K3 EXTERNAL ALC MODIFICATION

Revision B, February 14, 2009

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Introduction

MCU firmware release from 1.99 with DSP firmware release from 1.76 provide the capability to use external, negative-going ALC voltage to reduce the transmit drive level from the K3.

⚠ **We strongly recommend** that external ALC only be used to protect your amplifier during operation into a failed load or other serious condition. In fact, most amplifiers have such protection built in, and do not need or specify the use of ALC. ALC should not be used as a way to clip or compress fast voice peaks. The K3's ALC uses a moderate attack time specifically to prevent signal distortion due to ALC action, so it is the responsibility of the operator to keep drive below this level.

⚠ **Do not set the K3's power level to maximum** and adjust the amplifier output using the amplifier's ALC control! This will result in splatter and key clicks. Instead, adjust the drive on each band so it's just below the level where ALC starts to activate. K3 firmware provides per-band power control to make this practical.

⚠ **Before you use the External ALC feature**, you **must** make the following modifications to your K3. If you apply an ALC voltage to the K3 without making these modifications, you risk damage to the K3 DSP module!

Modification Procedure

Using external ALC involves four steps:

- Install the MCU and DSP firmware.
- K3 hardware modifications.
- Enable the EXT ALC function.
- Connect the K3 ALC input to your amplifier or transverter.

Let's take them in order.

Install MCU and DSP Firmware

Use K3 Utility to perform the firmware update. The new firmware does not require the modifications to the K3 if you are not going to use external ALC. To use external ALC, you **must** install the new firmware.

K3 Hardware Modifications

⚠ The modifications can be made to your K3 without using external ALC. The K3 will function normally with these modifications.

You will need: three resistors; Philips screwdriver; razor blade, hobby knife or other means to cut traces on PC boards; solder; soldering iron; pliers or nut driver. The three resistors are available on request from Elecraft. The values needed one each of 69.8K 1% (blue-white-gray-red-brown), 100K 1% (brown-black-black-red-brown) and 137K 1% (brown-orange-violet-red-brown).

Remove the front bottom cover from your K3. Cut two (2) traces as shown in the illustration below:
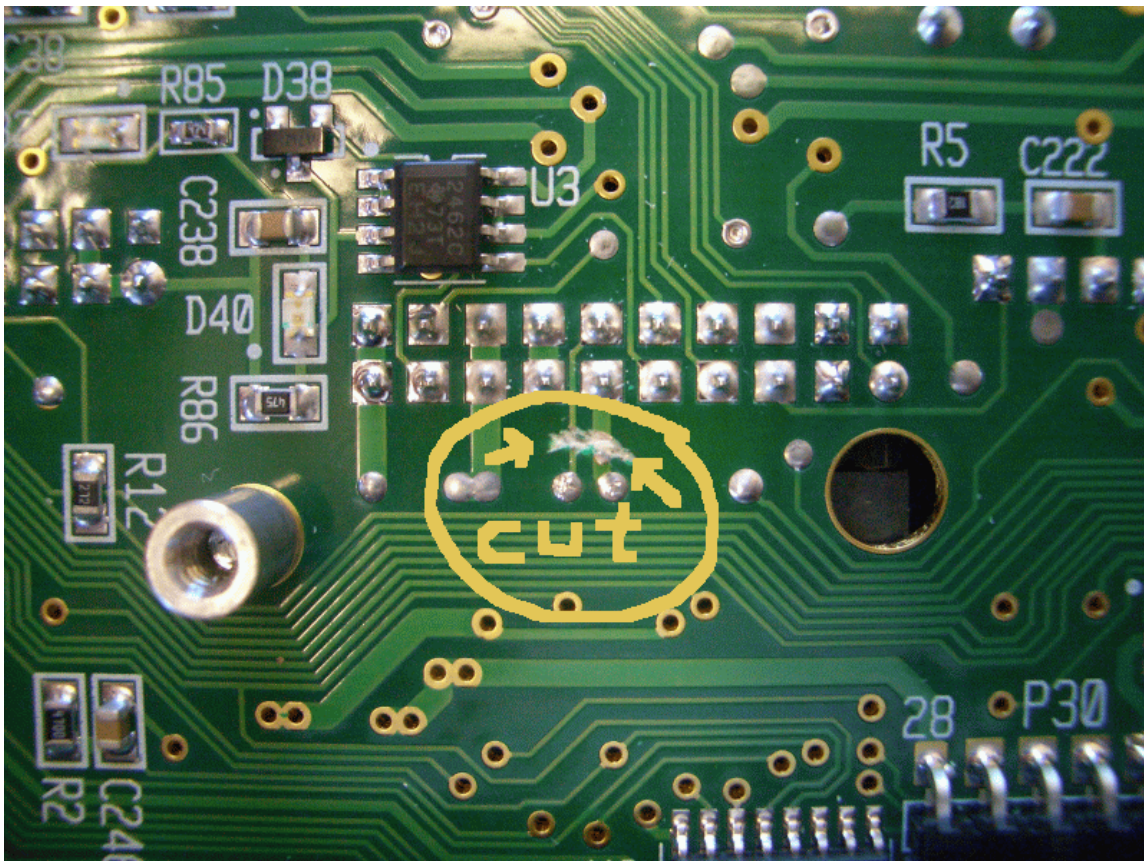
Verify the cuts with an ohmmeter. When you are satisfied the cuts are complete, reinstall the front bottom cover.

