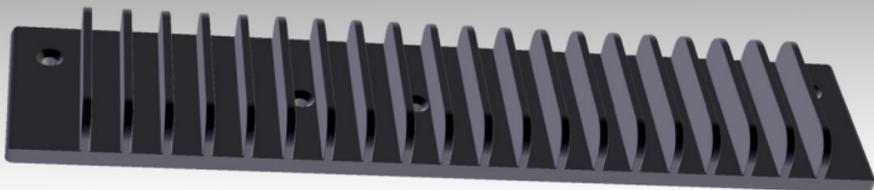


Pro Audio Engineering

PAE-Kx31 / Kx32 Heatsink

for the Elecraft™ KX3 Transceiver



Installation and Owner's Manual

Rev 4.0
February 4, 2016

Thank you for purchasing the PAE-Kx31 or Kx32 Heatsink for the Elecraft™ KX3 Transceiver.

We designed these heatsinks to allow extended transmit time at the KX3's full-power settings, which is especially useful while using digital modes.

No passive heatsink can currently allow unlimited key-down time on the KX3, however the PAE-Kx31 has been engineered using thermal CAD modeling techniques as well as KX3 transmit testing for maximum performance with a minimum of increase in overall size. This is the heatsink of choice for those who want enhanced transmit time and still retain low weight and size.

The PAE-Kx32 has also been designed using thermal CAD and it is the absolute maximum footprint which allows full freedom to position the KX3. It offers the greatest performance of any convection-cooled KX3 heatsink, and up to 25% greater performance than the Kx31 with a minimal increase of size or weight. In addition it is designed to allow mounting of the PAE-Kx32fan accessory for essentially unlimited transmit time when running digital modes.

For more information on these heatsinks and their design and performance capabilities, please visit:

www.proaudioeng.com

Howard Hoyt - WA4PSC

www.proaudioeng.com

IMPORTANT NOTES:

1. The longer 3/4" screw **MUST** be installed in the left hole closest to the DC Power Jack! Installing this screw in any other position **WILL** cause damage to the KX3.
2. Refer to the most current Elecraft KX3 assembly manual for any disassembly and reassembly (www.elecraft.com).
3. The KX3 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:

Step 1) Remove the stock factory heatsink plate (see note 2).

In all cases it is held on by four #4x40 screws. The center two screws hold the PA transistors against the inside of the case, and there are nuts inside the case which need to be removed as well. Be careful to hold and remove the nuts with needle-nose pliers so they do not fall into the KX3.

The original heatsink plate is flat, but it was replaced in late 2014 by the “enhanced” heatsink, which is “L” shaped and provided by Elecraft starting with S/N 7292 for kits, and S/N 7255 for factory assembled units.

When the screws are removed, the enhanced heatsink can remain stuck in place by the thermal transfer film. Simply heating the enhanced heatsink with a hair dryer to 40°C (104°F) and pulling up steadily on the bottom part of the “L” is enough to allow it to be removed as shown below:



In some cases prying firmly with a flat-bladed screwdriver stuck between the heatsink and one side of the case back may be necessary to initiate separation. When properly performed using a hair dryer, this procedure poses no potential damage to the KX3 or its powder coat finish. Thermal fold-back for the KX3 in normal operation is set by Elecraft at 60°C, and a hair dryer outputs air at about 50-60°C (122-140°F) maximum.

Powder coating begins to soften at around 100°C (212°F), and melts at around 150°C (302°F).

Step 2) Choose installation method.

There are three options one can choose from when installing the PAE-Kx31 or Kx32. These options are listed below in order of easiest and most modest performance, to most difficult and highest-performance. Please read each step thoroughly before committing to a plan of action. Before executing any of the three options reference the Elecraft KX3 Assembly Manual for screw and component locations. **Remember in all installations of a Kx31 or Kx32, the one long screw (3/4") supplied MUST be installed at the left side of the rig closest to the DC power input jack.** Here are the three suggested installation options:

1. No case modification or heatsink grease.

The PAE-Kx31/Kx32 is merely installed in place of the stock heatsink.

2. No case modifications, heatsink grease applied.

With this install option it is recommended the back case half of the KX3 be removed from the PCB (see note 2). This exposes the PA output transistor heat sinking surfaces so they can be properly coated with the provided thermal transfer compound. Once the PA transistors are exposed, knead the thermal compound packet, then apply a match-head sized (1/8"/3mm²) drop of compound to each, and using a single-edged razor blade or other flat tool, spread it to a thin even film over the entire back of the transistors. The correct amount will be translucent once spread out. Reassemble the KX3 back case half to the PCB. Apply the remaining compound to the powder-coated surface around the PA transistor holes in a rectangle approximately 1" by 2" (25mm x 50mm).

