Alexandria Radio Club

Building an Elecraft K3S

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September 11, 2015

I got in trouble at Hamvention this year. More trouble than I usually get into. I ordered a new K3S and a P3 panadapter from Elecraft. The usual crowd at the Elecraft booth looked like bears at a picnic. Apparently most had the same intentions that I had.

Photos by N8IK (except first and last slide)

27 pounds of parts

So eight weeks later, 27 pounds of parts arrive at the UPS depot. Of course I ordered the kit version. Why buy it already assembled when you can build it yourself? One of the many reasons Elecraft is so successful. Hams love to build.

Christmas in July

Very nicely packed. Would withstand lots of abuse in transit.

Lots of PCBs

Every part is marked and tucked into anti-static bags.

Boxes & boxes of stuff

Be sure to borrow the XYL's muffin pans. One is mandatory, a second might be handy. There is a LOT of hardware.

Front Display panel board

This is the front panel display board, encoders, and push buttons.

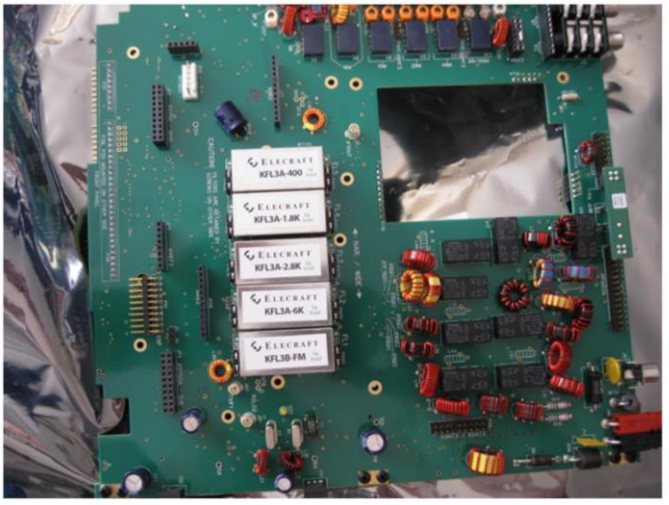
Mounted in Front Panel

Front panel display board is mounted in a nicely silk-screened powder-coated panel.

Main & Aux DSP Boards

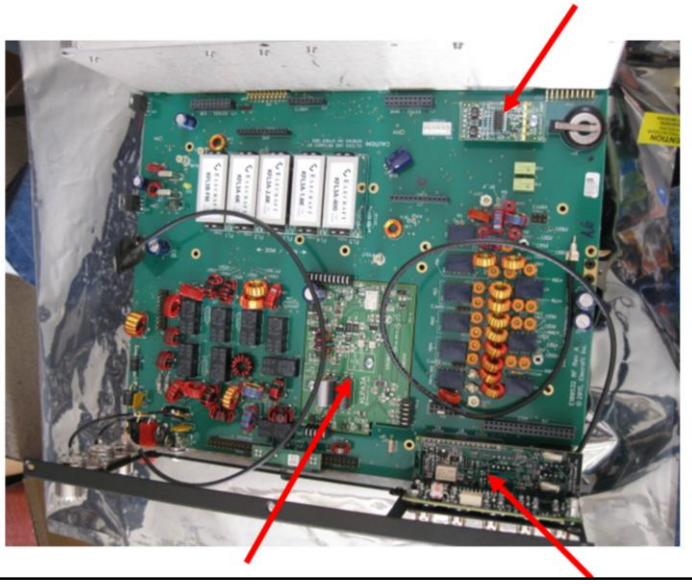
The main and auxiliary DSP boards are mounted on each other. The aux DSP board is for the KRX3A subreceiver. The KDVR3 digital voice recorder is also installed on the main DSP board. The whole assembly gets mounted on the back of the front panel board.

Main RF Board



The cutout is where the KLPA3A 10W amplifier will go. The modular approach allows for factory testing and reduces your problems to near zero. I ordered 5 filters for the main receiver. 13kHz FM, 6kHz AM and ESSB, 2.8kHz, 1.8kHz, and 400Hz. All 8-pole filters. Mounted in order of bandwidth – these are swapped in and out one at a time and not cascaded. Front on the left, rear on the right. You can also add gain to a filter so that the AF stays constant as bandwidth decreases. I added 2dB to the 400Hz filter.

