Application Note: K3 Rev B FP Modification

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Symptom: Incorrect K3 VOX operation (VOX 'hangs') and/or low or corrupted TX audio, when using a front panel mic which requires BIAS to be supplied to the mic through the audio pin. (Elecraft MH2, MD2, Proset-K2 with electret elements etc.) Rear panel mic connections do not exhibit this problem.

Applicability: K3s with serial numbers between 660 and 782 with Rev B Front Panel PC boards. *(K3s as early as S/N 654 may demonstrate this problem, but we think the problem starts with S/N 660.)*

Other K3s DO NOT require this mod. Dynamic-style microphones (mics which do not require a bias voltage on the mic audio pin) do not demonstrate this problem.

If you have an electret microphone which is wired for the K3 (Elecraft MH2, MD2, Proset-K2 etc) you can test for presence of this problem by attaching the mic to the front panel mic connector, setting "MENU | MIC fpL bias" or "MENU | MIC fpH bias" and seeing if the symptom above is present.

⚠ **If you have any concerns about your ability to safely complete this modification, contact Elecraft support (support@elecraft.com) with questions or to request the return of your K3 for service.**

This paper is comprised of two (2) sections:
Section A (1 page) which installs a single jumper wire to the rear of the K3 front panel, and Section B, which describes disassembly and re-assembly of an assembled K3.

Preparing for Disassembly

Tools Required

1. #1 size Phillips screwdriver.
2. Soldering iron with a "fine" tip (0.06" / 1.5mm or smaller recommended)
3. 63/37 or 60/40 Sn/Pb-content rosin-core solder, 0.015" to 0.025" (0.38mm to 0.6mm diameter)

SECTION A - Installing the Mod

Note - Refer to SECTION B - K3 Front Panel Disassembly and Re-assembly for instructions on accessing the back side of the Front Panel PC board of an already-assembled K3.

Figure 10, is a partial image of the back side of the K3 Front Panel PC board. Specifically the rear of the **AF Gain/SUB control** and the cutout through which the PHONES jack (from the DSP PC board) passes.

☐ Refer to Figure 10. Note the white wire which is installed between the top-right lead of the upper **AF Gain/SUB control** and the RIGHT side of C98 (partially obscured by the wire, but immediately above C97 in the figure). This is the jumper you will be instructed to install in the following steps.

☐ Cut a 1" length of hookup wire. Strip 1/8" (3 mm) of insulation from each end of the wire and twist the strands of wire tightly together on each end of the tire.

☐ Lightly solder-tin the wires at each end of this jumper wire.

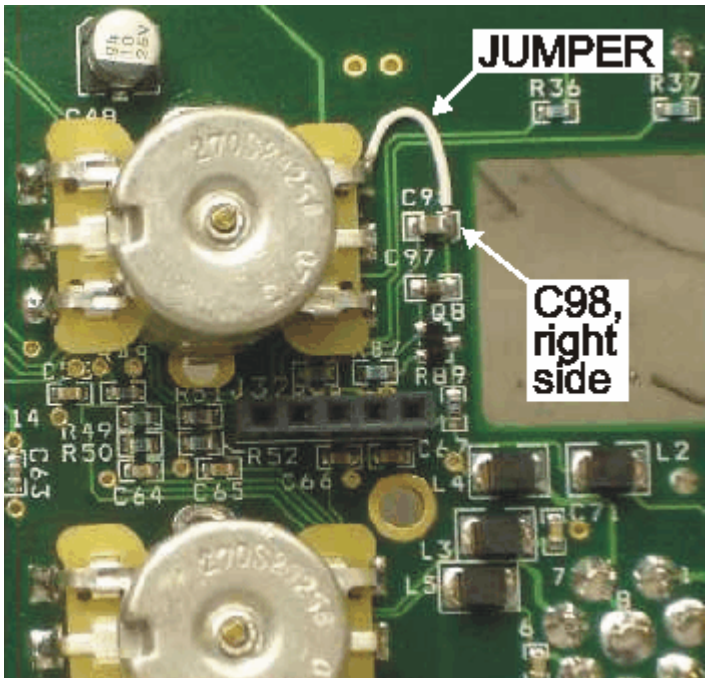

Figure 10. Installation of jumper

☐ Trim the length of ONE END of the wire to 1/16" (1.5 mm). This will be the C98 end of the wire.

