

ELECRAFT KX3 Application Note

Installing the Speaker Grille Cloth

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Background

Some KX3 owners have reported issues with the internal speaker. During our search for the cause, we found that the fabric grille could vibrate if the volume was very high, so we started removing the grilles.

Based on an evaluation of field reports and our own further testing, we've concluded that, in nearly all cases, edge-to-edge contact between the top and bottom covers is to blame, not the grille.

As long as the grille is not creased and is kept flat when the speaker screws are tightened, it should stay out of contact range of the speaker cone.

Order KX3GRILLEKT to obtain the grille and for new speaker mounting screws.

Tools Required

1. ESD Protection (see *Preventing Electrostatic Discharge Damage*, below).
2. #1 size Phillips screwdriver. To avoid damaging screws and nuts, a power screwdriver is *not* recommended.
3. Needle nose pliers.
4. 5/64" Allen Wrench for the VFO knob (supplied with the KX3).
5. Soft cloth or clean, soft static dissipating pad to lay cabinet panels on to avoid scratching.

Preventing Electrostatic Discharge Damage

Your KX3 contains many components susceptible to electrostatic discharge damage (ESD). ESD 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.

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:

- 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).

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)

Procedure

⚠ Observe ESD precautions when working inside your KX3. Wear an ESD wrist strap or touch an unpainted, metal ground frequently while working.

Separating the KX3 Case Halves

- Open the KX3 just as you would to install or remove batteries (see *Internal Batteries* in your Owner's Manual for details about how to do this).
- If batteries are installed, remove them.
- Disconnect the flex cable and the battery cable as shown in Figure 1. The owner's manual cautions against disconnecting the flex cable. That is because the connectors on the flex cable are not designed for heavy use. It is necessary to disconnect the ribbon cable in this case. Gently work the connectors loose holding the stiff section attached to each connector. Do not pull on the ribbon cable itself.

