

ELECRAFT Application Note

Front Panel Microphone Circuit Modification

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Background

Some K3 owners have noted distorted transmit audio caused by RF energy being coupled into the front-panel microphone input. In most cases this has been corrected by bypassing an RF choke in the K3 microphone circuit as described in this application note. This change has been incorporated into the design of the more recent K3s.

Be certain you have well-shielded cables connecting the microphone or other external device to the K3. The shielding used on audio cables may avoid hum pickup but it is seldom effective at RF. You may eliminate the problem by using small-diameter coaxial cable designed for RF applications, such as RG-174U, for any connections to the microphone connector. In any case, poorly shielded cable may cause trouble even after completing this modification.

This modification requires some simple soldering to install a jumper, but no work with surface mounted devices is required. You will need a short length of wire to use for the jumper.

Was the Change Incorporated in My K3 At the Factory?

You can check your K3 without disassembling it using a DMM to measure the resistance between the center pin (pin 8) and the metal ring on the front panel microphone connector as shown in Figure 1. The resistance should be less than 1 ohm. If the resistance is >3 ohms, the modification has not been done on your K3. Note that many DMMs show a resistance of > 1 ohm when the leads are touched together. First touch the leads together and note the reading, then subtract that value from the reading you get when making the measurement.

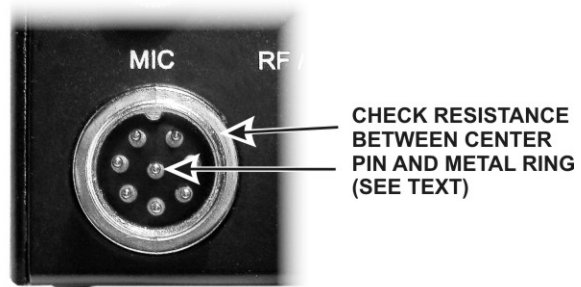


Figure 1. Checking Ground Resistance.

Tools and Test Equipment Required

You will need a DMM for making resistance checks (see above). To modify your K3 you'll need a Phillips screwdriver for removing the case screws, diagonal cutters, long nose pliers and a temperature controlled ESD-safe soldering iron with rosin core small diameter solder. A grounded wrist strap and ESD dissipating mat are recommended whenever you work inside your K3.

Procedure

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

- Remove the K3 top cover as shown in Figure 2.

⚠ Whenever you remove screws from a panel, if one screw seems too tight to loosen without damaging it, first loosen the other screws then try again. Sometimes one screw binds in its hole when the other screws are tightened.

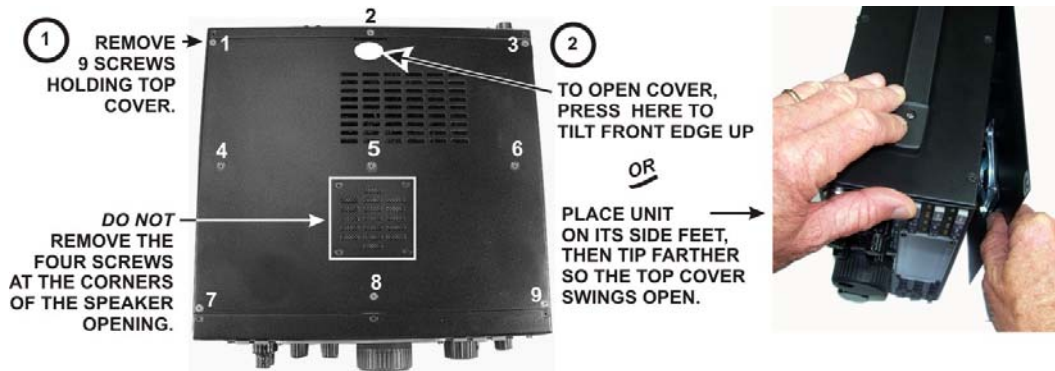


Figure 2. Removing the Top Cover.

