

# Elecraft K3

## Audio Output Chip Protection Modification

### Installation Instructions

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#### Introduction

Even though the K3's audio output I.C. has internal protection, a small number have failed under extreme conditions such as a dead short across the speaker output. This modification adds a 1-ohm resistance to each speaker output that tests show prevents failure even under these conditions. Some soldering of leaded parts is required to make this modification.

You should confirm that your K3 also has the AF Amplifier Output Modification that protects it from voltage spikes that can be produced by shorting the audio output. This modification was made at the factory for all K3s shipped after about December 23, 2008. See *K3 AF Output Mod Kit* at [www.elecraft.com](http://www.elecraft.com) for more information.


#### Was this Change Already Incorporated in My K3?

You must inspect the K3 RF Board to see if the audio output chip protection board is installed. If your K3 does not have the KRX3 sub-receiver or K144XV 2-meter option, you will be able to see the board by simply removing the top cover, otherwise you will need to remove the left side panel (the side with the handle) as described under *Procedure* to see the protection board. The installed board is shown in Figure 5. Note that an unmodified K3 has two capacitors in this location that look much like those on the protection board (see Figure 3). Be sure you can see the two large resistors next to the capacitors to confirm that the modification has been done.

#### Tools Required

1. #1 or #2 Phillips screwdriver (use size that fits the screws best).
2. ESD-safe soldering station with a fine tip and IC-grade solder along with normal hand tools for installing parts on a pc board. Do not use a high-wattage iron or soldering gun since this can damage pads, traces, or the parts themselves.
3. De-soldering tools such as a Soldapullit® or de-soldering wick to remove parts and clear through-plated pcb holes.

#### Parts Provided

Illustration	Description	Quantity	Elecraft Part Number
	Audio Output Chip Protection Board <b>⚠ Handle carefully!</b> Do not bend or break the pins on the bottom. Do not remove the protective tape from the self-stick pad until instructed to do so.	1	E850506

## Procedure

**⚠** If a screw seems very tight, try loosening the other screws in that panel first. Sometimes tightening other screws during assembly causes one already in place to bind. Loosening the others will usually free it.

Disconnect all cables from the K3.

**⚠ CAUTION:** Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3.

### *K144XV Option*

If you do not have the K144XV 2-meter option installed, go directly ahead to *Installing the Audio Chip Protection Board* on pg 3.

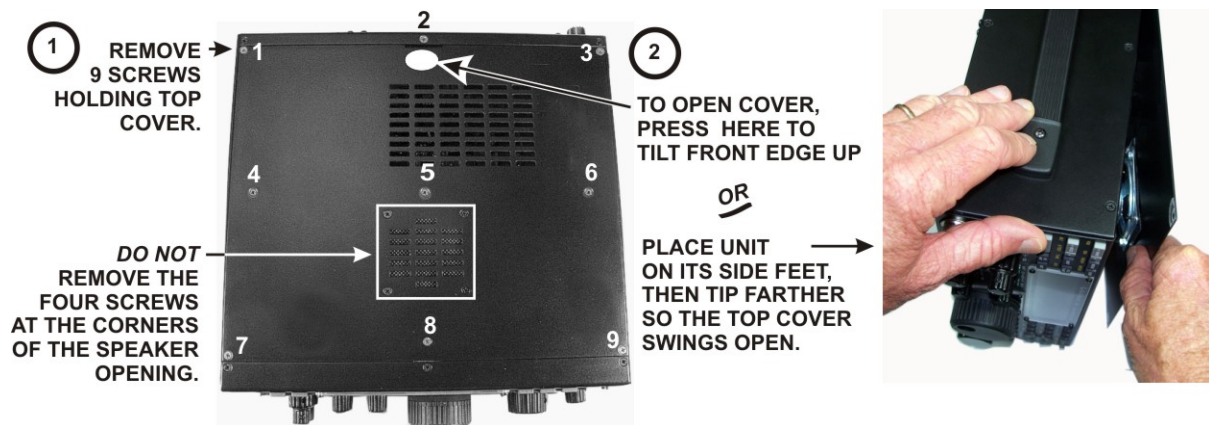
To install the audio chip protection board, you will remove the left side panel. Doing so will leave the K144XV module loose.

If you have the K144XV 2-meter option and both the KRX3 sub-receiver and KPA100 100 watt amplifier options installed, you can leave the K144XV module in place. The KPA100 shield and the KRX3 enclosure will keep the K144XV module constrained where it cannot damage the pc boards.

If you have the K144XV option and do not have the KRX3 sub-receiver option installed, remove the K144XV module as follows:

Disconnect power and all cables from your K3.