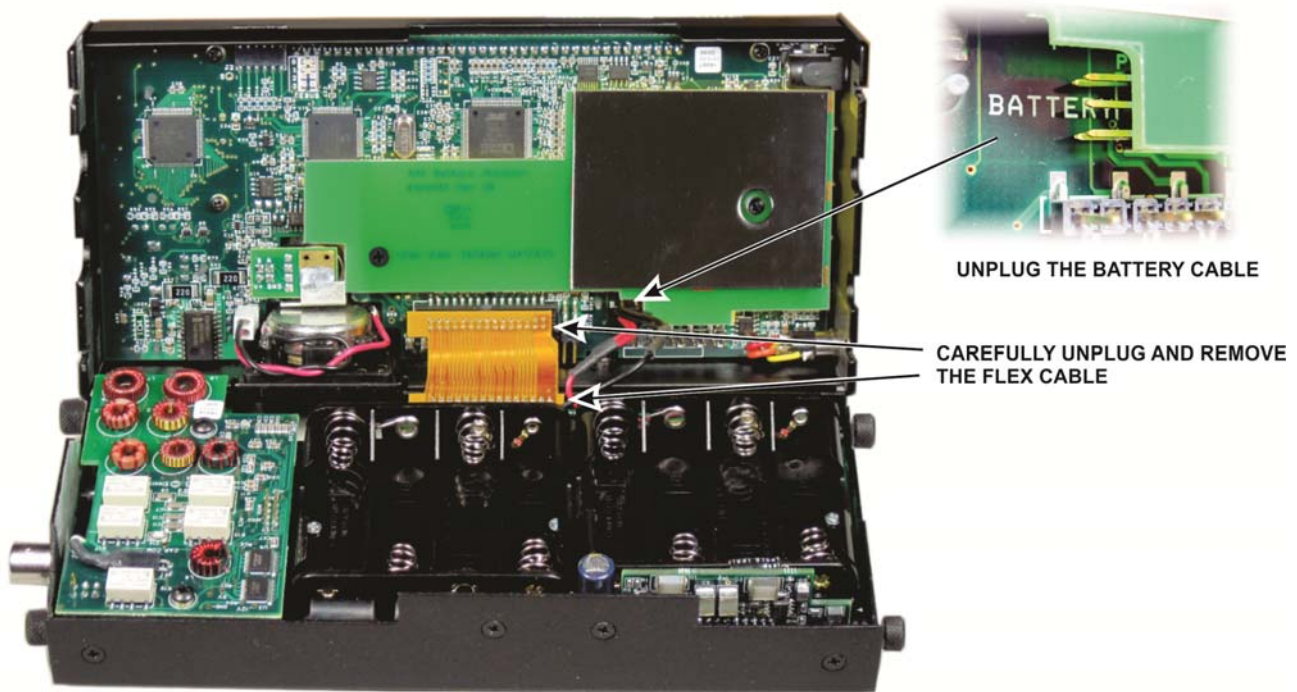


Figure 1. Opening the KX3.

- Set the bottom cover assembly aside in a safe place.

Removing the VFO Encoder

☐ Remove the VFO knob as shown in Figure 2. Use your fingernails or a soft tool to free the finger grip. A sharp tool may scratch the knob.



Figure 2. Removing the VFO Knob.

☐ Turn the assembly over so you can see the back of the encoder. There are two types of encoders used in the KX3. One has a shield soldered to the back of the encoder and the other has a shield that mounts onto the front. If your encoder has a soldered shield, there is a lock washer on the inside of the front panel. Take care not to lose the lock washer between the front panel and the CP board when you remove the encoder in the following steps.

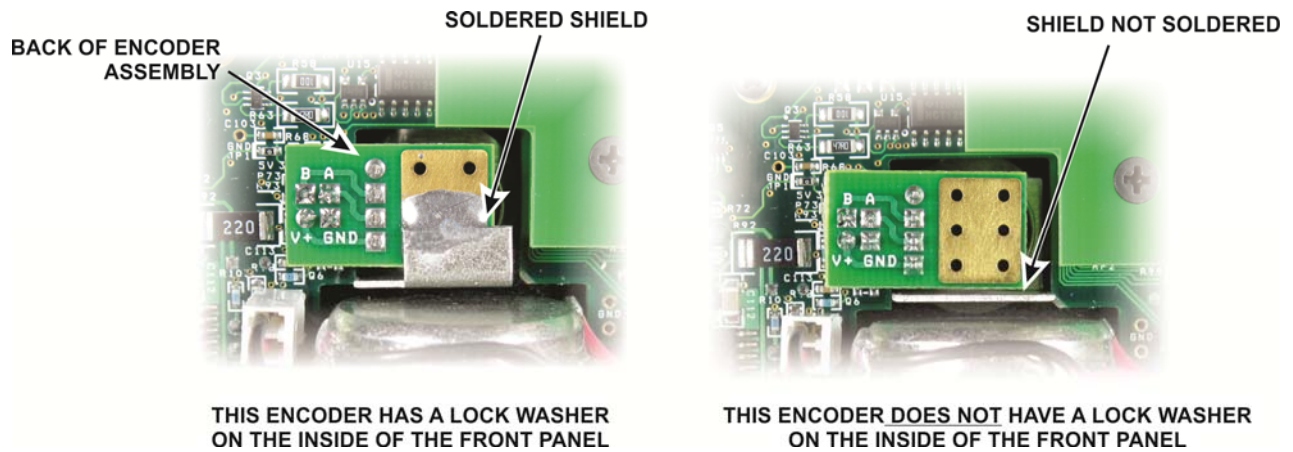


Figure 3. Encoder Types.

- Remove the encoder nut and lock washer (Figure 4). Use your needle nose pliers since there is very little space for a wrench.