Remove the top cover from your K3. Remove the cover plate from the KIO3. You must remove the jackscrews on the DE-9 and DE-15 connectors to remove the cover plate. Remove the Digital IO board. This is the board with the DE-9 and DE-15 connectors.

On the bottom of the Digital IO board you must cut one (1) trace and add three (3) resistors. Refer to the illustration for details. All three resistors are soldered to pin 12 on the header where they join.
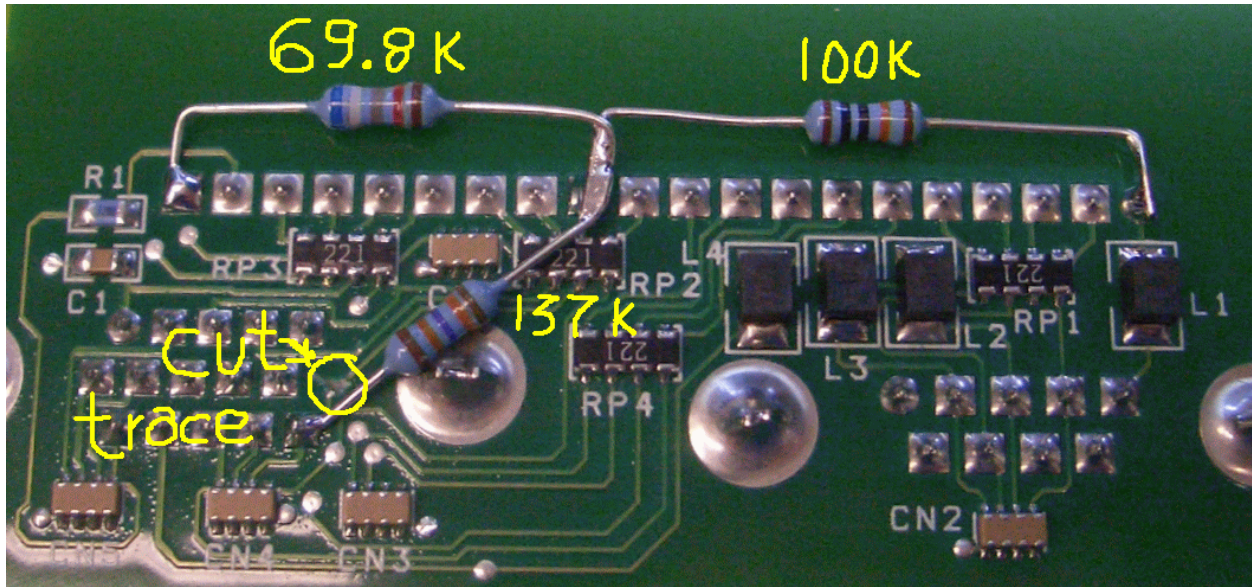
Verify the trace cut by measuring across the 137K resistor. It should measure about 137K ohms.