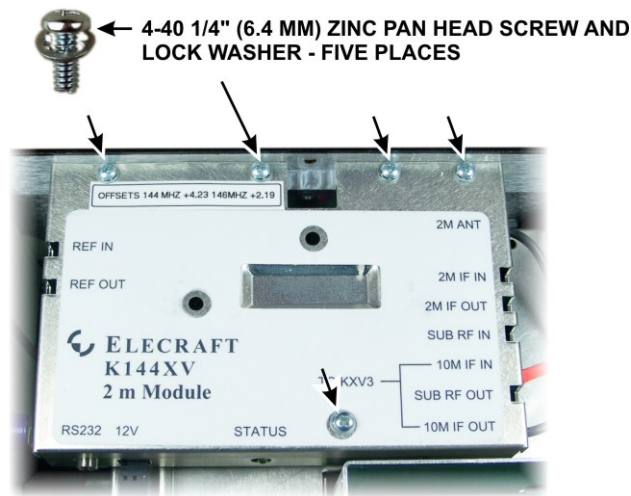
Remove the nine screws to free the top cover as shown in Figure 1. After the cover is open, lift it gently to reach the speaker wire connector. Unplug the speaker then set the top cover aside in a safe place.



**Figure 1. Removing K3 Top Cover.**

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**

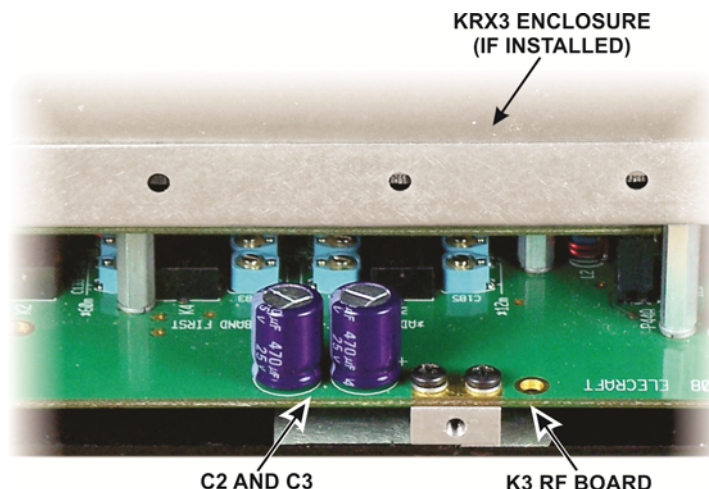
Unplug the coaxial cables and the power connector attached to the K144XV module. Pull on the metal part of the TMP coaxial connectors. Do not pull on the cables.

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.

### ***Installing the Audio Chip Protection Board***

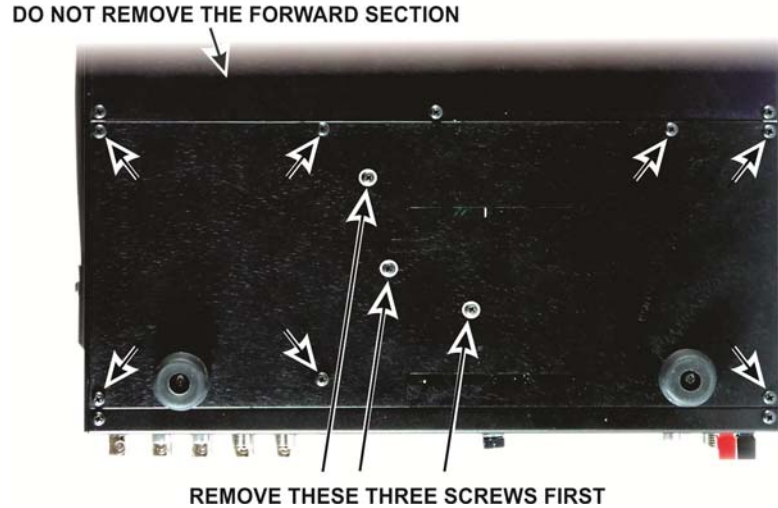
Remove the 4-40 flat head screws securing the left side panel (the side with the handle) to the K3. Note that one screw is near the forward end of the handle. Even if you do not have the K144XV module, there may be three larger (#6) screws above the handle. Do not remove them. They are there only to fill the holes. Set the side panel aside in a safe place.

Two electrolytic capacitors, C2 and C3, will be visible near the center edge of the K3 RF board (see Figure 3). In the following steps these capacitors will be removed and the Audio Chip Protection Board installed in their place.