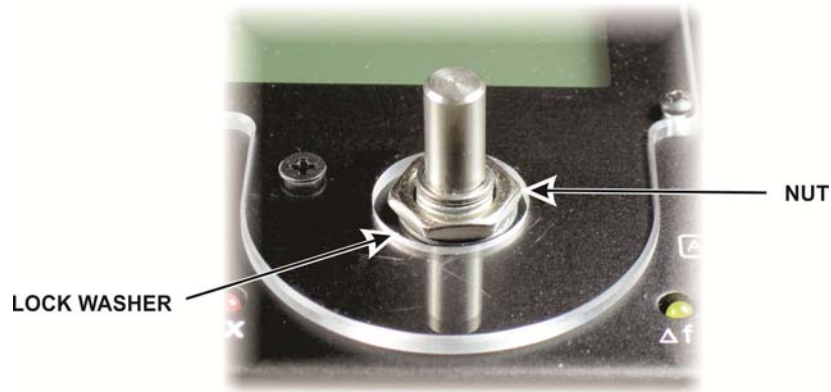


Figure 4. VFO Mounting Hardware.

- The encoder plugs into the CP board and is easily removed with a little pressure on the shaft. If your encoder has the soldered shield (Figure 3), hold the KX3 with the encoder pointing upward as you pull the encoder shaft out of the hole in the front panel to be sure the lock washer does not fall off and become lost between the CP board and the front panel.

- Unplug the speaker cable from the CP board.

- Remove the four screws holding the speaker in place and lift it and the gasket out of the KX3 (See Figure 5). The gasket may be stuck to the face of the speaker or to the inside of the top cover. Discard the gasket and the four mounting screws. They will not be used.

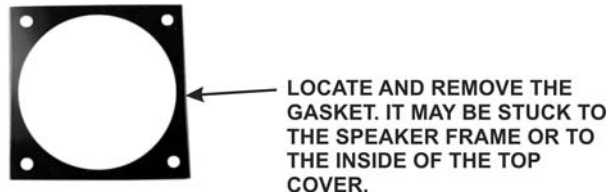
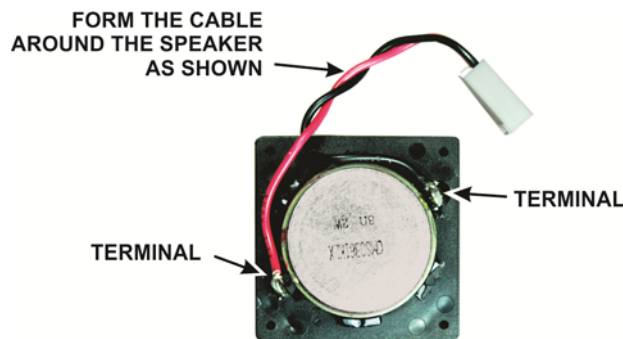


Figure 5. Speaker Gasket.

Installing the Grille Cloth

- Arrange the speaker cable as shown in Figure 6. This is important to ensure you orient the speaker correctly when replacing it in the top cover.



BE SURE THE SPEAKER TERMINALS ARE ORIENTED AS SHOWN. THE COLOR OF THE SPEAKER WIRES MAY VARY: THE RED AND BLACK MAY BE REVERSED OR BOTH WIRES MAY BE THE SAME COLOR.

Figure 6. Orienting the Speaker Cable.

- Inspect the grille and identify the side with a rubber gasket attached (see Figure 7).

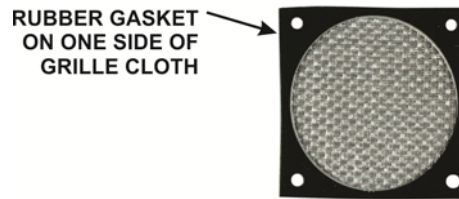


Figure 7. Rubber Gasket on Grille Cloth.

- Position the gasket on the speaker frame as shown in Figure 8 with the rubber gasket (Figure 7) facing the speaker as shown. The grille must lay flat. Otherwise the speaker cone can hit the grille producing distortion and noise.

