

# ELECRAFT® K3

## HIGH-PERFORMANCE 160 – 6 METER TRANSCEIVER

### KDVR3 DIGITAL VOICE RECORDER OPTION INSTALLATION INSTRUCTIONS

Rev C, February 16, 2012

Copyright © 2012, Elecraft, Inc.

All Rights Reserved

# Contents

Introduction.....	3
Customer Service and Support.....	3
Technical Assistance.....	3
Repair / Alignment Service.....	3
Preventing Electrostatic Discharge Damage .....	4
How ESD Damage Occurs.....	4
Preventing ESD Damage.....	4
Preparing for Installation .....	5
Tools Required.....	5
Parts Included.....	5
Installation Procedure .....	6
Removing the Front Panel Assembly.....	6
Removing the DSP Board(s).....	8
Installing the KDVR3 Board.....	9
Hardware Upgrades.....	10
Reassembling the K3.....	11
Preparing the KDVR3 for Operation.....	13
Using the Digital Voice Recorder .....	14

# Introduction

The KDVR3 Digital Voice Recorder allows you to prerecord voice messages to be transmitted and to record received audio. The KDVR3 is contained on a single circuit board that plugs into the main DSP board.

This manual describes how to install the KDVR3 in your K3. See *Digital Voice Recorder (DVR)* in your *K3 Owner's Manual* for instructions for using the KDVR3.

Only a few basic hand tools are needed (see page 5) to perform the installation. No soldering or wiring is required.

## Customer Service and Support

### *Technical Assistance*

You can send e-mail to [K3support@elecraft.com](mailto:K3support@elecraft.com) and we will respond quickly - typically the same day Monday through Friday. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-662-4211. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

### *Repair / Alignment Service (We want to make sure everyone succeeds!)*

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support to get your kit running, so please try that route first as we can usually help you find the problem quickly.)

**IMPORTANT: You must contact Elecraft before mailing your product** to obtain authorization for the return, what address to ship it to and current information on repair fees and turnaround times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location in Aptos. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Aptos without authorization will incur an additional shipping charge for reshipment from Aptos to our repair depot.*

### **Elecraft's 1-Year Limited Warranty**

This warranty is effective as of the date of first consumer purchase (or if shipped from factory, date product is shipped to customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

**Who is covered:** This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided to Elecraft at time of order to insure warranty coverage.

**What is covered:** During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to Elecraft for warranty repair, Elecraft will pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

**What is not covered:** This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

**Limitation of incidental or consequential damages:** This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.

# Preventing Electrostatic Discharge Damage

There is no climate or work location where the components of your K3 are safe from Electrostatic Discharge (ESD) unless you take specific steps to prevent such damage. Many of the components in your K3 can be damaged by static discharges of only a few volts: far too little for you to notice. It is those low-voltage but destructive discharges that easily happen anywhere and under virtually any environmental conditions.

ESD damage may not be apparent at first. The damaged components may not fail completely. Instead, the damage may result in below-normal performance for an extended period of time before you experience a total failure.

## How ESD Damage Occurs

Whenever an object containing a static charge touches a circuit in your K3, current will rush into the circuit until the components reach the same voltage as the source of the static charge. If the voltage or current that passes through a component during that brief period exceeds its normal operating specifications, it may be damaged or destroyed.

## Preventing ESD Damage

ESD damage cannot occur if there is no voltage difference between the components in your K3 and any object that touches them. That is how anti-static packaging works. Anti-static bags allow the static charge to flow over their surface, so that any part of the bag that touches the components inside are all at the same potential at all times. Anti-static foam keeps the leads of sensitive components at the same potential.

At your work bench, avoiding a dangerous voltage is achieved most easily by tying everything together and connecting them to a common mains safety ground. This includes your K3, individual boards or other sensitive components as well as everything they may touch at the work table.

Inexpensive static dissipating work mats are readily-available that will steadily and safely drain off any charges built up on parts or circuit boards placed on them. They are supplied with a lead that connects the mat to the common workbench ground. Also, metal cabinets on test equipment used on the bench should be tied together and connected to the common ground.

Most importantly, you must have a way of continuously draining off any static charges that occur on your body. Such charges are easy to create, even while sitting quietly at the work bench. Moving your feet on the floor, shifting position in your chair or even moving your arms so that clothing rubs against itself can produce destructive static charges. You can discharge yourself by touching an unpainted metal ground, but that will last only until you move in a way that produces a new static charge. The safest technique is to wear a grounded wrist strap with a series 1-megohm resistor that continuously drains off any charges. Such wrist straps are readily-available and inexpensive.