Optional

If you are using a Yaesu Quaddra or other amplifier that does not work with open-collector band outputs, you may add four (4) 2.2K (red-red-red-gold) resistors to pull up pins 7, 8, 9 and 14 as shown in the photo below:
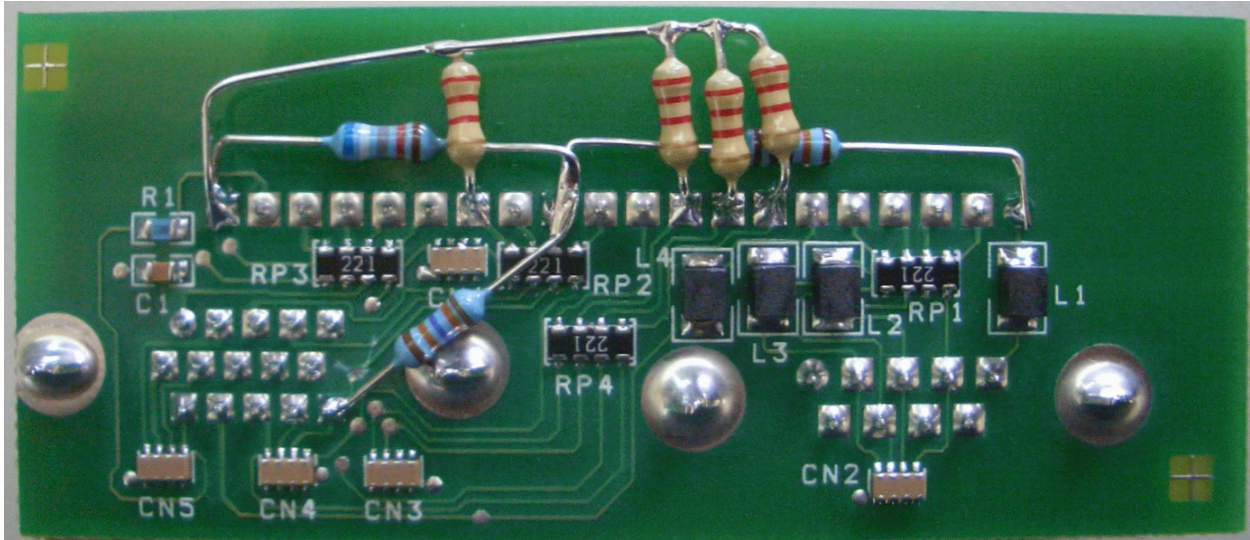
Replace the Digital IO board, the KIO3 cover plate and the K3 top cover.

Testing External ALC

To use external ALC you must wire up a cable with ALC to pin 15 and COMMON to pin 12 of the DE-15 ACC connector on the KIO3.

Before you connect this to an amplifier, test the wiring and the modifications. To do this:

- Set CONFIG:EXT ALC OFF (tap "1" on the keypad to toggle ON and OFF), and verify that you can transmit as normal.
- Set CONFIG:EXT ALC ON and verify that you can transmit as normal.
- Attach a 6V to 9V battery to the ALC cable, with NEGATIVE to the ALC pin, and positive to COMMON. Use a 1K to10K series resistor between NEGATIVE and the K3 ALC pin.
- With CONFIG:EXT ALC ON, verify the Tx power output drops dramatically.
- Set CONFIG:EXT ALC OFF and verify that you can transmit as normal.
- Remove the battery from the ALC cable.

This confirms that the modifications are functional, the firmware is working, and your cable is wired properly.

Operating with External ALC

⚠ **WARNING!** Do **not** attempt to use external ALC with an unmodified K3! You may damage the K3 DSP board if you do.

Once the mods have been made, attach the appropriate cable from the K3 ACC connector to the ALC output of your amplifier or transverter.

Go to CONFIG:EXT ALC and turn it ON by tapping '1'. 6 m is turned on/off separately from HF. The default external ALC threshold of -4.0V will work in most cases, but can be changed if required.

If your amplifier's gain varies from band to band, you should set CONFIG:PWR SET to PER-BAND. You can then adjust the drive level on each band to prevent external ALC activation during normal operation.

If you select CMP/ALC metering, external ALC activity is indicated by 8 or more bars. If you select SWR/RF metering, the CMP/ALC meter icons will flash during external ALC   activity to make you aware of the condition. Reduce the drive power if this occurs.