Stand the K3 on its side feet, remove the seven screws shown in Figure 3 and lift the left side panel off. Set the side panel aside in a safe place to avoid scratches.

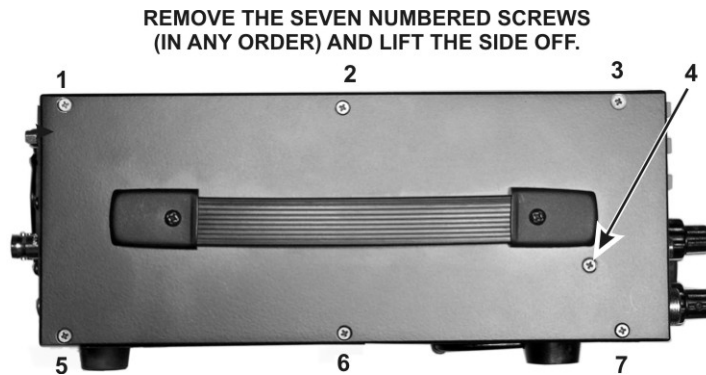


Figure 3. Removing the Left Side Panel.

Remove the screw shown in Figure 4. It is located directly behind the front panel microphone connector. There may be a lock washer under the screw. If so, save it with the screw. Removing the screw ensures the pc boards on the front panel assembly will have adequate clearance when the front panel assembly is removed in a later step. Remove only the screw shown. Leave the other screw in place as shown in the figure.

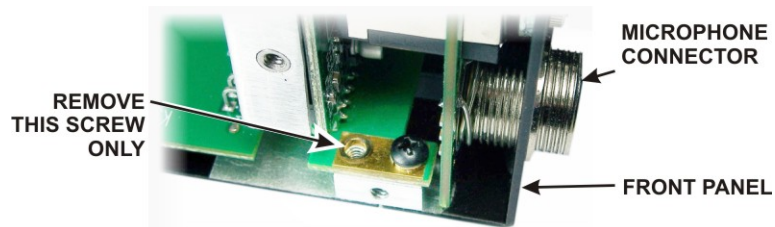


Figure 4. Removing the 2D Screw.

- Remove the three screws securing the top of the front panel assembly as shown in Figure 5.

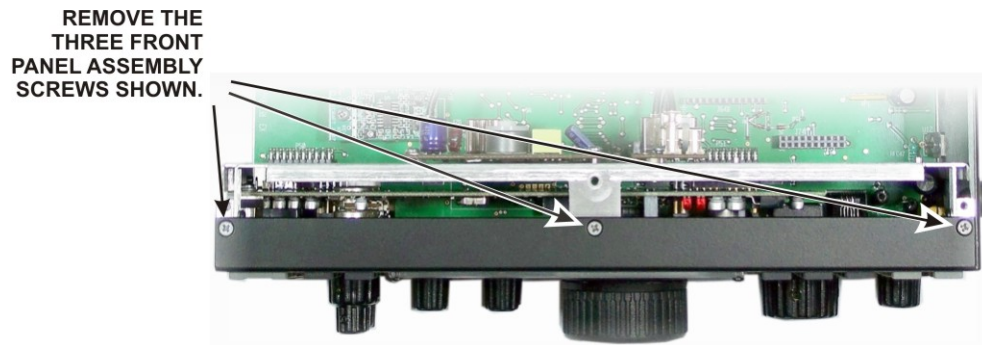


Figure 5. Removing the Top Front Panel Screws.

- Turn the K3 upside down. Place it on a clean, soft surface to avoid scratching the top of the front or rear panels.
- Refer to Figure 6 and remove screws 1 through 7, then lift the forward section of the bottom cover off. Put it in a safe place to avoid scratches.