NOTE: In the following step, USE CARE to use as little heat as necessary to complete the connection between the jumper wire and the SMD capacitor. Excessive heat, or applying heat for too long can heat the entire SMD capacitor, causing it to become dislodged from BOTH of its solder pads and to become improperly positioned.

☐ With the length of the jumper wire extending upward (toward the top of the Front Panel PC board), lay the 1/16" long end of the jumper wire up against RIGHT SIDE of C98 (side nearest the rectangular cutout in the PC board) and, using a fine-tipped soldering iron, carefully apply heat to the side of the wire, allowing it to melt the solder on the side of the SMD capacitor (C98) and to join with the capacitor at that solder pad. Little (if any) additional solder should be required. The connection should be able to be completed in 3-4 seconds time.

☐ Pre-tin a small spot on the top-right lead of the control just to the left of C98. Apply heat to the lead and apply just a small amount of solder to the heated area.

☐ Bend the jumper wire around until it touches the pre-tinned area of the control lead and touch the junction of the jumper lead and the control lead with your soldering iron. A small amount of additional solder may be required in order to complete a cleanly-soldered connection. Once this connection has been completed, there will be no stress or movement of the joint(s) so there is no need to provide a 'hooked' (or wrapped) connection around the control lead.

This completes the modification

SECTION B - K3 Front Panel Disassembly and Re-assembly

Removing the Front Panel

☐ Disconnect power and all cables from your K3.

☐ Remove the nine (9) 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.

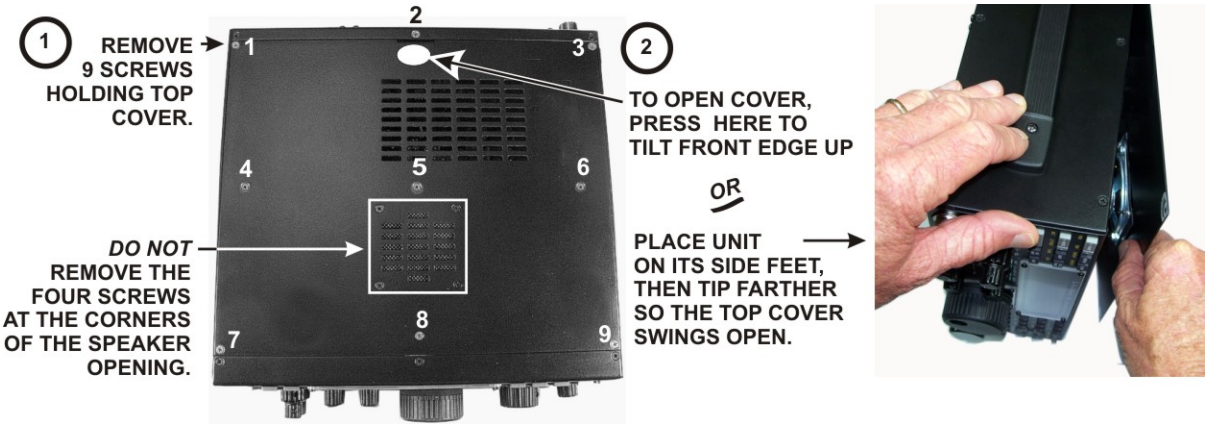

Figure 1. Removing K3 Top Cover.

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

☐ Stand the K3 on its side feet, remove the seven screws shown in Figure 2 and lift the left side panel off. Set the side panel aside in a safe place to avoid scratches.

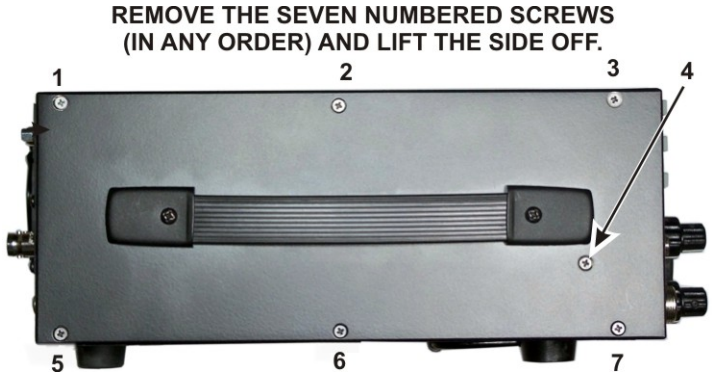

Figure 2. Removing the Left Side Panel.

