

## Elecraft KX1 HT

By, Edward R. Breneiser, WA3WSJ

I love to hike the AT and activate SOTA Summits. I built my Elecraft KX1 and have used it for hiking, but the idea came to me to use it as an HT. I could drop the weight and volume of coax and a larger antenna. It's small and lightweight so why not?

I needed a few things for my KX1 HT:

### Internal battery 11.8V @ 1.5AH Li-ion battery placed in battery holder

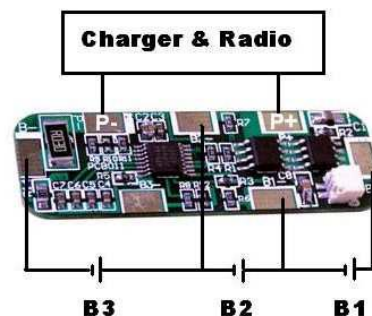
The Elecraft KX1 is a nice radio, but I needed more than 1- 2 watts of power output. Therefore, I decided to modify the internal battery. The radio originally uses six 1.5v AA batteries for a total of 9v to internally power the radio. With this arrangement, it will only produce around 1- 2 watts of RF power. I decided to install six 3.7v Li-Ion batteries using a configuration of two banks.



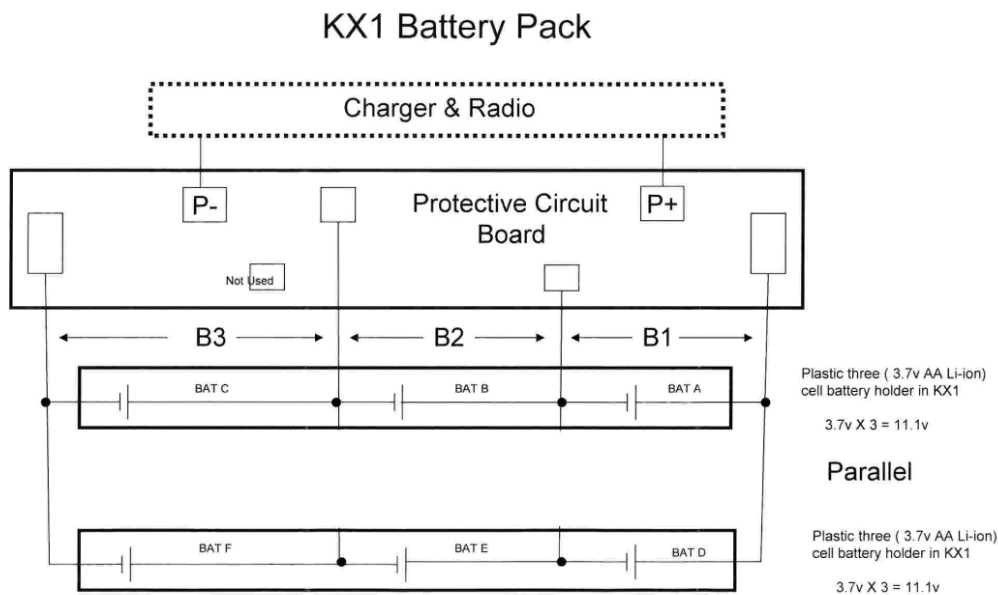
The battery shown is sold by Batteryspace.com. Each bank would have three 3.7v batteries in series. As each battery can produce 750MAH, thus one bank produces 11.1v @ 750MAH. I then put each battery bank in parallel. I now have an internal battery for my KX1 that will produce approximately 12v @ 1.5AH. Yes the three 3.7v batteries in series of each bank have a working voltage of 11.8 VDC. This will produce around 4w of RF power from my KX1.

### 11.1V Li-ion Protection PCB

I now needed a way to safely charge the Li-ion batteries. Batteryspace.com sells a small, cool, little board that will check the charge of each cell in my internal battery and shut off 12v power to the rig should my KX1 develop a short circuit. The board shown to the left is the 5A PCB Board sold by Batteryspace.com. for around \$6.00. The P+ and P- terminals are where you wire your power input leads to your KX1 and also the charger leads for the battery. You need this Protection Circuit Board to safely operate with the Li-ion 3.7V AA batteries! The B1, B2 and B3 represent three 3.7v AA Li-Ion batteries.