### **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 any live circuits with your other hand or any part of your body.**

We strongly recommend you take the following anti-static precautions (listed in order of importance) to avoid trouble:

- Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag or the component's leads may be inserted in conductive foam. Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.

- Wear a conductive wrist strap with a series 1-megohm resistor. 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. **DO NOT attach a ground directly to yourself as this poses a serious shock hazard.**
- Use a grounded anti-static mat on your work bench.
- If you choose to use a soldering iron to work on your K3 for any reason, be sure your iron has an ESD-safe grounded tip tied to the same common ground used by your mat or wrist strap.

## Preparing for Installation

### Tools Required

1. #0 and #1 size Phillips screwdrivers. To avoid damaging screws and nuts, a power screwdriver is *not* recommended. Use the screwdriver that best fits the screw in each step.
2. Blade screwdriver to fit the pry slots when removing the front panel assembly (see Figure 6 on page 8).
3. Pliers for installing 1/4" (6.4mm) nuts and standoffs
4. Small diagonal cutters.
5. Soft cloth or clean, soft static dissipating pad to lay cabinet panels on to avoid scratching.

The following tools are strongly recommended:

1. ESD wrist strap.
2. Static dissipating work pad.

### Parts Included

The following parts should be included in your kit. Check to ensure you have them all. If any parts are damaged or missing, contact Elecraft for replacements (see *Customer Service and Support*, page 3).

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	KDVR3 Printed Circuit Board Assembly  <i>ESD Sensitive.</i>	1	E850246
	Standoff, Hex Male/Female, 7/16" (11mm)	1	E700017
	Standoff, Nylon, 5/8" (15.9 mm)	1	E700163
	Screw, Nylon, Pan Head 4-40, 1/4" (6.8 mm)	3	E700166
	Screw, Zinc, Pan Head 4-40 1/4" (6.8mm)	1	E700005
	Lock Washer, 4-40, Split	3	E700004
	Nut, 4-40	1	E700011

# Installation Procedure

## Removing the Front Panel Assembly

- 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.

**⚠ CAUTION:** 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.

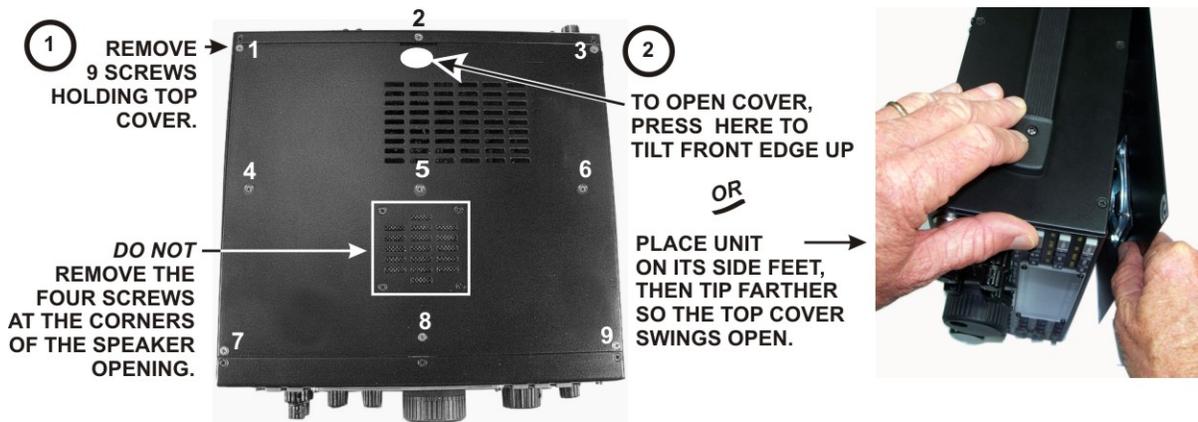


Figure 1. Removing K3 Top Cover.

**⚠ CAUTION:** Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3. See *Preventing ESD Damage* on page 4 for more information.

- 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.