☐ Remove the screw and lock washer shown in Figure 3. It is located directly behind the front panel microphone connector. This will ensure 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.

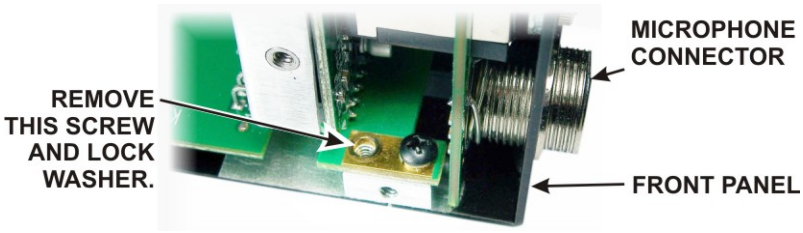

Figure 3. Removing the 2D Screw.

☐ Remove the three screws securing the top of the front panel assembly as shown in Figure 4.

Note: The following step (removal of the stiffener bar) is **OPTIONAL.** Though not specifically required for this mod, temporary removal of the stiffener bar from the K3 will help to ensure that the bar is not accidentally bent as a result of 'handling' of the radio during completion of this modification.

☐ Remove the three screws securing the top of the front panel assembly and the stiffener bar as shown in Figure 4. The screws attaching the end to the side panel has a captive nut. The two screws attaching the stiffener bar to the KPA3 shield may have captive nuts mounted on the stiffener or they may use separate nuts and lock washers.