Main RF Board

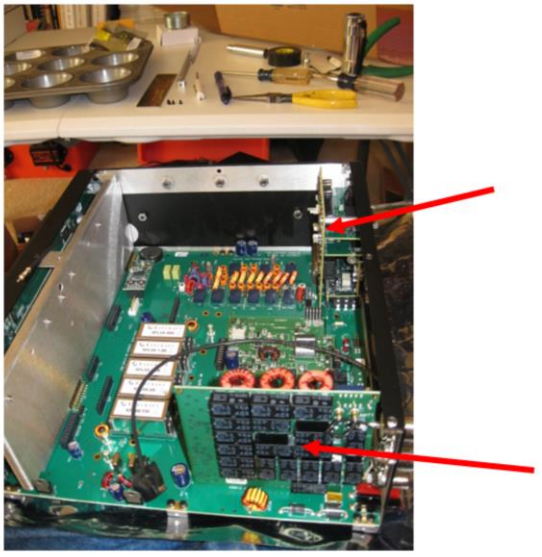


Filters for the main receiver in the upper left and mixer board and RTC battery in the upper right. KLPA3A 10W amplifier is now mounted in the cutout. Rear panel is also mounted along with the KXV3B interface module (separate RX antenna, transverter i/o, IF out for panadapters) in the lower right.

Starting to look like a radio!

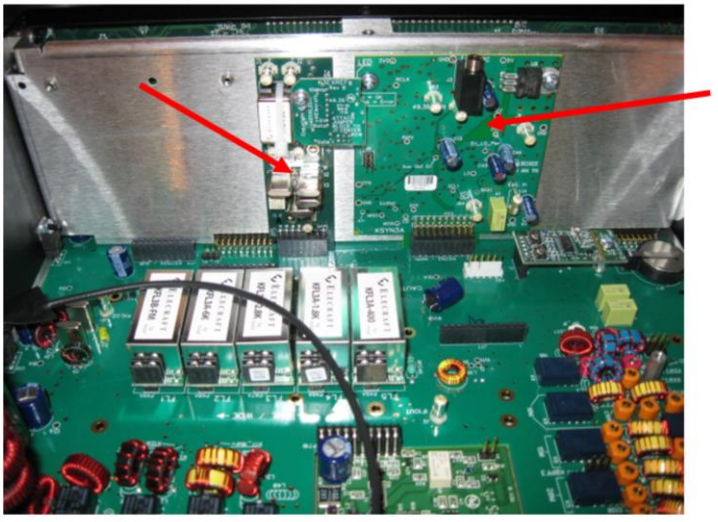
Front panel is now on.

KIO3B & KAT3A Modules



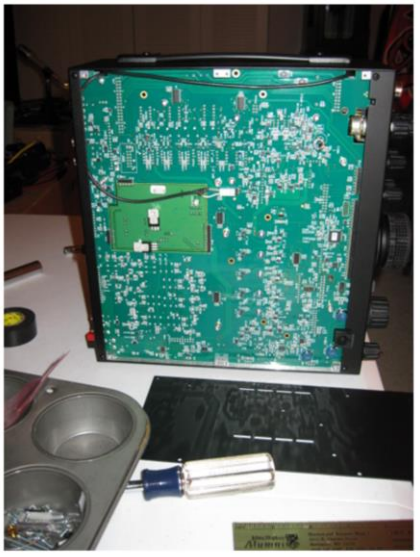
The KAT3A automatic antenna tuner is on the lower right. The KIO3B digital interface for USB and RS232 signals is at the upper right. The KIO3B provides seamless integration with the P3 Panadapter.

Looking forward from the rear



KREF3 reference oscillator module in the middle with the +/- 1ppm TCXO. The small board between this and the main KSYN3A synthesizer on the right locks a 10 MHz external reference to the radio. I did the K3EXREF mod to correct a 40Hz shift on 2M in case I get a K144XV module later. Couldn't resist the opportunity to heat up a soldering iron!

Bottom of the K3S



I think this is a 4-layer board so it's pretty busy.