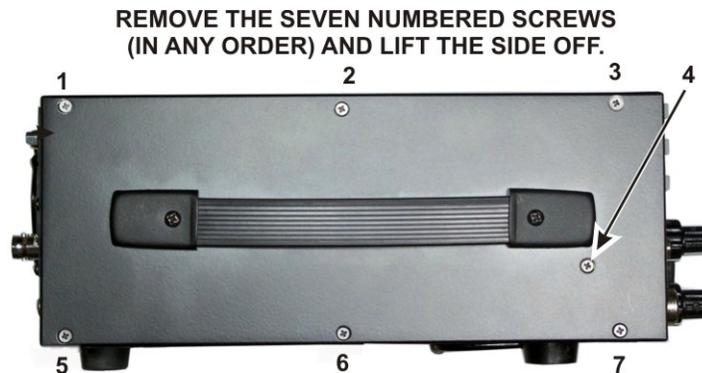


Figure 2. Removing the Left Side Panel.

Remove the screw shown in Figure 3. 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.

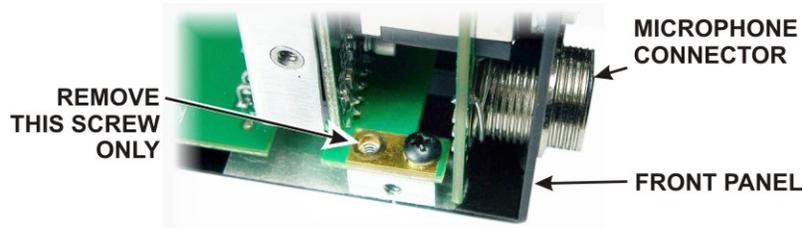


Figure 3. Removing the 2D Screw.

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

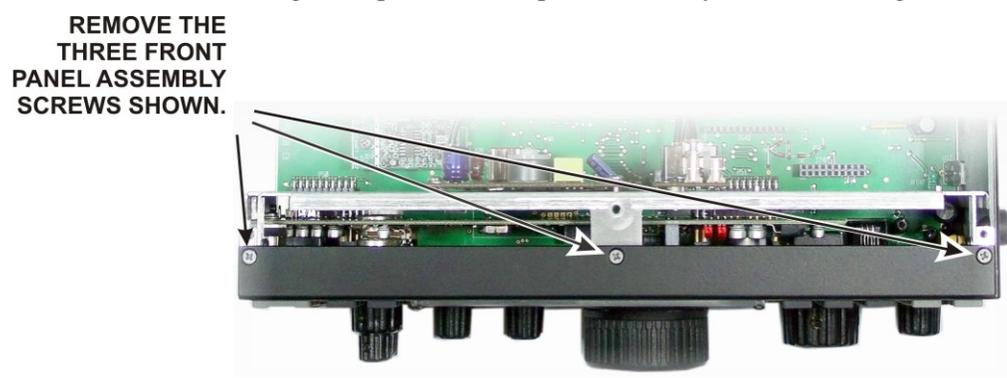


Figure 4. Removing the Top Front Panel Screws.

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 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.

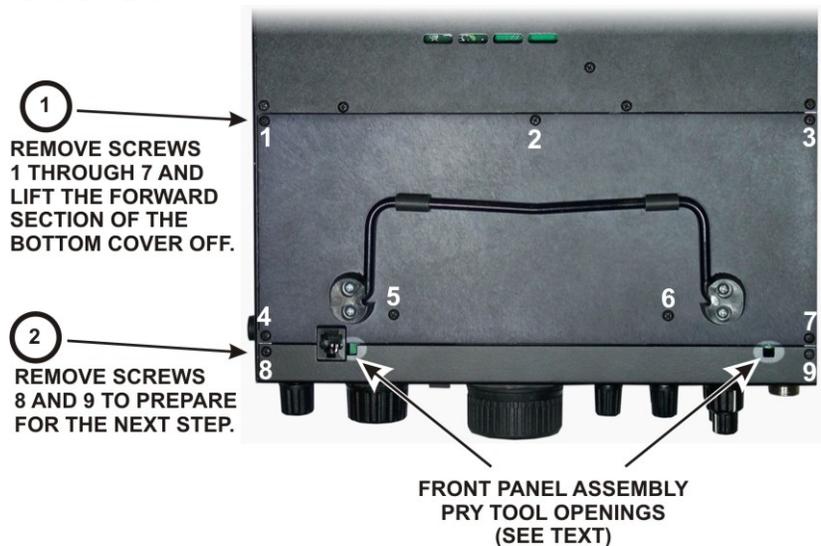


Figure 5. Removing Bottom Cover and Front Panel Assembly Screws.

