K3 Modifications

Numbers in () refer to my notes below on installing the modification.

Reference	Purpose	Hardware	Status
HAGCMDKT	Raise hardware AGC threshold	-- I don't need to install this. It was incorporated Jan, 2008 approx S/N 350	N/A
K3AFMDKT (1)	Audio Line Out Mod Kit. Improve speaker & line out distortion and IMD.	KIO3 main board two resistors, RF board, cut trace, installed larger RFC. Work this part with (4). Second part on KIO3 board, parallel two 51 ohm with existing resistors. Work that one with (2) and (3).	CPT
K3DSPLPF (8)	Audio LPF to reduce artifacts in audio chain.	Install on DSP board, behind front panel. Gives access to microphone connector rear, so combine with (9).	CPT
K3IOBUFFKT (4)	Increase signal level at I.F. output by more than 10 dB. Note: I don't have IF out without KXV3A interface ($110). Can install mod for future.	Easy one resistor (leaded or SMT) to main RF board. Work with (1), first (RFC) part since same area is accessed.	CPT
AFOPMDKT (2)	Protect audio amp from short circuit or low Z loads.	Add two 470 ohm resistors to KIO3 board. See PDF. Do with (1)	CPT
App Note (5)	Extreme signal RX protection mod, protect against close transmitters usually on same band.	One wire on RF board (remove bottom cover). See PDF.	CPT
App Note (9)	Protect against RF pickup at microphone connection by bypassing RF choke.	Short jumper. Access looks difficult. Consider not doing unless combined with other mods. See PDF. Turns out I didn't need this since my display board has been replaced with a newer one. But definitely combine with (8) if that one is done.	N/A
App Note (6)	Protect against chirp from synthesizer by increasing DDS signal driving the PLL.	Add 51 ohm 1/8 watt resistor to SYN board. – Work with (7), same board.	CPT
App Note (3)	Improve immunity of RS232 and audio connections to RF by bypassing RF chokes	Bypass chokes (4) on KIO3 board. See PDF. Do with (1) and (2)	CPT
App Note (7)	K3 SYN ALC mod. Assure enough drive when in high temperature environment	Add resistor to SYN board, recalibrate. See PDF – work with (6), same board.	CPT

My K3 is S/N 01195, received July 2008

(1) Easy if doing the "cut trace" version. Remove the front half of the bottom cover, giving easy access to the area of the main board. Cut trace. Solder in the new, larger RFC.

But (1) also has a separate modification requiring removing the KIO3 board. Remove the top cover. Then you remove the DB9 and VGA connector hardware and two screws to remove the back plate. Then unplug and remove the board with those connectors by pulling straight back. At this point, the KIO3 main board will come straight out (up). It still has a small audio daughter board attached to it at right angles. For this part of the mod, you install two 51 ohm resistors in parallel with existing larger resistors. You can use the supplied leaded resistors or supplied SMT resistors and stack them on top of the existing ones. I used the SMT ones but they ARE pretty small.

(2) I did this one with (1) since it's on the same board. There was an Elecraft kit containing the two 470 ohm leaded resistors but without instructions so refer to the PDF. Its title is something like AF_Output_MOD_Rev_C.pdf or similar. This is an easy mod and you already have the board out.

(3) This one also goes logically with (1) and (2) since you already have the KIO3 board out. You need to remove the small audio sub-board from it for better access to the RF chokes. It's plugged in pretty snugly, so I used a small bladed screwdriver to pry up on both sides before finally pulling it out. You bypass three chokes on this little board and one on the main KIO3 board with a choice of removing the chokes and jumpering, or bypassing with chokes still installed. I did the latter. It was kind of tricky to bend wires in a U-shape without exceeding the maximum 3/16 height. So I would solder a straight piece of bare wire about an inch long to one end of a choke, then bend over, then down, and keep trimming until it fit to the solder pad on the opposite side. Then solder both ends a little more.

(4) This mod goes best with the RFC part of mod (1), as the required part of the board is accessed by removing the front half of the bottom cover. I removed the existing R8 by using solder wick on both sides of the resistor, then installed the new SMT 13k resistor. I did this easy mod for possible future use as I don't have the IF OUT module yet.

(5) Extreme signal RX protection mod, see PDF file titled "K3 RX Protection MOD Rev B.PDF" or similar. This is an easy mod that should work with (1) and (4) since removing the front half of the bottom cover gives access to the main board points. A jumper about 2.5 inches long is installed between two easily accessible points, allowing the latest software to turn off the preamp and turn on the attenuator when required.

(6) KSYN3 DDS Gain MOD, application not PDF. Can prevent chirp while working cross-band split, which I have encountered (while using QSK). The KSYN3 board is easy to remove. It is mounted on the aluminum shield behind the front panel. With the top cover off and rear of the K3 toward you, it's on the right side of that metal plate. To remove, you unplug one coax cable and take out two screws. (Note that there are washers on both sides of the board.) (My KSYN3 did not have the metal plate or shield that some K3s have.) After unplugging the cable and removing the screws, it pulls straight up out of its connector. The mod is to wire a 51 ohm resistor in parallel with existing resistor R20 using a 1/8 watt leaded resistor. One lead goes to the left side and the other to a land or via near the right side. Do (7) below at the same time since it's the same board.

(7) App_Note_KSYN3_ALC_REV_A Insures enough drive in ALC loop at high temperatures around 50C (Field Day!). See (6) above on getting the board out. This is a very easy mod adding a 180 k leaded

resistor to the front of the board between two existing vias. Verified ~56k when done, this resistor is added in parallel with R10, 82 k. After mods were finished, I did the ADC adjustment per software 2.73 release notes and the synthesizer calibration per the manual, both simple tasks.

(8) Adding the LPF board to the DSP board was the most involved modification. Had to take off the top cover, left side cover (with the handle), phone jack nut, then pry off the entire front assembly, remove three screws and remove the DSP board from the assembly. This leaves the front display and control board still installed to the front panel. The method of mounting the LPF sub-board is pretty clever but it assumes six vias are clear when they were actually full of solder. I was able to remove all of the solder from only one via. The instructions were for you to install two solid wire leads, thread the board on (with popsicle stick spacer in place), then feed the other four wires through. This wasn't possible with three of those four still plugged, so I soldered in all five leads and then threaded the board on. It wasn't very difficult but took a couple of tries. (When I say I soldered the leads into the plugged holes, it went like this. I was able to remove about half of the solder from the hole with solder wick. Then stand the bare wire up in the hole (holding with needle nose) and heat it and the via until the remaining solder melted and I felt the wire move down into the hole. Then add a bit more solder.) Then I installed the sixth wire per the instructions.

This process left the back of the microphone connector accessible, so an excellent time to do modification (9), bypassing the RF choke at the microphone connector. I was surprised at first when mine passed the resistance test, meaning I didn't need it. But then I remembered that I had replaced my display board due to a failure so it was newer than the rest of the K3. The pads for L4 have a zero ohm resistor installed across them.

(9) Bypass choke at microphone connector to eliminate possible RF feedback problem. I didn't need this, but definitely combine with (8) if you do that one. Not sure I'd do this mod just for its own sake unless I'd definitely seen the RF problem.

DDS board updates. I had the mark-ups from a list member showing changes to the board to shift audio response toward the lower end. I considered replacing some of the 33 uF output capacitors with 100 uF but I'm not sure I have SMT electrolytics to fit the footprint. Possibly I could have paralleled leaded capacitors with them but decided to just rely on the new LPF for now. I also noted that my C18 has a dent, like it may have been stabbed with a screwdriver. This is the coupling capacitor for LINE OUT, left channel.