Top of the K3S

The KPA3A 100W amplifier shield and chassis stiffener are installed

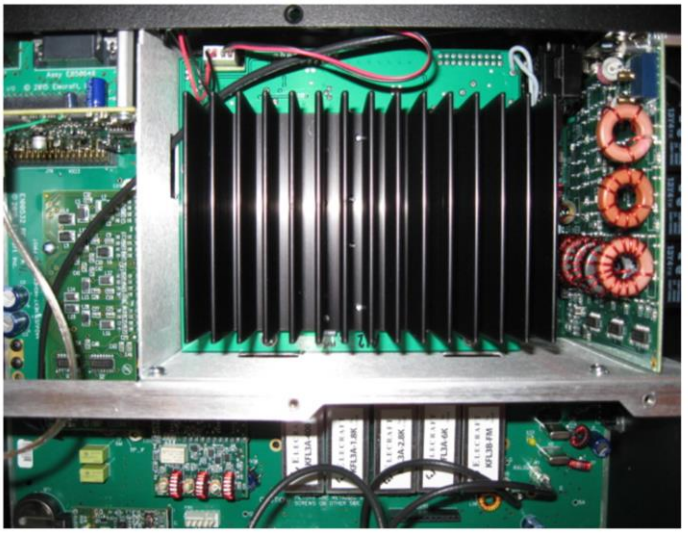
KPA3A 100W amplifier

Modular like most everything else.

How to get into tight spaces

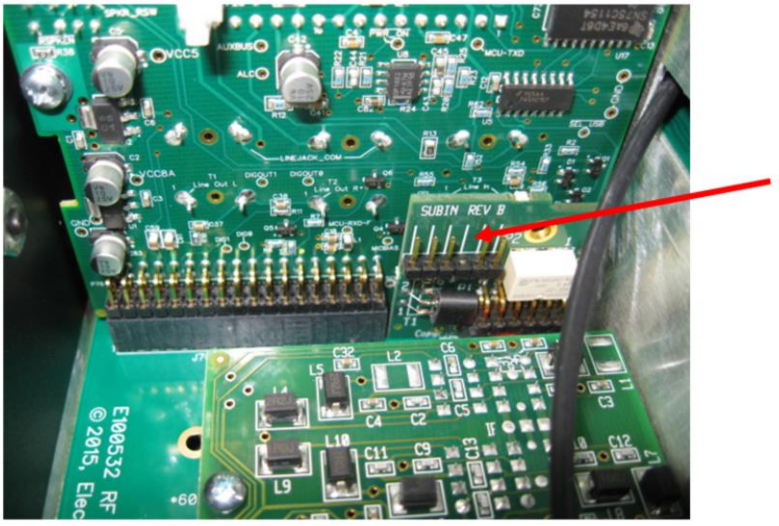
This technique will greatly help with the 3 screws that hold the KPA3A 100W amplifier module down. Don't wrap the electrical tape all the way around. Just enough to hang on to the screw and tooth washer until you get it started. Then once the screw is started pull slowly away, remove the tape, and finish snugging it down. Easy!

100W KPA3A and KAT3A



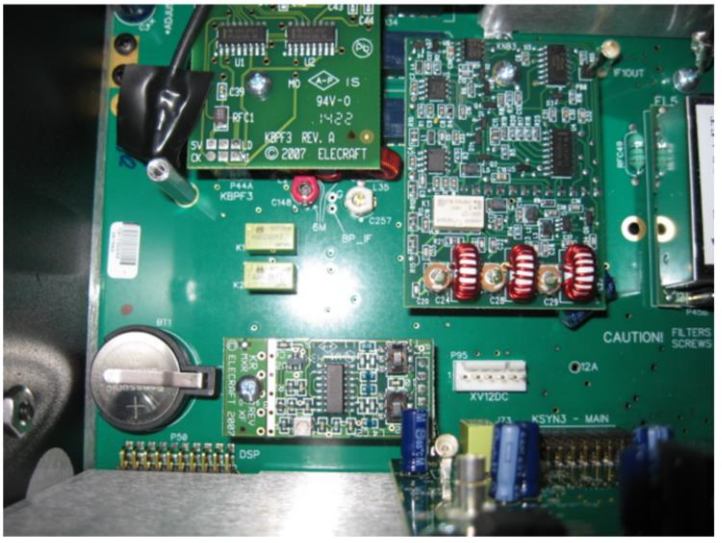
The KAT3A antenna tuner is on the right of the amplifier.