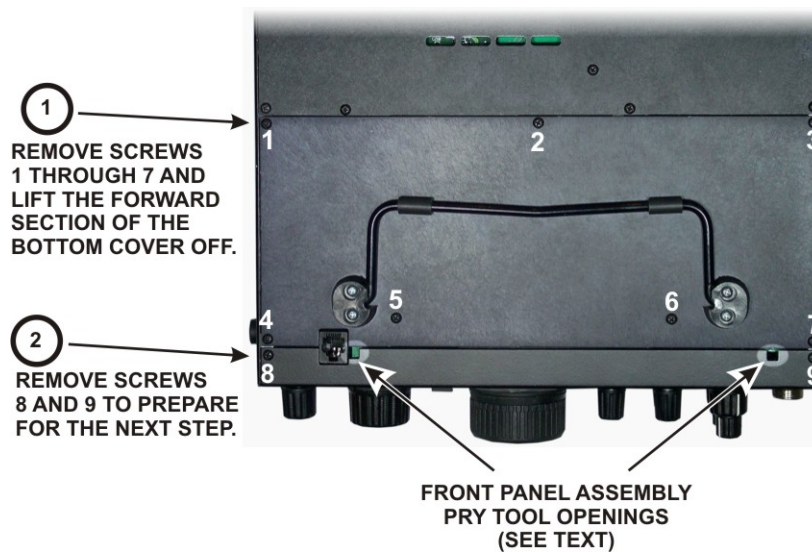


Figure 6. Removing Bottom Cover and Front Panel Assembly Screws.

- Refer to Figure 6 and remove screws 8 and 9 that secure the bottom of the front panel assembly.

⚠ CAUTION: Before continuing on with the next step, be sure you have removed the three top Front Panel Assembly screws shown in Figure 5. You may bend and damage the front panel or shield assemblies if the screws are not removed!

Use a screwdriver in the pry tool openings to press back against the circuit board while pushing the lip on the front panel assembly toward the front as shown in Figure 7. **Do not insert the screwdriver any farther than necessary to avoid damaging components!** When you have the front panel assembly free, set the main chassis aside in a safe place.



PLACE A SCREWDRIVER IN THE NOTCH PROVIDED AT EACH END OF THE FRONT PANEL SO IT PASSES AGAINST THE EDGE OF THE RF BOARD TO PRY THE FRONT PANEL ASSEMBLY LOOSE

Figure 7. Separating the Front Panel Assembly from the Chassis.

On the front panel, remove the knurled nut from the PHONES jack directly above the MIC connector (see Figure 8). Be very careful not to scratch the paint on the front panel.



Figure 8. Phones Jack Knurled Nut.

Place the front panel assembly face down on a smooth, clean soft surface to avoid scratches to the LCD cover or front panel paint

Remove the three screws and split lock washers shown in Figure 9.

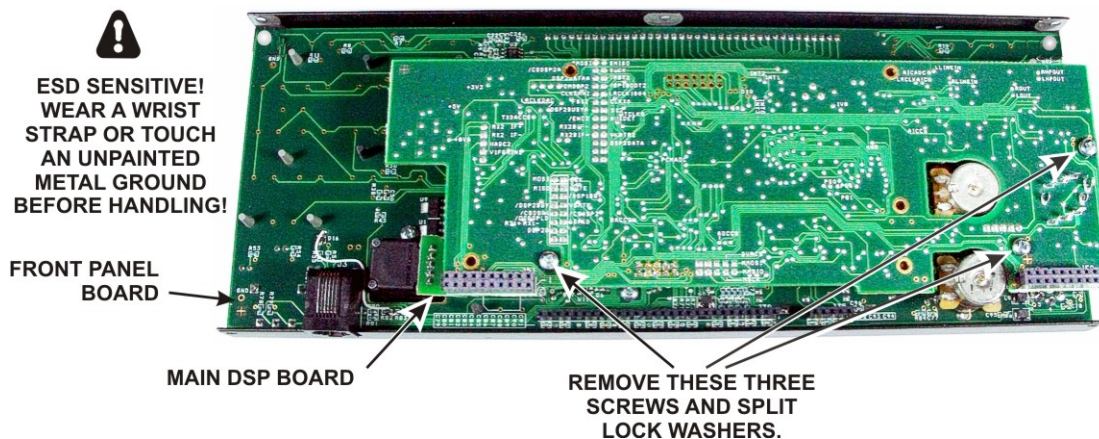


Figure 9. Removing DSP Board Assembly.