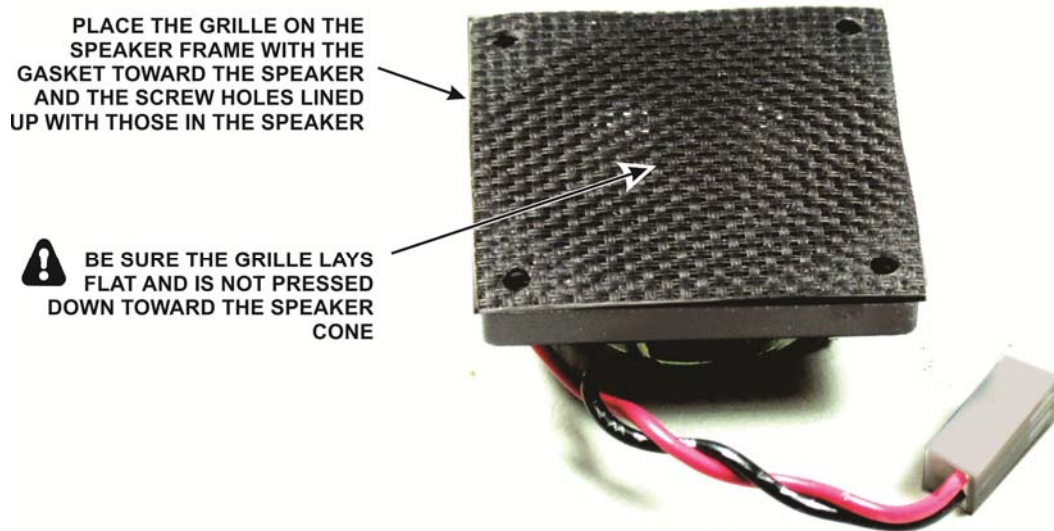


Figure 8. Positioning the Grille and Gasket on the Speaker Frame.

Stand the KX3 on one side with the speaker opening facing up as shown in Figure 9. Lift the speaker with the grill on top and carefully maneuver them into place so the screw holes in the grille and speaker frame line up with the holes in the top cover and with the speaker oriented so the speaker cable is as shown. Secure the speaker with the four screws supplied with your modification kit. They are slightly longer than the originals to ensure they thread into the plastic speaker frame properly. **Do not tighten the screws beyond the point at which the heads reach the metal to avoid stripping the threads.**



Figure 9. Replacing the Speaker in the KX3.

Reassembly

Reconnect the speaker to the CP board as shown in Figure 10. Be sure the wire is positioned as shown.



Figure 10. Reconnecting the Speaker.

Replace the encoder. Be sure to include the lock washer if your encoder has one inside the front cover. Hold the KX3 so the encoder shaft points horizontally or upward until it is through the front panel to avoid losing the lock washer inside the KX3. Be sure the encoder is oriented as shown in Figure 11 and that the four pins engage the sockets on the CP board as shown.

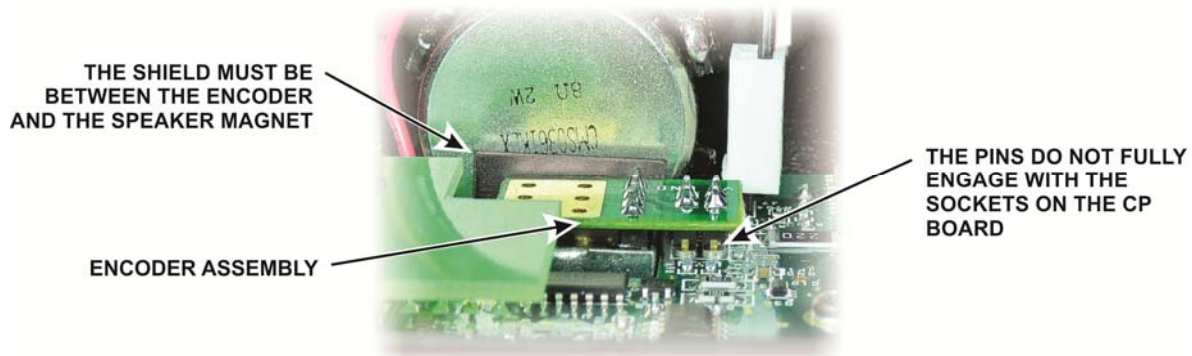


Figure 11. Replacing the Encoder.