Refer to Figure 5 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 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.



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 6. Separating the Front Panel Assembly from the Chassis.

## Removing the DSP Board(s)

On the front panel, remove the knurled nut from the PHONES jack directly above the MIC connector (see Figure 7). Be very careful not to scratch the paint on the front panel.



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

Figure 7. Phones Jack Knurled Nut.

Remove the three screws and split lock washers shown in Figure 8.

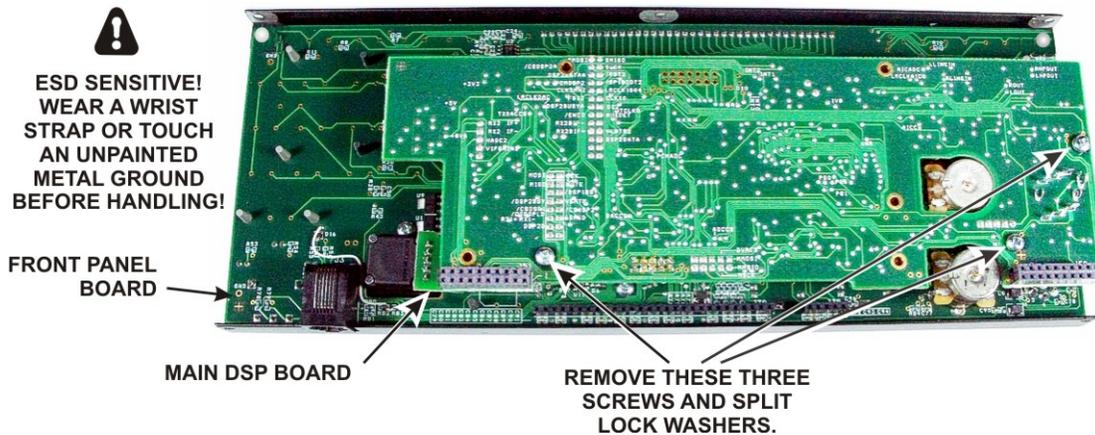


Figure 8. Removing DSP Board Assembly.

□ 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 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.

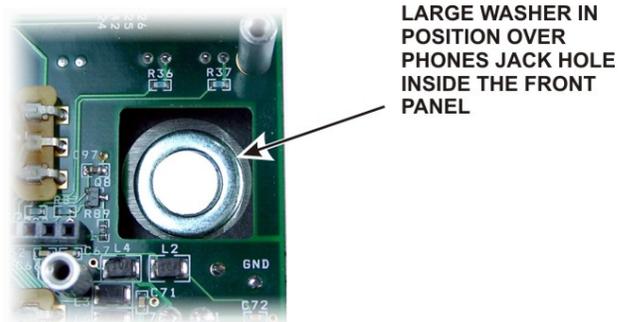


Figure 9. Phones Jack Washer

### Installing the KDVR3 Board

□ Install the KDVR 3 board on the main DSP board as shown in Figure 10. Be sure you use the nylon screw. A metal screw here may short to the front panel board after reassembly. **Do not over tighten the nylon screw. It is easy to strip the threads. Look at the split in the lock washer and tighten the screw only until the washer is compressed flat.**