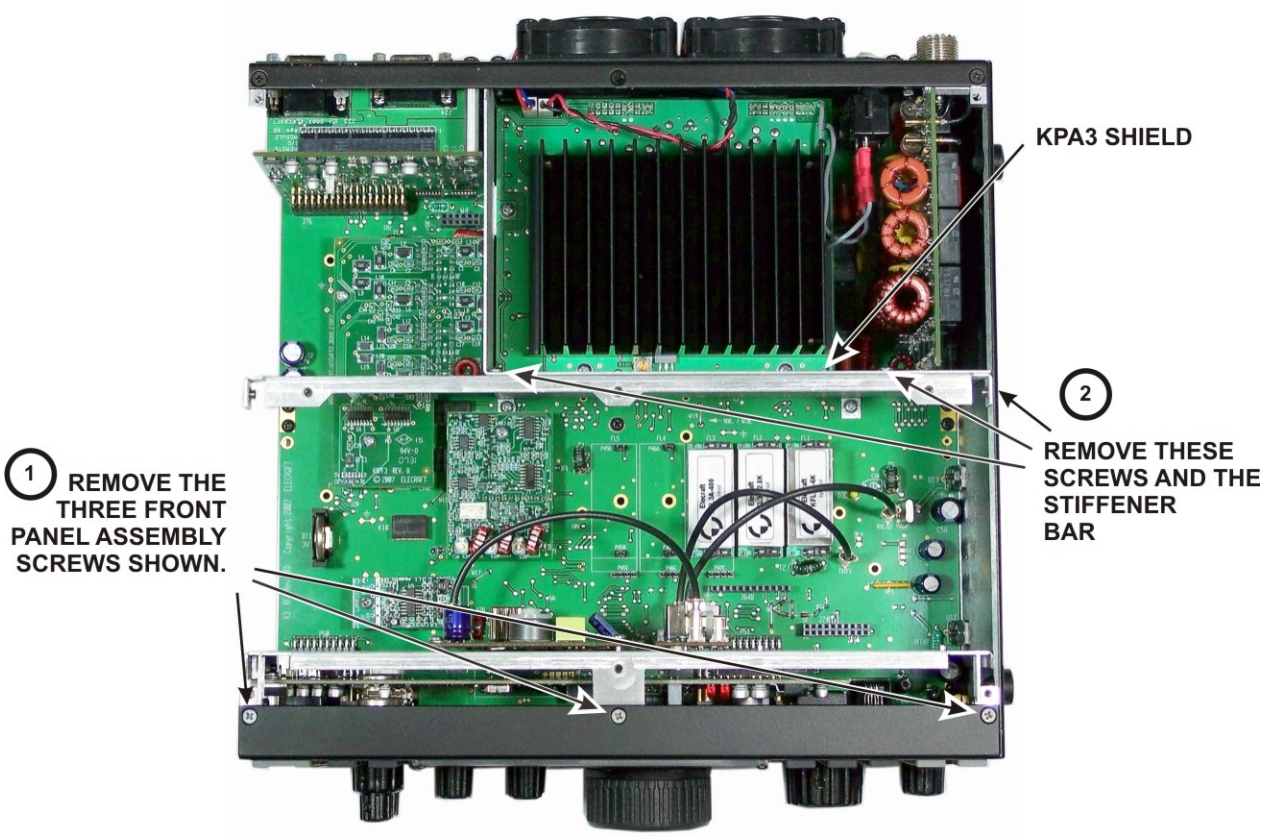

Figure 4. Removing Front Panel Mounting Screws and Stiffener Bar.

☐ 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 5 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.

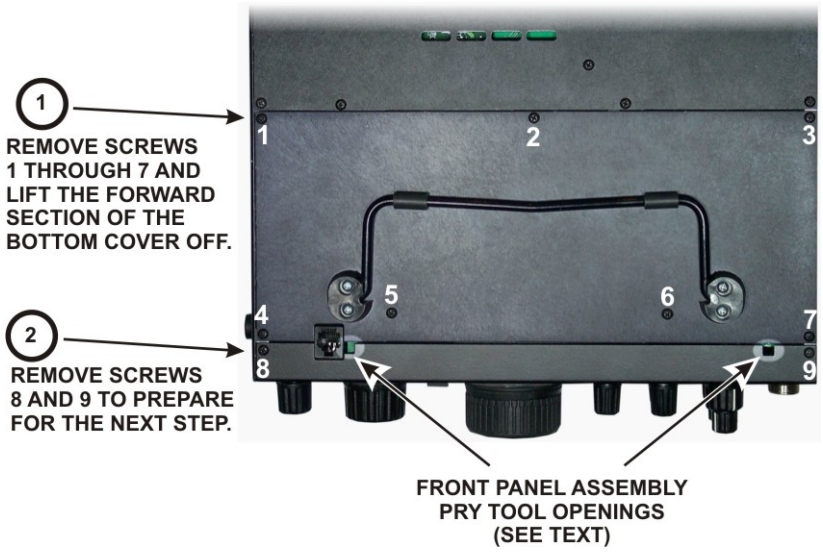

Figure 5. Removing Bottom Cover and Front Panel Screws.

☐ Refer to Figure 5 and remove screws 8 and 9.

> ⚠ **CAUTION: Before continuing on with the next step, be sure you have removed the three top Front Panel Assembly screws shown in Figure 4. 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 6. **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.

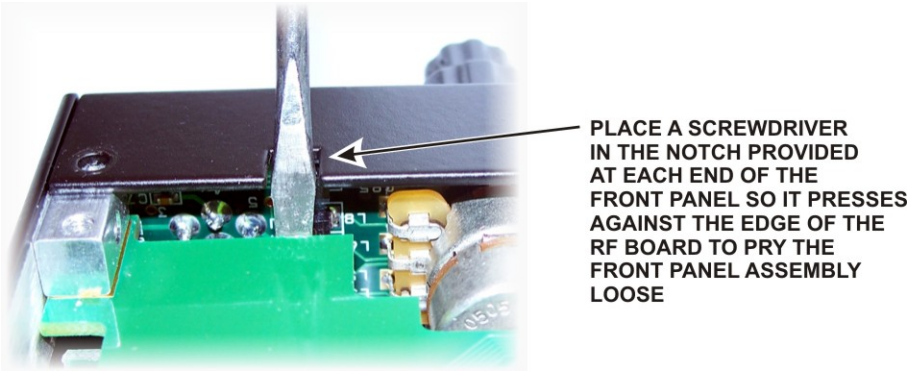

Figure 6. Separating the Front Panel Assembly from the Chassis.

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

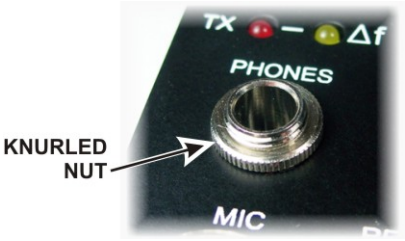

Figure 7. Phones Jack Knurled Nut.

☐ 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 8.