With the three screws removed, the main DSP board is held on to the front panel board by two multi-pin connectors. Slip your finger tips between the boards and pull the main DSP board away from the front panel board to unplug it.

A large, thick spacer washer should be lying on the front panel near the hole for the phones jack (see Figure 10). This spacer fits between the phones jack and the back of the front panel board to provide a solid mechanical ground connection when the boards are in place. Remove the washer and set it aside. If it's lying on the inside of the front panel you can tip the panel so it will slide out at the end.

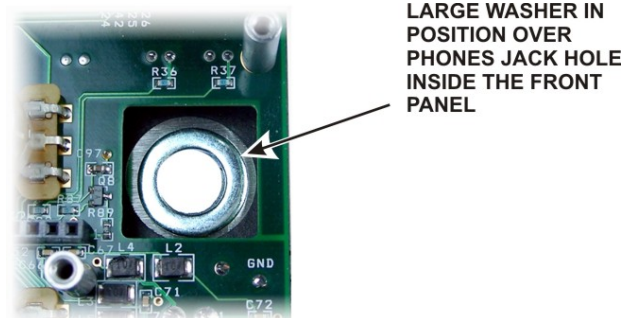
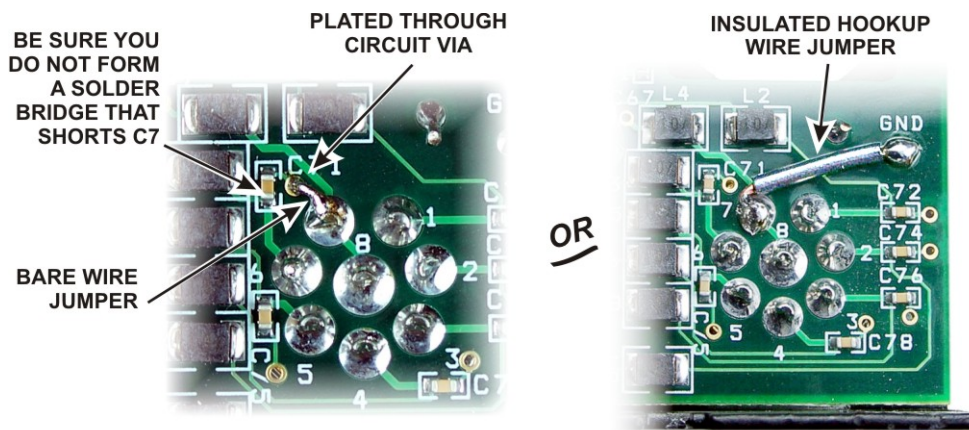


Figure 10. Phones Jack Washer.

⚠ CAUTION: The boards are especially vulnerable to ESD damage when unplugged. Wear a wrist strap or touch an unpainted metal ground frequently when handling the boards to avoid ESD damage.

Locate the back of the microphone connector (directly below the hole for the Phones Jack Washer shown in Figure 10). Install one of the jumpers between pin 7 and ground as shown in Figure 11. Two ways of installing a jumper to ground are shown. They are electrically identical. Choose the one easiest for you.



INSTALL *ONE* JUMPER. CHOOSE ONE BASED UPON YOUR SOLDERING SKILL AND SOLDERING TIP SIZE TO AVOID DAMAGING COMPONENTS OR CREATING SHORTS.

Figure 11. Installing the Ground Jumper.