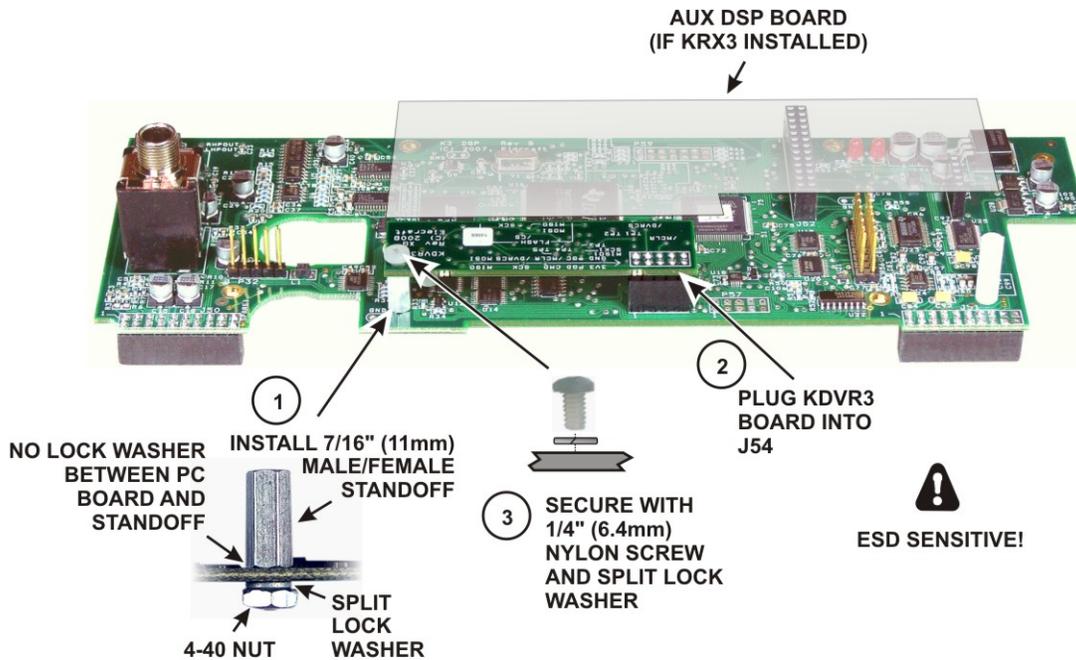


Figure 10. Installing the KDVR3 Board on the Main DSP Board.

## Hardware Upgrades

The following changes have been implemented in newer K3s to avoid the possibility of shorts or intermittent operation in some K3s. All the hardware needed is supplied with your KDVR3 kit.

If you have the KRX3 installed, check the three screws securing the auxiliary DSP board to the main DSP board to see if they are nylon or metal (see Figure 11). A nylon screw was originally used in one location. If the other two are metal, replace them with the 4-40, 1/4" (6.4mm) nylon screws supplied. Use the same metal split lock washers under each screw. This change eliminates the possibility of one of the metal screw heads shorting to a live circuit on the front panel board.

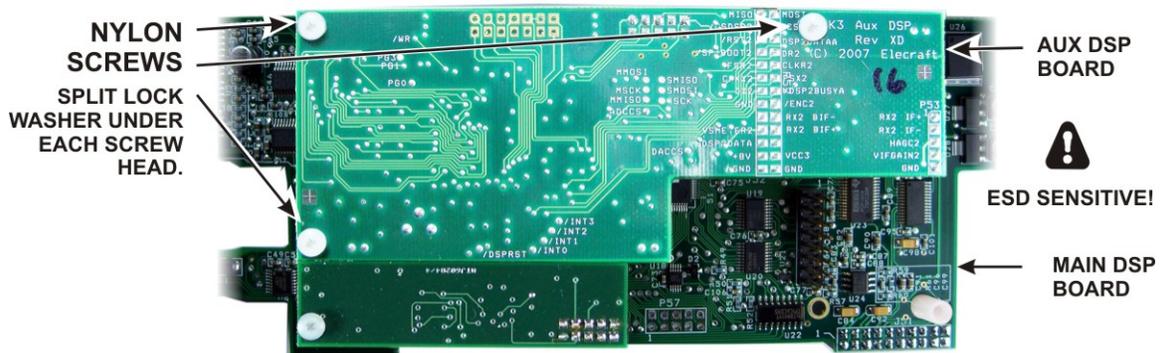


Figure 11. Aux DSP Board Screws.

Check to see if the nylon standoff shown below near J51 is mounted on the main DSP board (see Figure 12). If not, install the nylon standoff supplied with your KDVR3 parts as shown. Be sure you place it in the correct hole near the corner of the board. This standoff ensures that the main DSP board does not flex when the front panel assembly is mounted on the chassis.

**CAUTION:** To avoid damaging a circuit trace very close to the metal ring around the screw hole, position the lock washer under the screw so the split faces away from the trace. Tighten the hardware by turning the standoff while holding the screw and lock washer stationary. *Do not over-tighten the screw. It is easy to strip the threads in the nylon standoff.*