KIO3B and SubIn Boards



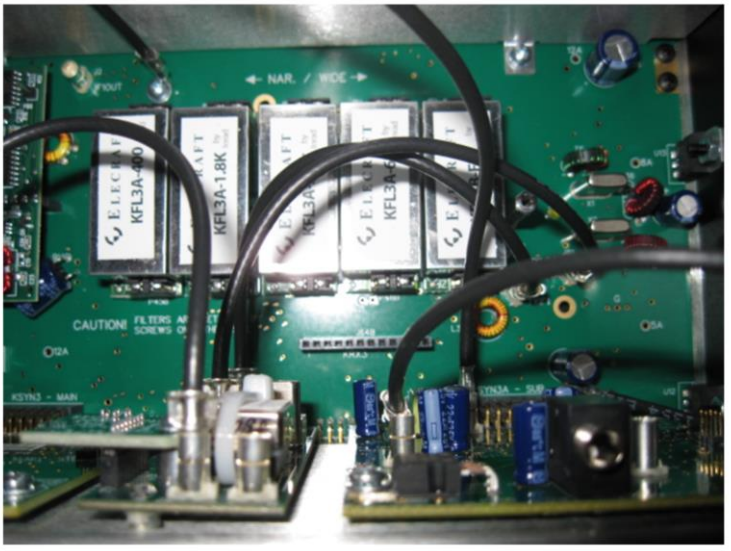
Looking from the front this is on the back left of the radio.

KBPF3A and KNB3



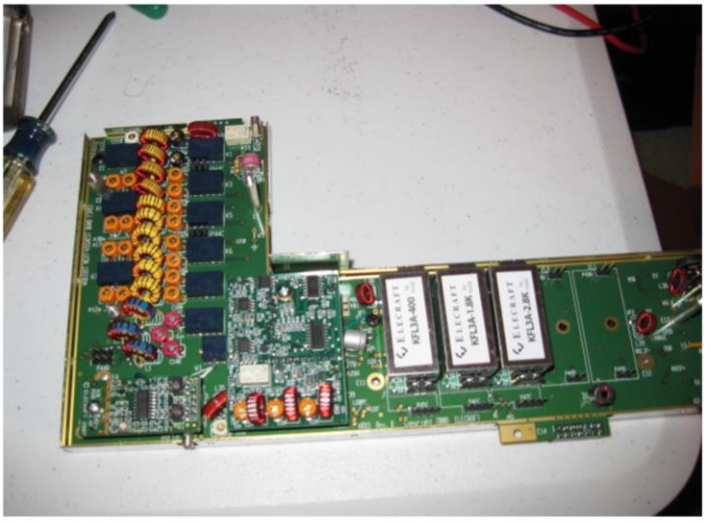
KBPF3A general coverage receive board on the left and KNB3 noise blanker on the right. The KRX3A subreceiver module will cover these. Mixer board and RTC battery in the lower left.

KREF3 & Sub KSYN3A



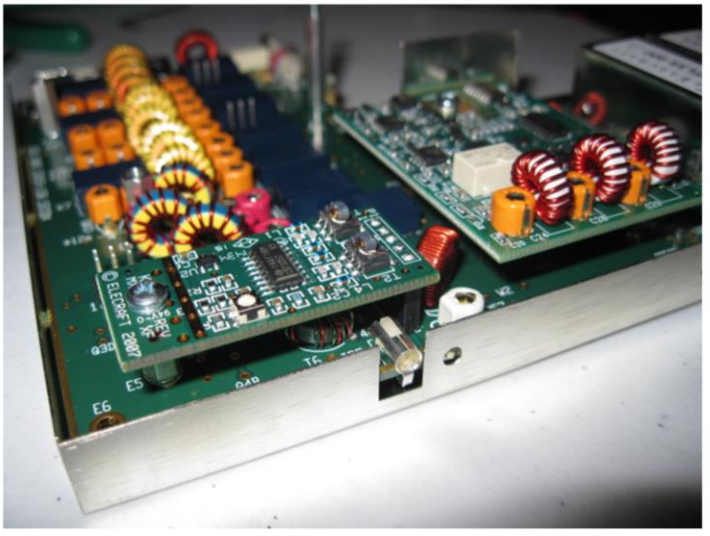
Subreceiver synthesizer on the right. Reference oscillator on the left. Front of the radio is at the bottom of the picture.

