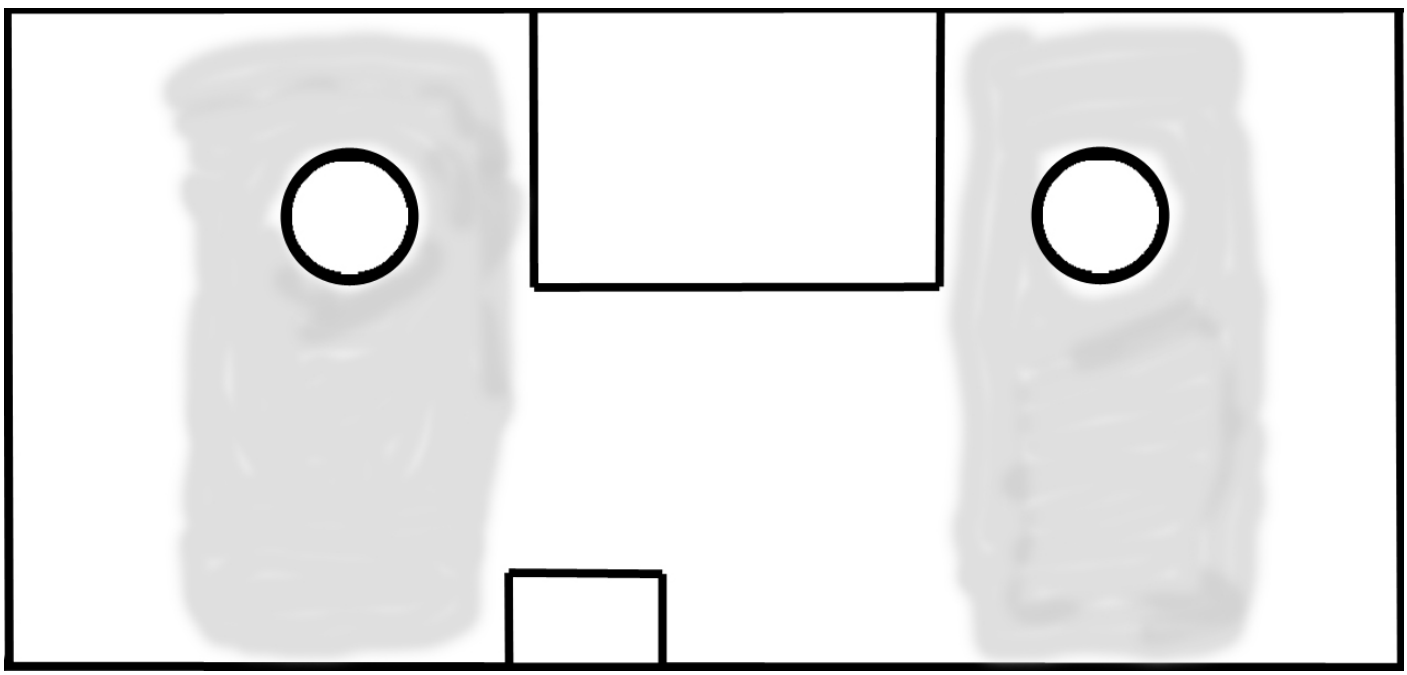
Reassemble the BNC jack, ground lug and washer onto the Kx22 heatsink, and paying attention to the ground lug orientation, push the ground lug as far away from the PA FET mounting location as it will go, then tighten the nut. If this is not done, the **Rev3** PA FET board may interfere with the ground lug.

Re-insert the terminal on the black wire into the white plug housing with the lock tang on the side with the opening. Ensure it is engaged, you should hear and feel a slight click as the lock tang engages the slot. If the terminal does not fully engage the housing and click into place, revisit Step 4 again to readjust the locking tang on the terminal.

► Step 7 - Apply thermal compound to the PA FETs.

Knead the included thermal compound packet for 20 seconds to reintegrate the grease, making sure there are no lumps left in the packet. Tear the end of the packet off at the pre-cut line.