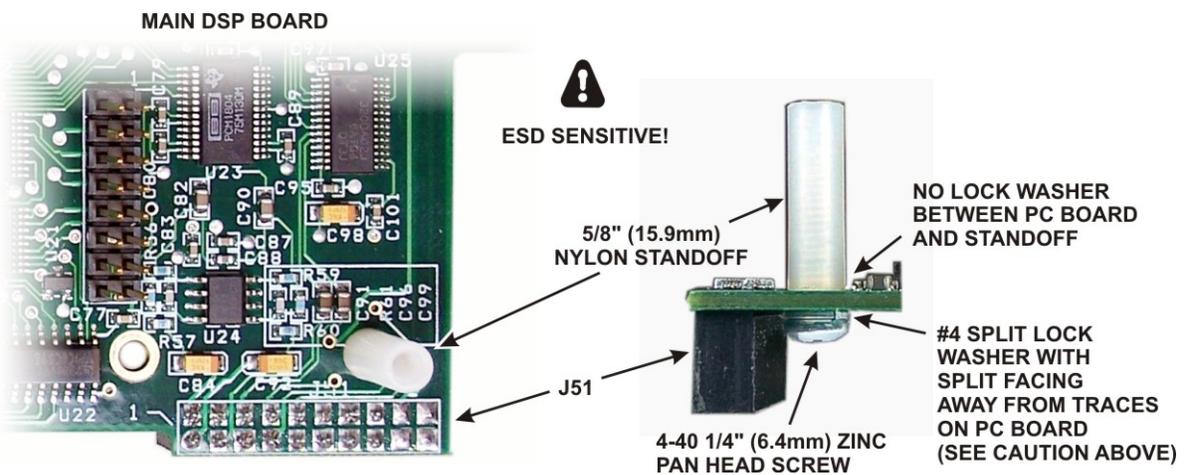


Figure 12. Installing Nylon Standoff on Main DSP Board.

Check the VFO B encoder and trim the pins as shown below if they haven't been trimmed already to ensure they cannot short against the main DSP board. If trimming is needed, remove the encoder to ensure clipped ends don't get lost in the front panel assembly. To remove the encoder, loosen the set screws and remove the knob, then remove the felt washer and nut and lift the encoder out. You need trim only the five pins shown close to the back of the pc board. Replace the encoder by reversing the process. Be sure the spacer nut on the inside is tight against the shoulder of the ferrule.



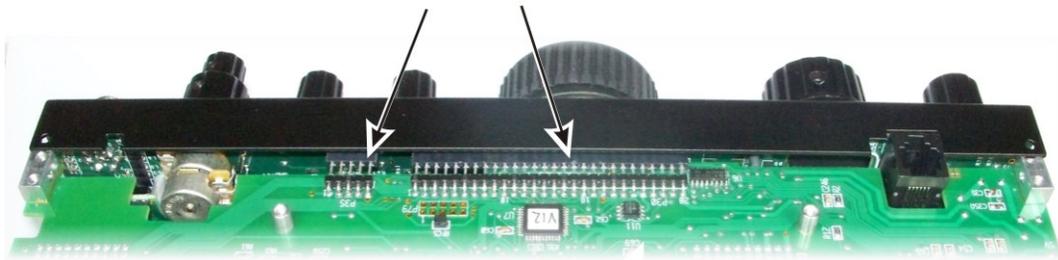
Figure 13. Checking and Trimming the VFO B Encoder Pins.

## Reassembling the K3

- 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 9 on page 9). 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 8 on page 8).
- Replace the knurled nut on the PHONES jack (see Figure 7 on page 8).

- 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 14). 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.**

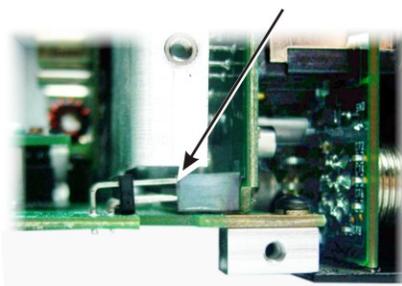


**BOTTOM VIEW**

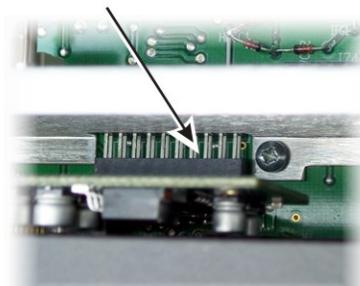
Figure 14. Mounting the Front Panel Assembly- Mating P30 and P35.

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

**ADJUST POSITION OF FRONT PANEL AND RF BOARD SO THE PINS OF BOTH CONNECTORS ENGAGE**



**LEFT SIDE (VIEWED FROM END)**



**RIGHT SIDE (VIEWED FROM TOP)**

Figure 15. 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 3/16" (4.8 mm) black pan head screw and, if used, lock washer in the 2D fastener (see Figure 3 on page 7).