Replace encoder nut and lock washer on the front (see Figure 4). A wrench is not required. Needle nose pliers apply enough torque to properly secure the encoder.

Replace the VFO knob by reversing the procedure shown in Figure 2. Before replacing the finger grip on the knob, set the pressure against the felt washer for the amount of drag you prefer. Move the knob in small increments, retightening the set screw after each adjustment, to find the desired amount of drag. A good starting point is to set the KX3 face up and let the weight of the knob define the pressure before tightening the set screw. When you are satisfied, replace the finger grip.

□ Before you replace the flex cable, fit the top and bottom covers together and check the alignment of the top cover just below the speaker with the bottom cover as shown in Figure 12. There must be a gap between the edge of the top cover and the bottom cover as shown. If needed, adjust the top cover as shown in Figure 13. Work carefully, bending the cover in small amounts then rechecking the fit.

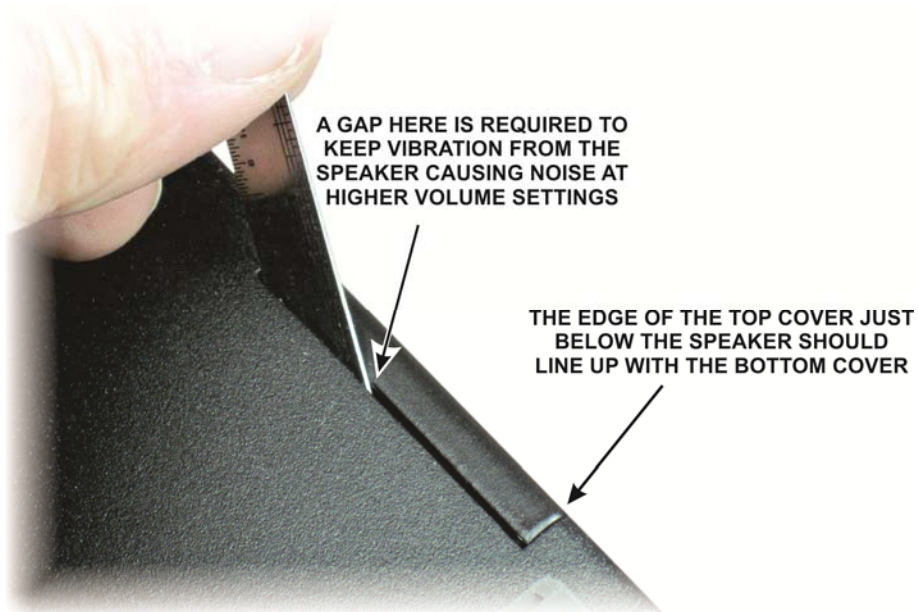
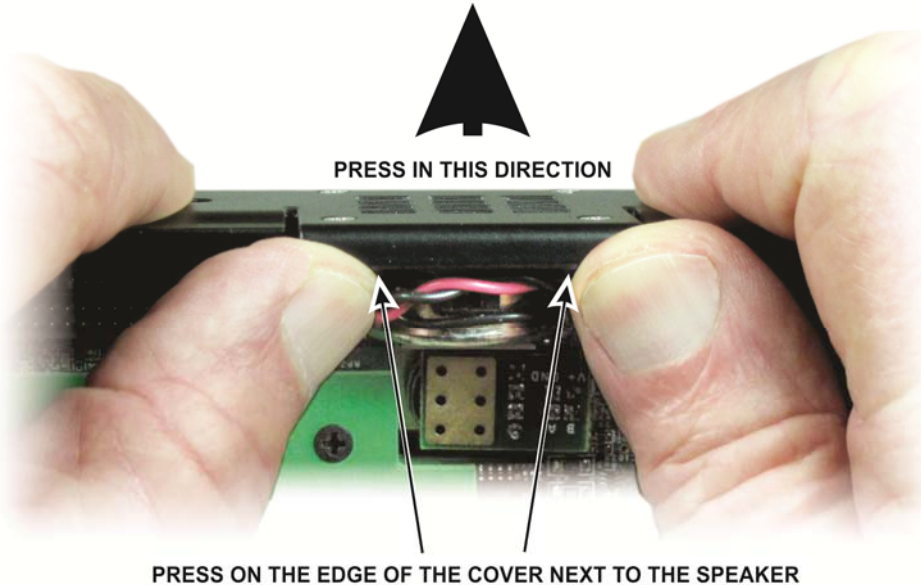