Rev1 and **Rev2** KX2 installations: apply a small match-head size (1/8^{2}", 3mm^{2}) drop of thermal compound to the back of each PA FET. Using the single-edge blade, spread the compound to a thin film over the full FET surface and discard any excess.
Rev3 KX2 installs: apply a small match-head size (1/8^{2}", 3mm^{2}) drop of thermal compound near each mounting hole on the PCB. Spread it on the back of the PCB in a pattern similar to the grey area in the diagram below:



Spread it as evenly as possible and so thin that it becomes transparent. The compound is non-toxic and I find this easy to do with a clean latex or nitrile gloved finger. Remove any extra, you do not want ANY bumps or blobs of compound on the back of the PCB!

► Step 8 - Attach the Kx22 to your KX2.

Starting with the three #4-40x1/8” screws, attach the Kx22 to the KX2. Leave them slightly loose to allow for alignment of the PA FET screws.

Screw the small #2-56x1/4” screw into the Kx22. Do not tighten it very tight, as it has few threads to hold it. Just tighten until it bottoms and then 1/16 turn additional will be sufficient.

► Step 9 - Install the PA FET Hardware.

When installing the two PA FET screws, here is the suggested procedure:

Rev1:

a) Loosely install the captive lockwasher nut but do not tighten,

b) Go back and tighten the three #4-40x1/8” screws holding the heatsink to the KX2.

c) Then tighten the FET screws to (15 in-lbs / 17 kg*cm max).

Rev2, Rev3:

a) Pick up the shoulder insulator washer with the needle nose pliers held in one hand, and hold the screw in place with a #1 screwdriver with the other hand while placing the washer on the screw. If the ATU is in place, you may have to let the screw push back out a little to fit the washer in between the end of the screw and the KXAT2.

b) Repeat for the lock washer and nut, but do not tighten yet!

c) Go back and tighten the three #4-40x1/8” screws holding the heatsink to the KX2.

d) On a **Rev3** install, ensure the BNC lockwasher is not interfering with the PA FET PCB. If it is, loosen the BNC and push the lockwasher out of the way.

e) Tighten the PA FET screws firmly (15 in-lbs / 17 kg*cm max) to ensure good thermal contact between the PA FET PCB and the Kx22.

► Step 10 - Reattach the Antenna Connector.

Reinstall the KXAT2 if removed following Elecraft's **KXAT2 Builder's Alert.pdf** document. Plug the antenna connector back into either the main PCB or KXAT2 if so equipped. Be sure to orient it correctly with the black wire closest to the Kx22 heatsink as shown on page 3. Additionally the correct orientation is printed on the PCBs.

► Step 11 - Reinstall the Bottom Cover.

Reconnect the speaker connector, reinstall the battery if desired, then replace the bottom cover and tighten the two end thumbscrews.

Congratulations! Your Kx22 Heatsink is installed and your KX2 is now ready for extended transmit duty!

Use & Cleaning:

For maximum performance and component life, whenever possible operate and store the KX2/Kx22 in a cool place out of direct sunlight. To clean the PAE-Kx22, use only a dry or damp cloth, soft brush or cotton swabs. Do NOT use any solvents or cleaners!

Thermal Performance

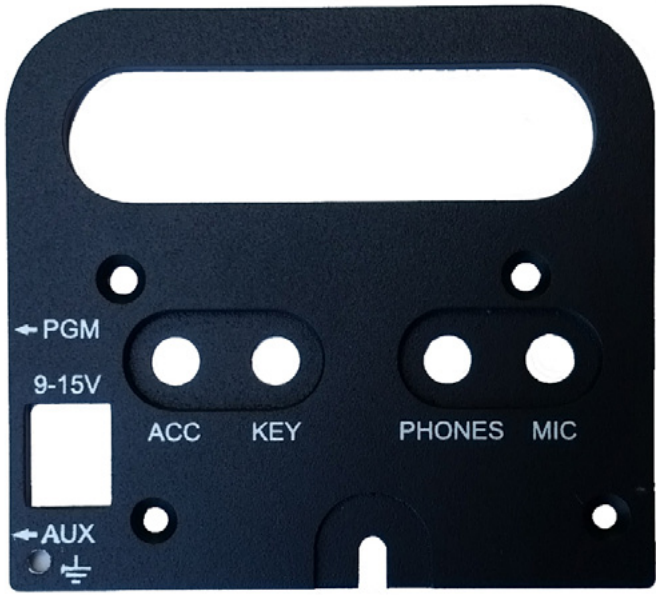
Thermal CAD programs were used in the design of the PAE-Kx22. There is only a ~4°C differential between the hottest and coldest parts of the heatsink modeled while being cooled only by natural convection. Tests in a draft-free laminar airflow box have confirmed the models predicted performance.