- Replace the left side panel (with the handle) as follows:
  - Start the seven 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 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.**
- Replace the forward bottom cover using seven 3/16" (4.8 mm) black pan head screws (see Figure 5 on page 7).
- 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 16.

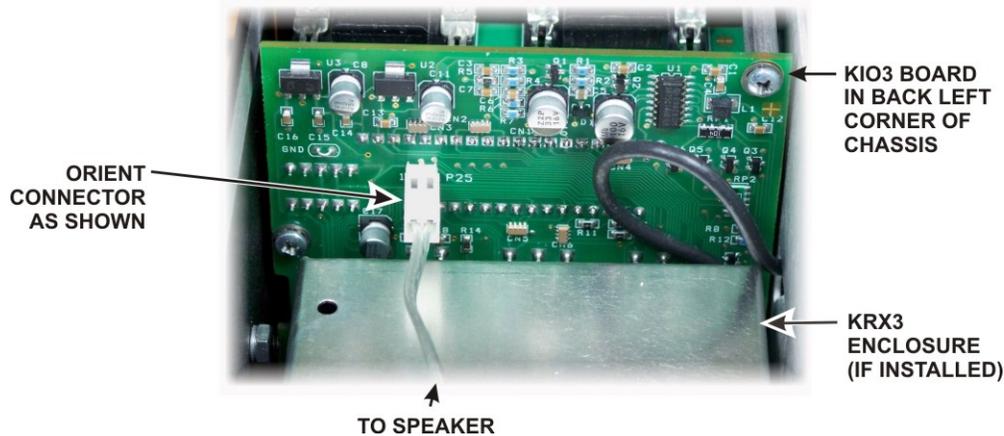


Figure 16. Connecting Speaker Cable.

- Replace the nine top cover screws shown in Figure 10 on page 6. Replace and tighten all the screws. Loose or missing screws may result in birdies or other hard-to-locate problems with your K3.

## Preparing the KDVR3 for Operation

- Enable the K3DVR module as described in your K3 Owner's Manual under *Option Module Enables*.

**⚠ Your KDVR3 will not operate until you have enabled it as described in the step above.**

That completes the installation of your KDVR3 digital voice recorder. Detailed instructions for using your digital voice recorder are on the following page.

## Using the Digital Voice Recorder

**Note:** You must have MCU firmware version 2.73 or later installed.

The KDVR3 option allows you to record and play voice messages as well as capture received audio.

### Transmit Message Record and Playback

- ⓘ MIC gain must be set to show 5 bars on the ALC display on voice peaks for the proper recording level.

You cannot transmit and record at the same time:

**Using PTT:** You do not need to press the PTT unless that is required for your mic to produce audio. In that case, press the PTT after starting record or you will transmit, not record. Once recording starts, you will not transmit even if you are still holding the PTT closed at the end of the recording time period.

**Using VOX:** Either disable VOX while recording or take care not to trip the VOX until after starting record or you will transmit, not record. Stop speaking at the end of the recording period to avoid accidentally transmitting.

To start recording, tap **REC** then tap any of **M1** - **M4**. The remaining buffer time in seconds will be displayed as you speak. Tap **REC** again to stop. **Hold REC** to select bank 1 or 2 (4 messages each).

Tap **M1** - **M4** to play. To cancel, tap **REC**.

To auto-repeat a message, *hold* (rather than *tap*) **M1** - **M4**. *MAIN: MSG RPT* sets the message repeat interval (1 to 255 seconds).

To play back two memories in a continuous chain, hold the memory button for the first message until **REPEAT** appears, then tap the memory button for the second message. **CHAIN** will appear briefly. The second message will start automatically after the first message ends.

### Receive Audio Record and Playback

Hold **AF REC** to start record. The  icon will flash slowly. To stop recording, hold **AF REC** again. The most recent 90 seconds of recorded audio will be available for playback.

Hold **AF PLAY** to start play. The  icon will flash quickly. A seconds counter will be displayed on VFO B, along with an asterisk (\*) if you're within the most recently recorded audio segment. Rotating VFO B jumps forwards/backwards through recorded audio. To stop play, tap any button.

To transmit recorded audio, press the PTT or tap **XMIT**. If you tap the **XMIT** button, do so before starting playback since tapping any button stops playback.

### IMPORTANT NOTES:

1. Messages may be at least 10 seconds long.
2. The recorder takes the audio after the MIC gain control but before it is filtered and processed. Compression and equalization may be applied to playback audio.