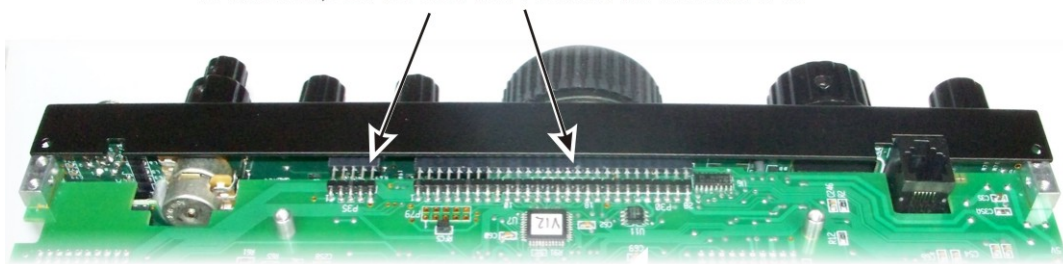
- Mount the DSP board assembly on the front panel board as follows.
 - Place the front panel assembly face down on a soft, clean surface to protect the finish. The back side of the front panel board should be facing upward.
 - Position the large flat washer on the inside of the front panel over the PHONES jack hole (see Figure 10 on page 5). This is easily done by sliding the washer into place from the end of the front panel.
 - Gently position the DSP board assembly on the front panel board so that the large jack fits through the cutout in the front panel board with the threaded section passing through the large flat washer and the circular opening in the front panel. Adjust the position of the board as needed so you can see the standoffs on the front panel board lined up with the screw holes in the main DSP board. Note: The nylon standoff next to J51 rests against the front panel board, but is not attached to it.
 - Pick up the assembly while holding the DSP assembly board in place and inspect the position of the two male plugs on the DSP board. They should mate with J31 and J32 on the front panel board. J31 is near the encoder for VFO A and J32 is between the two dual potentiometers. Adjust the DSP board's position as needed so the pins enter the corresponding holes in the sockets on the front panel board.
 - Squeeze the boards together while ensuring the pins are mating with the connectors until the DSP board is resting against the three standoffs on the back of the front panel board that you installed earlier. The two connectors will not mate completely. About 1/4" (6.4mm) of the pins may be visible when the DSP board is positioned against the standoffs.

Replace the three 4-40 1/4" (6.4 mm) zinc pan head screws you removed earlier with a split lock washer under each screw head (see Figure 9 on page 4).

Replace the knurled nut on the PHONES jack (see Figure 8 on page 4).

Turn the chassis upside down and position the front panel so the pins of P30 and P35 on the bottom of the RF board just begin to engage the connectors on the lower edge of the front panel assembly as shown in Figure 12). Do not fully mate them yet.

POSITION THE FRONT PANEL ASSEMBLY SO THESE CONNECTORS BEGIN TO ENGAGE, BUT DO NOT TRY TO MATE THEM FULLY YET.



BOTTOM VIEW

Figure 12. Mounting the Front Panel Assembly- Mating P30 and P35.

Hold the front panel in place against the chassis assembly and turn the unit over to look at the two multi-pin connectors on the top of the RF board. See if they are engaging the corresponding connectors on the front panel assembly (see Figure 13). Adjust the position of the RF board or the front panel assembly to ensure they are mating properly.

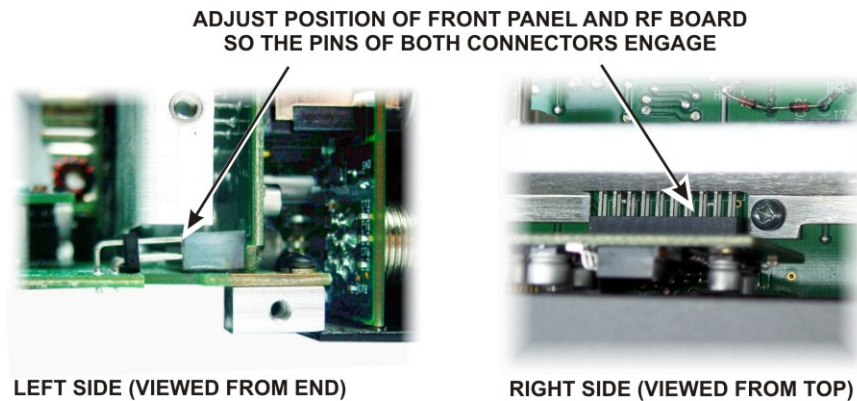


Figure 13. Mounting Front Panel Assembly - Mating P50 and P51.