If you are operating the KX2 in warm weather or unavoidably in the sun, the rig may become very hot, since both the KX2 case and your new Kx22 heatsink are entirely black and efficient at absorbing solar radiation. In these situations it will help to keep the rig cool by providing shade for the KX2 and positioning a small fan to blow air at the Kx22 end.

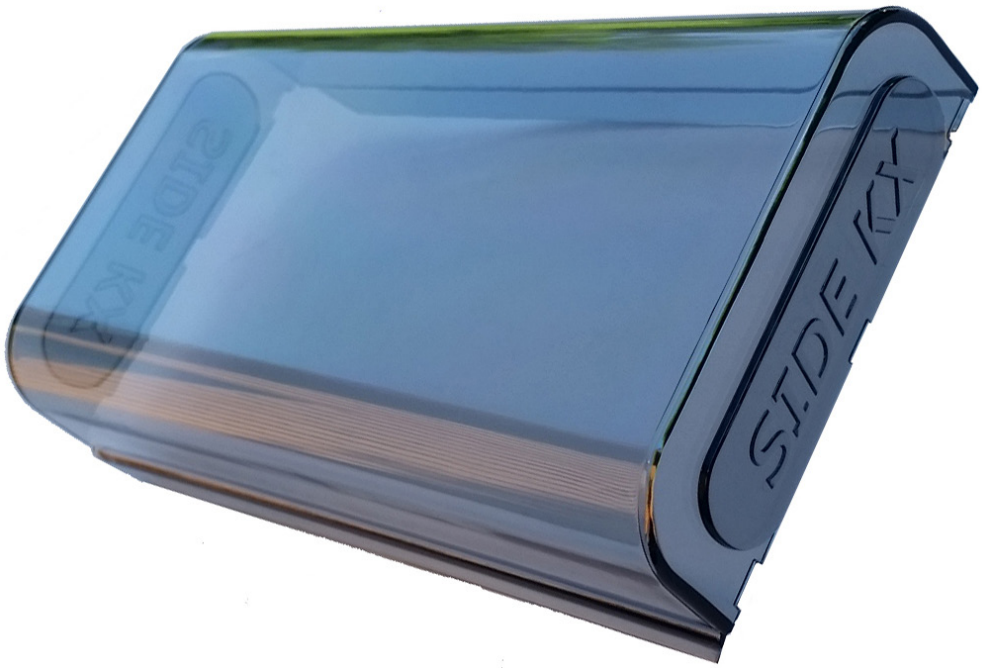
Accessories:

Pre-mounted BNC. The Kx22 can be purchased with the BNC antenna connector pre-mounted.

Left SideKX Plate.
We offer the SideKX left end plate for the matching our Kx22.
With both the Kx22 and Left SideKX installed your KX2 has full roll-over protection for the knobs and display.



SideKX Cover.
This protective cover provides full protection to the KX2 faceplate. Molded of high-strength Lexan for durability. The SideKX Cover turns the KX2 into its own storage case!



Specifications:

Size: width - 2.86” (72.6 mm)
depth - 0.5” (12.7 mm)
height - 2.57” (65.3 mm)

Surface Area: 11.3 in^2 (7280 mm^2) vs. 4.8 in^2 (3096 mm^2) stock.
Weight: 1.36 oz (38.7 g), only 0.75 oz. (22 g) more than the Elecraft panel it replaces.

Thermal Resistance: <6°C/W

Key-down Transmit Time Improvement over stock:
80M-250%
40M-250%
20M-250%
15M-250%
10M-200%

Color: Dyed black to match the Elecraft™ KX2.

Warranty: The Kx22 is warrantied against all manufacturing defects.