Elecraft K3
Installing Crystal Filters in the KRX3 Subreceiver

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Introduction

The crystal (roofing) filters in the KRX3 subreceiver are contained in the L-shaped RF module mounted above the main K3 RF board (see Figure 2). Installing or changing the filters involves removing the RF module and the circuit board inside. The filters plug into the circuit board and are held in place by screws. No soldering is required.

Tools Required

You will need a Phillips screwdriver and long nose pliers. Normally a No. 1 Phillips is correct, but some find a No. 2 is a better fit. Always use the screwdriver that best fits the screws.

A grounded wrist strap and ESD dissipating mat are recommended whenever you work inside your K3.

Your KRX3 Subreceiver Owner's manual. Reference is made to that manual for some steps in the procedure.

Procedure

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

☐ Remove the K3 top cover as shown in Figure 1. As you lift the cover off, unplug the speaker wire that connects to the KIO3 board in the left rear corner of the K3.
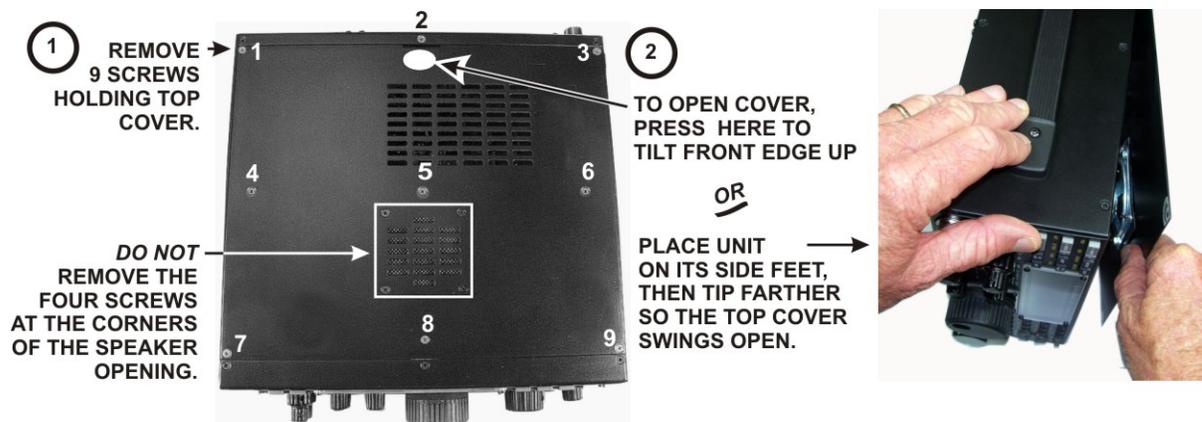

Figure 1. Removing the Top Cover.

⚠ **Observe ESD precautions when working inside your K3. Wear an ESD wrist strap or frequently touch an unpainted metal ground while working.**

☐ If you have a K144XV 2-meter option installed, disconnect the TMP cables leading to it, then remove the three 6-32 flat head screws securing the module to the side of the K3. Set the K144XV module aside.

☐ Remove the KRX3 RF module as follows. The circled numbers refer to Figure 2 below.

— Remove the four screws ① holding the stiffener bar that crosses the top of the K3. If your K3 does not have the optional KPA3 100 watt amplifier, the bar is held by only the screws at the ends.

— Remove the two long screws ② that attach the KRX3 enclosure to the K3 main board.

— Grip the knurled nuts ③ and lift the KRX3 enclosure up and out of the K3. The enclosure will unplug from two interface boards ④, one near the front and the other at the back. Also there will be two coaxial cables attached to the forward edge and usually one cable attached at the back of the enclosure. Carefully unplug these cables holding onto the metal finger grip, not the black coax. The connectors are held by friction and slide apart. They do not unscrew.

☐ Remove the two small interface boards ④ that plug into the board on the bottom of the K3 and the KRX3 enclosure. The boards may still be attached to the K3 main board or may be attached to the connectors on the KRX3 RF module. Set them aside in an ESD-safe place.