KRX3A Subreceiver



Subreceiver board. 2.8kHz, 1.8kHz, 400Hz filters to match the main receiver.

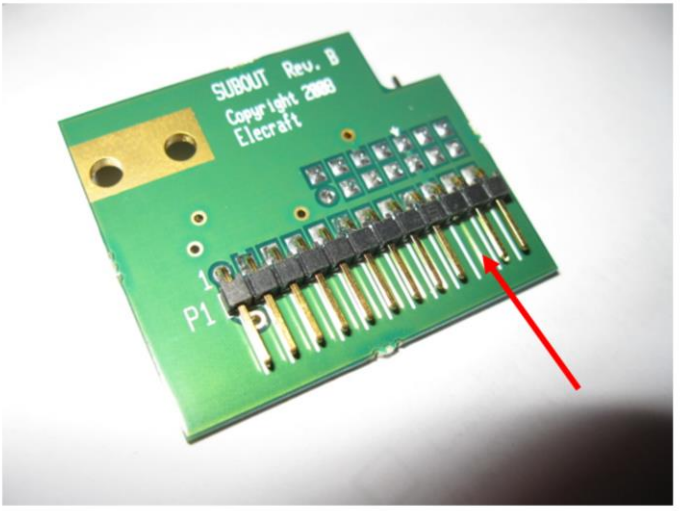
Mounted in shielded enclosure



Finished subreceiver module

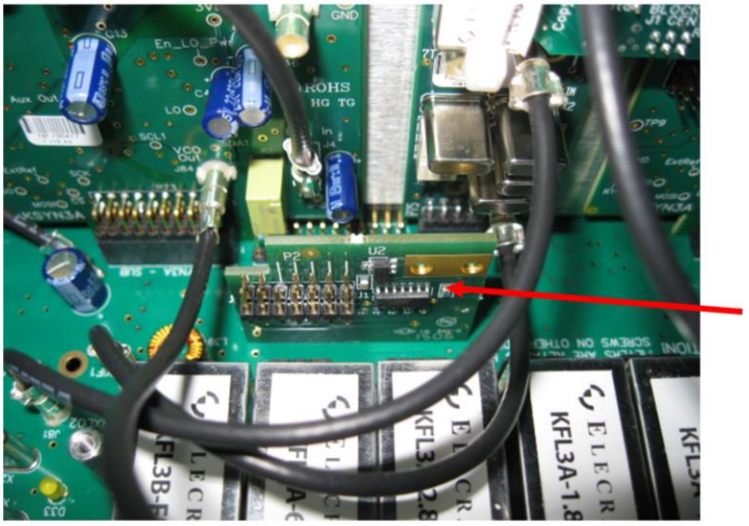
Fully shielded subreceiver with a label of the three filters installed.

Preventing random acts of stupidity



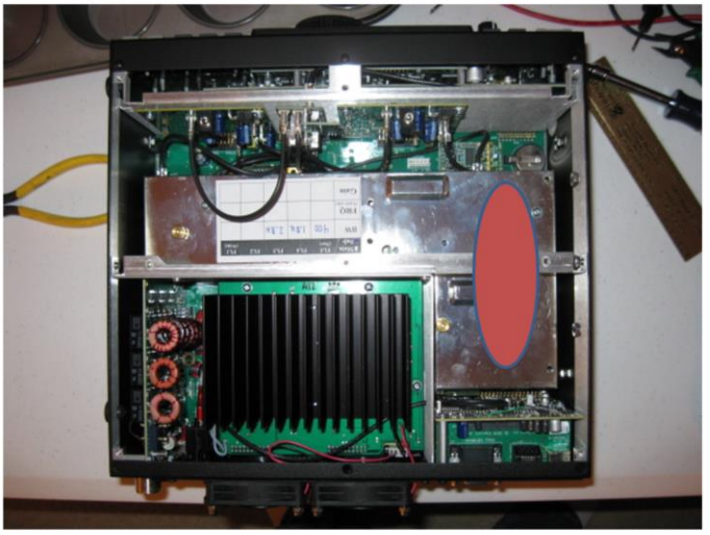
The missing pin is intentional and prevents random acts of stupidity. There's a corresponding filled hole on the RF board connector so there's no way you can install it backwards.