With the pins of all four connectors started, press the front panel onto the RF board connectors. Press only from the bottom of the front panel to avoid flexing the RF board. You can use your fingers to press on the back side of each multi-pin connector on the top of the RF board while holding the front panel to engage them. There may be small areas of pins showing even after they are mated. You will know they are properly mated when the screw holes on the bottom lip of the front panel assembly line up with the screw holes in the 2D fasteners on the bottom of the RF board.

Secure the front panel assembly at the bottom lip to the 2D fasteners at the forward edge of the RF board with the two 4-40 3/16" (4.8 mm) black pan head screws you removed earlier. No lock washers are used on the external case screws.

Fasten the top of the front panel assembly with three 4-40 3/16" (4.8 mm) black flat head screws (see Figure 5).

Replace the 3/16" (4.8 mm) black pan head screw and, if used, lock washer in the 2D fastener (see Figure 4 on page 2).

Replace the left side panel as follows:

- Start the six 4-40 3/16" (4.8 mm) black flat head screws through the panel: three along the bottom, one at the top rear, one at the top front, and one just below the front end of the handle. It is normal to adjust the position of the panels slightly when assembling so the screw holes line up. The cabinet will become structurally sound and rigid when all the panels, including the top and bottom covers, are mounted.
- Tighten all six screws. ***Be sure all the screws are tight, including the screw near the forward end of the handle that threads into the front panel shield.***

Replace the forward bottom cover using seven 3/16" (4.8 mm) black pan head screws (see Figure 6 on page 3).

Hold the top cover above the K3, route the speaker wire under the stiffener bar and plug it into P25 on the KIO3 board at the left rear of the K3 as shown in Figure 14.

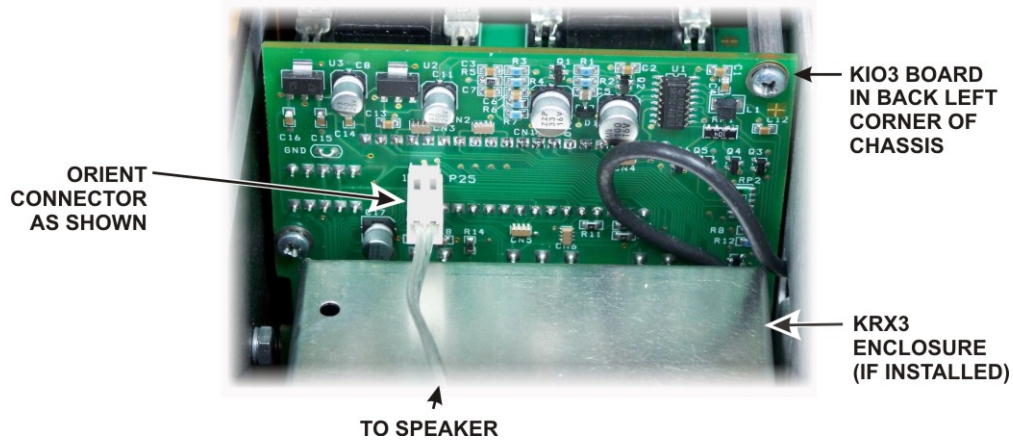


Figure 14. Connecting Speaker Cable.

⚠ IMPORTANT: The cabinet screws are essential for the K3 shielding to work properly. Leaving one loose may result in unwanted birdies in the receiver and other hard-to-troubleshoot problems. Check all of the cabinet screws including the screws on the left side panel, the three screws at the top of the front panel assembly and the screws on the bottom cover and front panel assembly. Be sure every screw has been replaced and is snug, but do not over-tighten them to point of damaging the screw heads or stripping the threads.

This completes your microphone connector grounding modification.