☐ Place the KRX3 RF enclosure on your work table. Remove the two knurled nuts ③ and lift the top half of the KRX3 RF enclosure off of the lower half
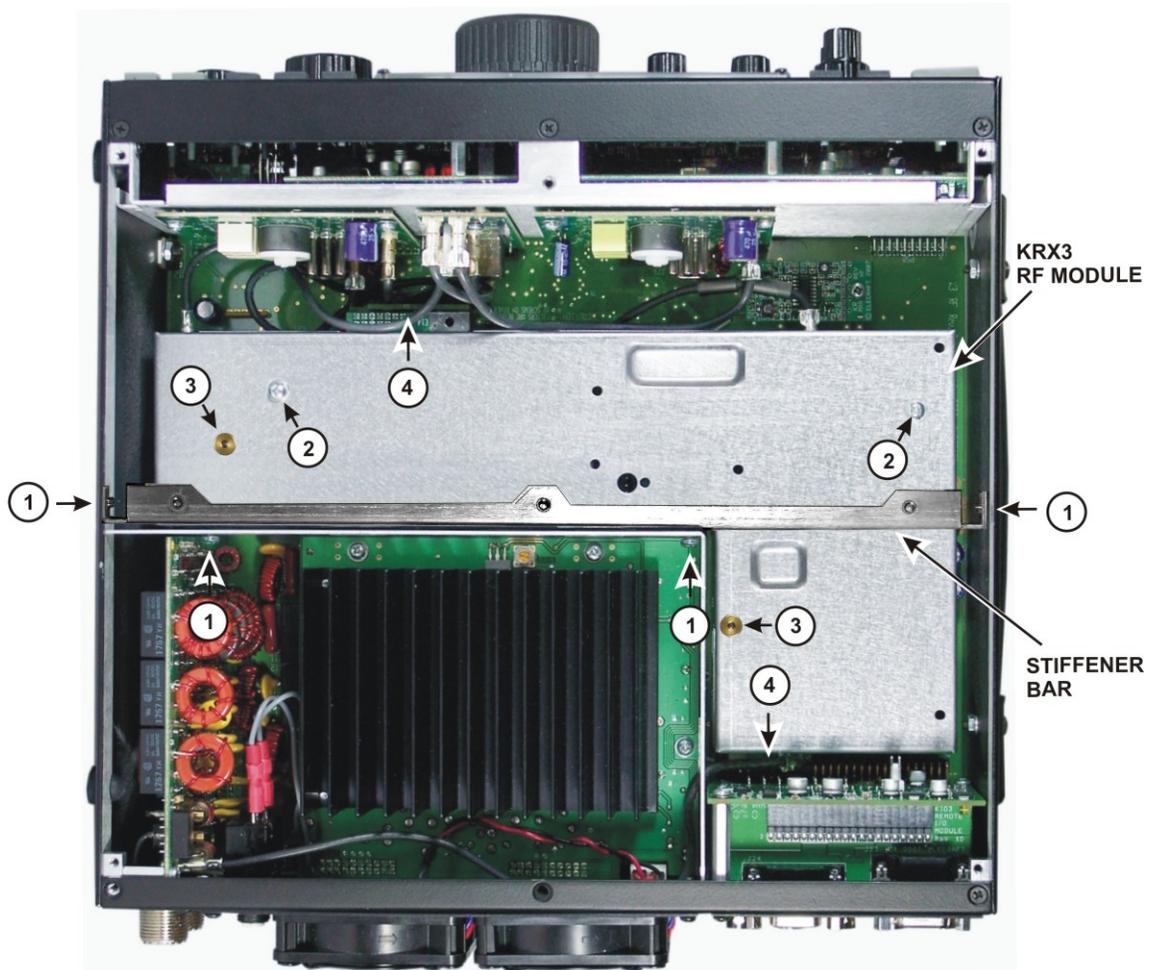
Figure 2. Removing the KRX3 RF Module.