Subreceiver Output



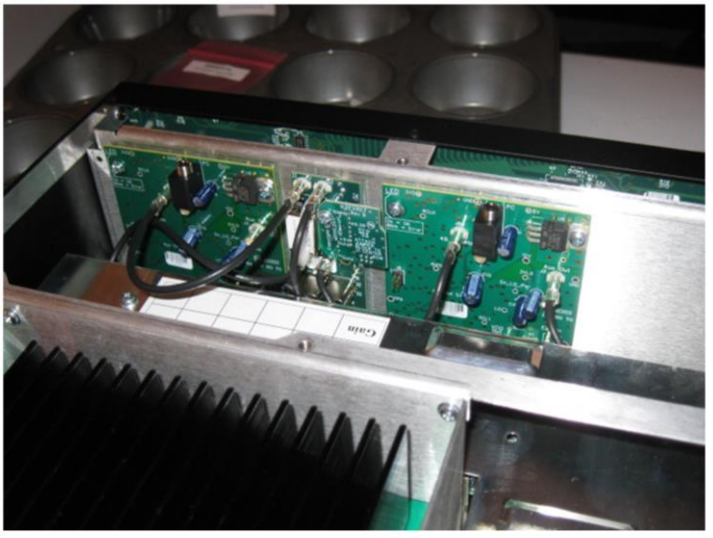
Synthesizers on the left and right. Looking at the back of the K3S front panel.

Nearly done!



Subreceiver is installed. A fully integrated 10 watt all-mode 2m module would be installed on the right on top of the subreceiver. It would be interfaced as a transverter. The K3S will display the actual frequency of the transverter, whether the K144XV or up to nine other external transverters.

Looking at the back of front panel



Both KSYN3A synthesizers, KREF3, and K3EXREF boards.

Rear Panel – Left Side

Multiple antenna ports. ANT3 is for the missing K144XV 2M module. That gaping hole is going to force me to buy the 2m module. The two fans are for the KPA3A 100W amplifier.

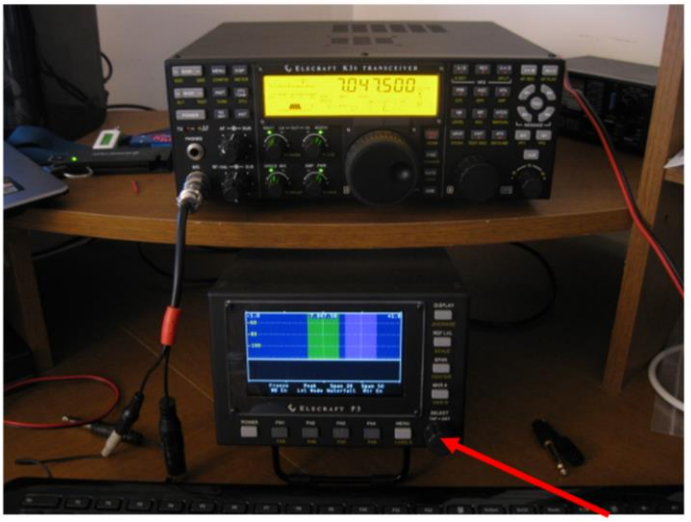
Rear Panel – Right Side

Very busy but very flexible.

s/n 10111 is done!

Then the miracle occurs. No, not really. It would be a miracle if it *didn't* work. The instructions are great and if you need help, an email brings in the big guns quickly. Elecraft wants you to succeed and have fun. Like Heathkits, but without the snail mail.

Couldn’t resist the P3



I knew I’d miss the scope on my Icom IC-756Pro2 so this was a no-brainer. And it is much more capable than Icom’s scope. For starters, just twist the knob at the lower right to an interesting signal (aren’t they all?) and push the same knob. Instant QSY. The screen can be split between the spectrum display and a waterfall for PSK31.

P3 with P3TXMON display

Now the learning starts!

Questions?

www.n8ik.net

That's all folks! Any questions? If you'd like a copy of this presentation, it's on my website www.n8ik.net