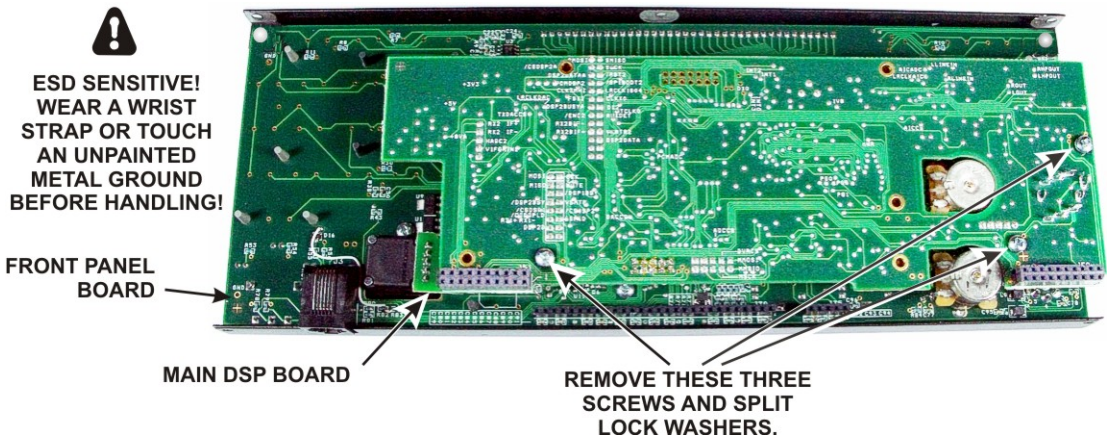

Figure 8. Removing Main DSP Board.

☐ 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 9). 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.

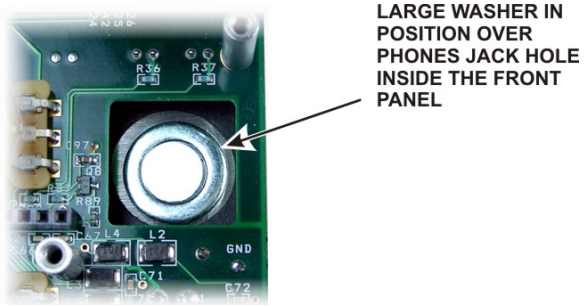

Figure 9. Phones Jack Washer.

Replacing the DSP Board

☐ Mount the DSP board assembly on the front panel board as follows.

⚠ **ESD SENSITIVE: Wear a grounded wrist strap or touch an unpainted metal ground before touching the DSP or front panel boards.**

- ☐ 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 7). 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.
- ☐ 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 inch (6.4 mm) zinc pan head screws you removed earlier with a split lock washer under each screw head (see Figure 8).

☐ Replace the knurled nut on the PHONES jack (see Figure 7).

☐ 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 10). Do not fully mate them yet.

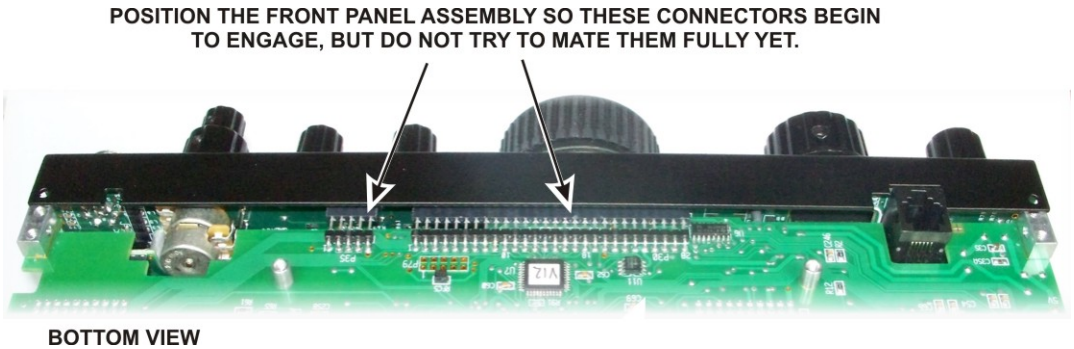

Figure 10. Mounting Front Panel Assembly - Mating P30 and P35.

☐ 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 11). Adjust the position of the RF board or the front panel assembly to ensure they are mating properly.