☐ Remove the RF board from the lower half of the enclosure as follows (see Figure 3):

— Remove the two sleeves ① from the long screws.

— If the KBPF3 option is installed, remove the two screws ② and unplug it from the RF board underneath.

— Remove the two screws ③ securing the KRX3 RF board to the bottom half of the enclosure. These screws thread into bushings attached to the enclosure with screws. If a screw seems to turn without loosening, hold the corresponding screw on the bottom of the enclosure so it cannot turn.

— Lift the RF board out of the enclosure. It is a tight fit. There may be small bumps along the sides of the board that snap into holes in the sides of the enclosure. Start by lifting carefully at the two extensions where the board extends outside of the shield while pressing down on the edge of the shield to free it then work the board up and off of the long screws.
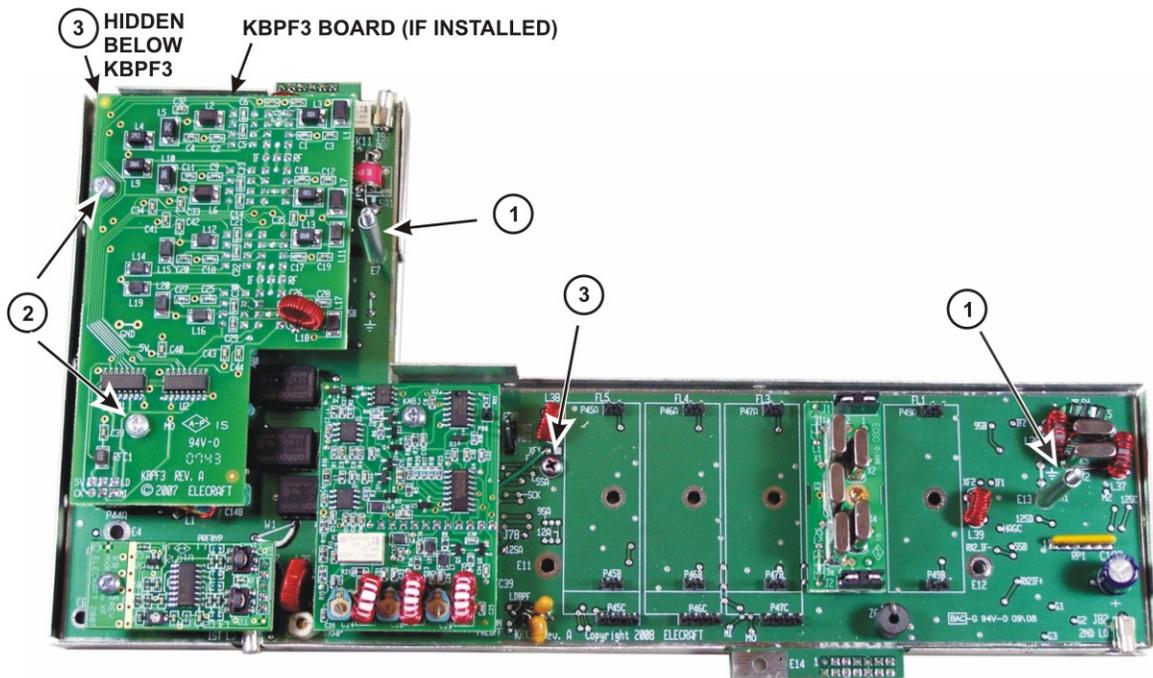
Figure 3. Removing the RF Board from the Enclosure.

☐ The crystal I.F. filters are installed at positions FL1 thorough FL5 on the RF board. If the KRX3 has been in use there will be at least one filter already installed. Plan where you are going to install, replace or move the filters. They must be installed in a certain order according to the following rules:

a) The widest bandwidth filter must be closest to FL1. Note that FL1 is at the *right hand* end of the row of filters when the board is arranged to read the silk screening on the pc board. The filters must be in order of decreasing bandwidth from the right (nearest FL1) to the left (nearest FL5). If you're installing the K-FL3B FM filter, place it in position FL1 since it is the widest bandwidth filter available.

b) You may leave unoccupied filter positions as long as the order in a) above is followed. This is handy if you plan to add more filters later. Note that only a single filter is installed on the board shown in Figure 3, leaving space for a wider bandwidth filter to be added in FL1 position and narrower filters to be added to FL3 through FL5 later if desired. More information and examples for planning your filters is included in Appendix A of your K3 Owner's manual.