Figure 12. Checking the Cover Fit.



CAUTION: TO AVOID BENDING THE COVER TOO MUCH, DO NOT TRY TO MAKE THE ADJUSTMENT IN ONE TRY. WORK IN SMALL STEPS, CHECKING THE RESULTING GAP AFTER EACH ADJUSTMENT.

Figure 13. Adjusting the Top Cover Fit.

Set the top and bottom parts of the KX3 next to each other as shown in Figure 1, and then reconnect the flex connector and battery cables. Orient the flex cable as shown, with the longer tab at the connector pointing toward the speaker. Route the battery cable away from the flex cables so they do not interfere when the case is closed.

Replace the batteries (if used). Before installing each cell, sheath around the cell for damage. The sheath provides critical insulation to avoid short circuits. Many cells, especially single-use (not rechargeable) alkaline cells, have the entire cell casing connected to the positive terminal which is separated from the negative terminal at the bottom end of the cell by a thin insulator (see Figure 14). If the plastic sheath is damaged, the spring contact in the battery holder can bridge the insulation, shorting the cell. The resulting heat can do extensive damage to the KX3. Damage to the sheath along the sides of the cells can also cause short circuits by touching the metal shield on the battery retainer.

⚠ CAUTION

NEVER USE A CELL WITH ANY DAMAGE TO THE PLASTIC SHEATH. THE CELL BELOW HAS HAD A LARGE SEGMENT OF THE SHEATH REMOVED TO SHOW THE CONSTRUCTION CLEARLY, BUT ONLY A SMALL TEAR ON THE SIDE OR AT THE BOTTOM CAN ALLOW A SHORT CIRCUIT TO OCCUR RESULTING IN SEVERE DAMAGE TO YOUR EQUIPMENT.

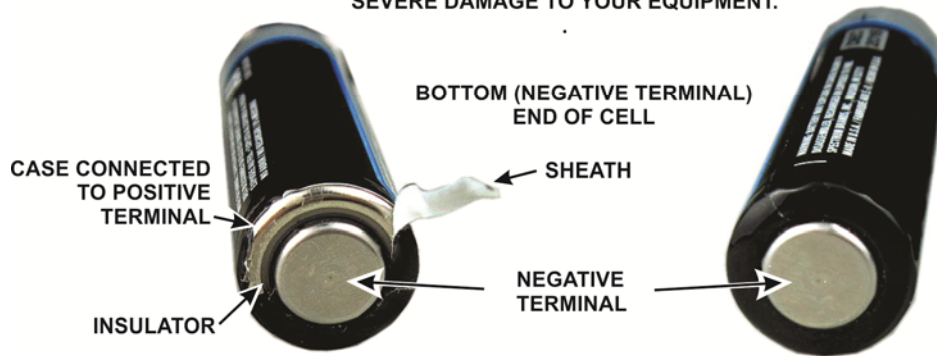


Figure 14. Checking the Battery Cells.

Close the case and tighten all four thumb screws.

This completes the installation of the speaker grille cloth.