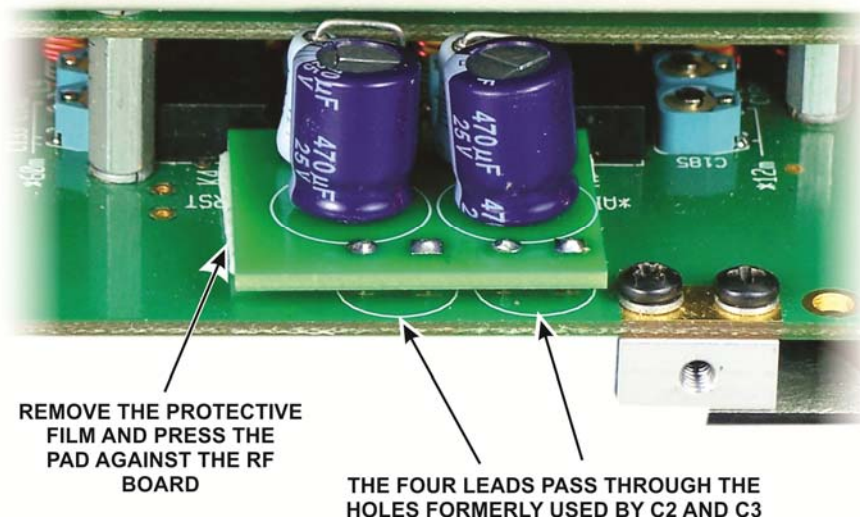
**Figure 3. C2 and C3 Location.**

- Turn the K3 upside down and remove the *rear* portion of the bottom cover starting with the three screws indicated. Those screws secure the low power amplifier transistors to the bottom cover. Removing them first ensures you will not disturb the position of the transistors when removing the cover.



**Figure 4. Bottom Cover Rear Section.**

- Unsolder and remove C2 and C3. Hint: heat one lead at a time while pulling gently on the capacitor until it moves, then switch to the other lead so you “walk” the capacitor leads out of the holes.
- Clear the holes of solder, and then test fit the audio output chip protection board on the K3’s RF board (see Figure 5). If necessary adjust the pins so they all line up and pass through the holes in the RF board.



**Figure 5. Audio Output Chip Protection Board in Place.**

- When you are satisfied that the pins pass through the holes easily, remove the protective paper from the foam tape on the bottom of the audio output chip protection board and then replace the board on the K3 RF board. Press down to ensure the adhesive bonds to the K3’s RF board.
- Turn the K3 upside down, solder and trim all four leads.



## Reassembly

Check to ensure there are thermal pads on the three transistors that attach to the bottom cover. These pads must be in place for proper heat transfer to the cover.

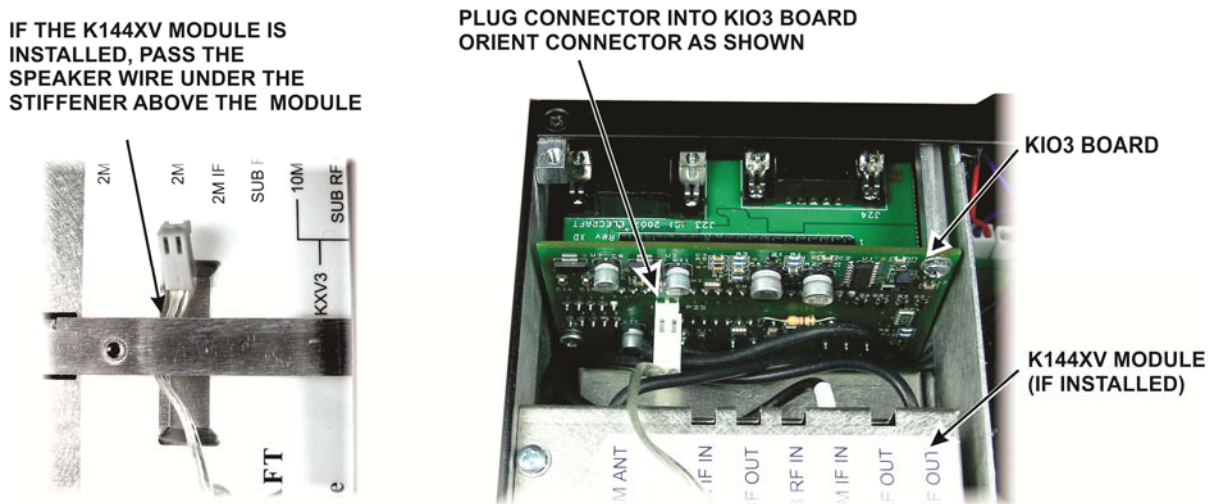
Replace the bottom cover, using the three 4-40 1/4" (6.4 mm) pan head screws with lock washers in the holes over the transistors and seven 4-40 3/16" (4.8 mm) pan head screws in the other locations.

**⚠ CAUTION:** Be certain the three pan head screws securing the transistors have inside tooth lock washers under their heads and thread in smoothly until the screw head compresses the lock washer. The transistors will fail if these screws do not hold the bottom cover tightly against them.

Replace the side panel. Depending upon the options installed in your K3, there may be one or more small coaxial cables that pass through notches along the edge of the RF board or the KIO3 board. Be sure these cables are in place and not pinched between the edge of the board and the side cover.

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.

If you removed the top cover hold it above the K3, route the speaker wire under the stiffener bar and plug it into the KIO3 board as shown in Figure 6. 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 6. Connecting the Speaker Cable.**

Set the top cover on the K3. The tab at the rear of the cover goes under the lip on rear panel. Replace all of the screws.

### **⚠ IMPORTANT**

**The electrical and mechanical integrity of the enclosure requires that all the screws in the enclosure be replaced and tightened. Do not leave screws out.**

That completes the installation of the Audio Amplifier Chip Protection Modification.