⚠ **IMPORTANT:** **The information recorded in the next step is required to enable your filters after reassembling your K3. Record the data in the table clearly and completely. If the information is incomplete or incorrect, you will have to disassemble your KRX3 again to retrieve it before you can use your subreceiver. Recommend using a pencil so you can change the data later should you decide to install additional filters.**

☐ Enter the following data on Table 1. Be sure you're following the rule described in the step above about the proper order for the filters. Note that Table 1 is set up with FL1 to the right and FL5 to the left, just as they must be installed on the RF board.

    — Enter the bandwidth of each filter in the row below the filter position in which it will be installed.

    — Enter the FREQ OFFSET shown on each 5-pole filter (see Figure 4). The optional 8-pole filters have no offset. Enter a zero in the FREQ OFFSET column for those filters. **For the 5-pole filters, note that the frequency offset may be *negative*, indicated by a minus sign (single dash) ahead of the number.**

Table 1. Filters Installed.

Note: FL1 is to the right and FL5 is to the left. In the next step you will install the filters right-to-left on the KRX3 RF board as well.

POSITION	FL5	FL4	FL3	FL2	FL1[1]
BANDWIDTH[2]					
FREQ OFFSET[3]					

1. **If you're installing the K-FL3B FM filter, place it at FL1 since it is the widest bandwidth filter available.**

2. **The bandwidth is shown in the label attached to the filters except the K-FL3B FM filter. Record a bandwidth of 13 kHz for the K-FL3B FM filter.**

3. **All of the optional 8-pole filters have an offset of zero. Note that the 5-pole filters may have a negative offset, indicated by a minus sign ahead of the number.**

☐ Install the filters as shown in Figure 4. Refer to the list of filters you created in Table 1 to determine which filter to install at each location.

☐ If the subreceiver RF module top cover has a label on it with places to record the bandwidth (BW), and frequency offset (FRQ) of each filter, copy the information from Table 1, erasing and moving the information already there to match your filter setup. The label will ensure you have the installed filter information in case this page is misplaced. (If you do not have a filter information label on your subreceiver, you can obtain one from Elecraft.) Use pencil in case you change your filters later. Note that the filters read ***right to left*** on the label, just as they were installed on the pc board and shown on Table 1. The label also has a row for Gain. This is a value you can determine later after installation is finished. It is a value set in the K3's MENU to adjust the overall gain for each roofing filter so the audio remains constant when switching from one filter to another. Making this adjustment is described under *Filter Loss Compensation* in your owner's manual.

⚠ *CAUTION*

1) Do not use screws longer than 1/4" (6.4 mm) to mount the filters. Longer screws may extend into the optional 8-pole filter and destroy it. We strongly recommend you use a 1/4" screw even when installing the 5-pole filters to reduce the possibility of damaging an 8-pole filter should you change them later.