3. Case modification and heatsink compound.

This option requires modification to the KX3 back case half, but provides the highest level of performance. First, disassemble the KX3 back case-half from the PCB (see note 2). Using a marker, lay out a 1" by 2" (25mm x 50mm) rectangle symmetrically around the PA transistor attachment holes on the case half powder coating.

Using a sharp tool such as a knife or file, remove the powder coating from inside this rectangle as shown:



Once the powder coating is removed, take a single-edged razor and scrape the bare area flat and smooth. Alternatively you can mask the area and use paint stripper to remove the powder-coating. Once the coating is removed and the aluminum is flat and bare, knead the thermal compound packet, then apply a match-head sized (1/8"/3mm²) drop of compound to each PA transistor surface, and using a single-edged razor blade or other flat tool, spread it to a thin even film over the entire back of the transistors. The correct amount will be translucent once spread out. Reassemble the KX3 back case half to the PCB. Apply enough of the remaining compound to thinly cover the rectangular area you scraped to bare aluminum around the PA transistor holes. If done carefully, this case modification will be completely covered, even by the stock heatsink plate, rendering the modification invisible. This will retain the stock appearance if it is desired to remove the PAE-Kx31 or Kx32 and replace it with the stock plate.

Step 3) Attach the PAE-Kx31/Kx32 using the screws supplied (see notes 1&3).

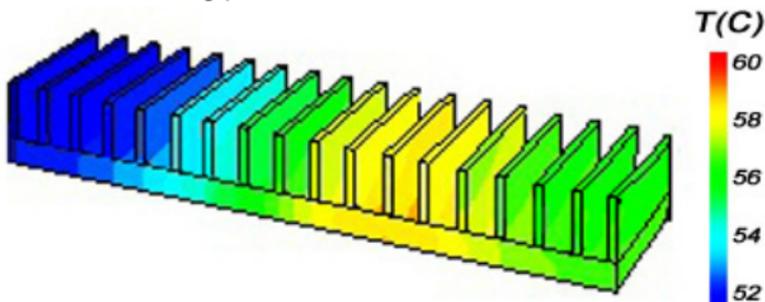
Make sure to put the #4x40x3/4" screw at the left most location near the DC power jack. The other three locations take #4x40x1/2" screws. When tightening, do not overtorque, excessive torque can deform the PA transistors and actually impair thermal transfer from them. Tighten the middle screws holding the PA transistors first, then the two outside ones. If you chose a method using heatsink grease, retighten after 5 minutes.

Use & Cleaning:

For maximum performance and component life, whenever possible operate and store the KX3/Kx31/Kx32 in a cool place out of direct sunlight. To clean the PAE-Kx31/Kx32, use only a dry or damp cloth and cotton swabs. Do NOT use any solvents or cleaners!

Thermal Performance

Thermal CAD programs were used in the design of the PAE-Kx31 and Kx32. The model below shows the calculated thermal gradient for a Kx31 present when the PA transistors in the KX3 are at their thermal limiting point of 60°C:



There is ~8°C differential between the hottest and coldest parts of the heatsink modeled while being cooled only by natural (not forced) convection air flow. Tests in a draft-free laminar airflow box have confirmed the models predicted performance.

The difference in thermal gradient between the Kx31 and Kx32 is a 1°C lower temperature differential and the presence of a gradient along the front-to-back (depth) dimension for the Kx32 which is visible but not pronounced in the Kx31.

Specifications:

Size: Kx31: width - 7.125", depth - 1.500", height - 0.625"
Kx32: width - 7.125", depth - 1.750", height - 0.750"

Surface Area:

Kx31: 38in²
Kx32: 48in²

Weight:

Kx31: 158g, 5.6oz.
Kx32: 204g, 7.2oz.

Thermal Resistance (mounting method not included):

Kx31: <3°C/W
Kx32: <2.75°C/W

Key-down Transmit Time Improvement (relative to original Elecraft heatsink):

Kx31:	160M-350%	Kx32:	160M-430%
	80M-300%		80M-350%
	40M-300%		40M-350%
	20M-250%		20M-300%
	15M-250%		15M-300%
	10M-350%		10M-430%
	6M-450%		6M-550%

Color: Custom dye batch black to match the Elecraft™ KX3 .

Warranty: The Kx31/Kx32 are warranted against all manufacturing defects.