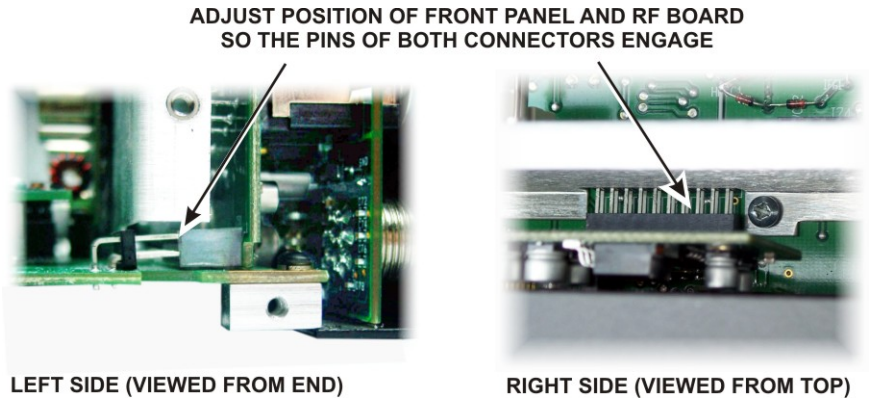

Figure 11. Mounting Front Panel Assembly - Mating P50 and P51.

☐ 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 4).

☐ Replace the 3/6” (4.8 mm) black pan head screw and split lock washer in the 2D fastener (see Figure 3).

☐ Replace the left side panel (with the handle) 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 with all the panels, including the top and bottom covers, are mounted.
- Start one 4-40 3/16” (4.8 mm) black flat head screw at the top corner of the front panel assembly.
- Tighten all seven 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.***

Final Assembly

☐ Replace the forward bottom cover using seven 3/16” (4.8 mm) black pan head screws (see Figure 5).

☐ Set the K3 on its bottom feet. If you removed the stiffener bar to avoid damaging it (Figure 4), replace it now using two 4-40 3/16” (4.8 mm) black flat head screws. Be sure to orient it as shown in the figure.

☐ Hold the top cover above the K3, route the speaker wire under the stiffener bar and plug it into P25 on the KPAIO3 board at the left rear of the K3 as shown in Figure 12.

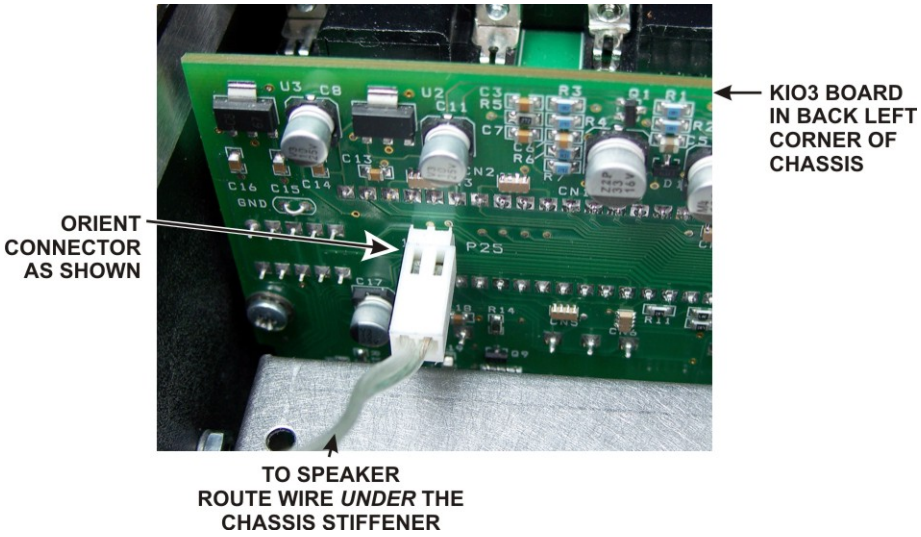

Figure 12. Connecting Speaker Cable.

Position the top cover on the K3. Note that the tab on the back center goes under the rear lip of the K3 rear panel. Secure the top cover with the nine 4-40 3/16” (4.8 mm) black flat head screws you removed earlier.

REPLACE ALL REMAINING SCREWS.

The K3's chassis has excellent rigidity despite its light weight. The screws that hold the top cover in place are an important part of the structural design. Please be sure to replace all the screws and verify they are tight whenever you replace the cover or other panels