2) Do not over-tighten the screws. Too much torque may pull the threaded bushing out of the bottom of the filter module.
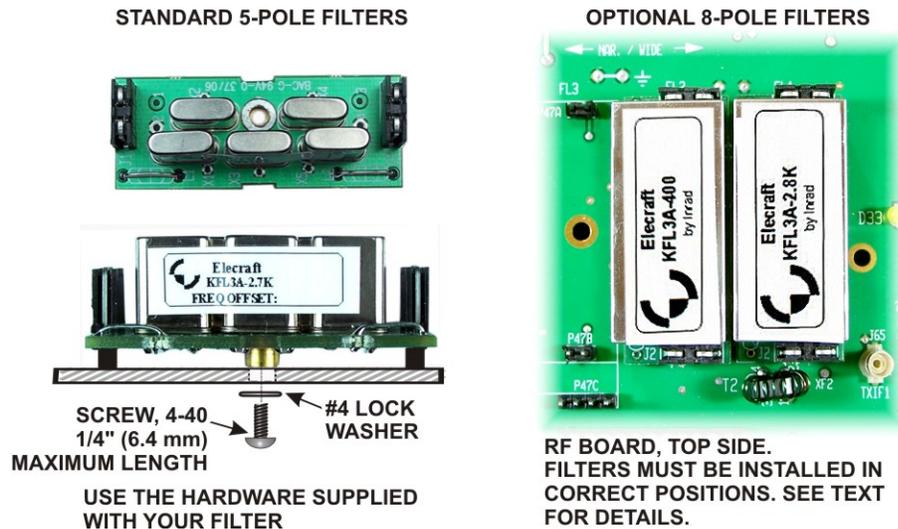
Figure 4. Installing the Crystal Filters.

☐ Double-check to ensure you installed each filter in the location you noted in Table 1. If you make a mistake recording the data or installing the filters and miss it now, you'll need to disassemble the KRX3 again to correct it.

⚠ **IMPORTANT: Do not over-tighten screws during reassembly. The screws should be tightened so that the lock washers are fully compressed but *never* as tight as you can make them.**

☐ In the bottom half of the enclosure, check to ensure the four standoffs are tight against the enclosure. If not, tighten the screws. Two are short standoffs for the board mounting screws and two standoffs have the long screws threaded through them.

☐ Place the KRX3 RF board in the bottom shield so that the long screws extend through holes shown in Figure 3. Press the circuit board down against the standoffs. The board may "snap" into position as the small bumps along the edges of the board slip into the holes in the sides of the shield. When properly positioned, the board will be against the standoffs in the bottom half of the enclosure. If needed, press down gently on the board near the long screws to ensure it is not caught on the threads.

☐ Secure the KRX3 main circuit board to the short standoffs at locations ③ in Figure 3 with the 4-40 3/16" (4.8 mm) black pan head screws and #4 *split* lock washers you removed earlier. Do not use inside tooth lock washers.

☐ If you removed the KBPF3 board, replace it. Be sure the three connectors are aligned so all the pins engage. The connectors are visible from the sides. Secure the board at locations ② in Figure 3. Use the 4-40, 1/4" (6.4 mm) pan head screws and *split* lock washers you removed earlier. Do not use inside tooth lock washers.

☐ Replace the unthreaded sleeves over each of the long screws so they rest against the top of the circuit board (locations ① in Figure 3), then place the top shield over the assembly and adjust its position so the edge of the top fits inside the bottom and rests against the KRX3 main board on all sides. The long screws will pass through holes in the top cover. Secure the top with the knurled nuts finger-tightened only enough to hold the cover in place so it isn't loose. Lock washers are not used under the knurled nuts.

☐ Turn to your KRX3 Installation and Operation manual, and follow the procedures under *Installing the KRX3 Subreceiver Module* and *Final Assembly* to complete the installation and reassembly of your K3. Note that:

  a) You will not need to assemble the battery cover, but be sure it is in place on the battery as shown. The cover is essential to avoid shorting the battery to the bottom of the KRX3 enclosure.

  b) Jumper W4 already will have been removed since the KRX3 was previously installed.

  c) The speaker pad should already be in place.

☐ If you have the K144XV 2-meter option, reinstall it and reconnect the TMP cables as described in your K144XV Owner's manual.

⚠ **IMPORTANT: When you have finished reassembling your K3, you must complete the filter setup in the next step or your subreceiver will not function correctly.**

☐ Refer to the data you recorded in Table 1 and set up the filters you have installed as described under *Configuration / Crystal Filter Setup* in your K3 Owner's Manual.

That completes the installation of crystal filters in your KRX3 subreceiver.