I then just wired three additional series batteries in parallel with these three. Please note – I only monitor one set or bank of batteries. I assume the other bank will charge in a similar manner. I only monitor one bank because of wire and size constraints. In addition, I only want the PCB to monitor one cell not two at the same time.



### 11.1V Li-ion Battery Charger

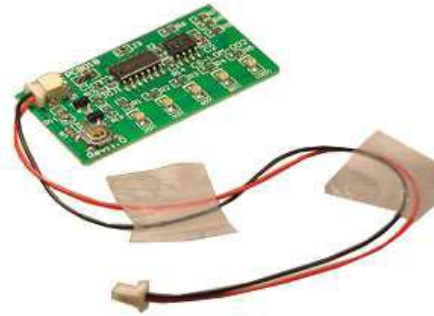
The battery charger to the right works wonderful on 3C Li-ion batteries. I have been using this charger with my KX1 for awhile now with zero problems. Please note that all Li-ion batteries require the correct charger to properly and safely charge a Li-Poly battery. I



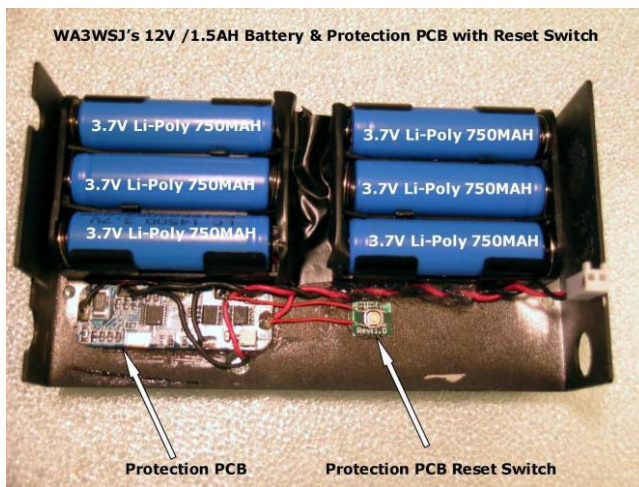
bought this 11.1v charger from Batteryspace.com for around \$20.00 or so. The neat feature about the charger is the LED. The LED displays the charge of your battery by changing colors! Red is a dead battery, yellow is a low charged battery and green is a fully charged battery.

## Battery Fuel Gauge PCB

Batteryspace.com also sells a neat little PCB that can be used with the above protection board that just plus into the white connector shown above. It has LEDs on the board and acts like a battery fuel gauge. As your battery's charge drops, it will tell you via LED readout. I didn't have the room in my KX1 to install it, but it's small and neat! I did however use the PCB switch from this board as a reset switch for my 5A Protection Circuit Board. I just cut the switch off the board with a dermal tool. I then used clear RTV as with the 5A Protection Board to fasten it to the lower lid of my KX1. The switch is wired from P+ to B1+. Should a short circuit develop in the rig, the 5A PCB will disconnect the battery from the KX1 and not allow 12V to connect to the KX1 until the short is removed. Just push the reset switch after removing the short and the rig will again turn on – neat! I tested this feature by shorting the red+ and black – minus leads that feed the KX1 and the radio just shut off. I left the short and pushed the reset switch – nothing. I then removed the short and pressed the reset switch. The KX1 now turned on as normal with the short removed from the 5A PCB. The Fuel Gauge PCB is sold by Batteryspace.com for about \$4.00.



12V / 1.5AH Internal Battery for KX1 The picture is my finished KX1 internal 12v 1.5AH battery with the 5A PCB and reset switch.



Please note the black electrical tape between the rewired battery holders. I put tape here to prevent the possibility of the grounded crystal cases on the KX1 main PCB touching the + terminals on the battery holders. I had to use # 2/56 machine screws with washers and a nut on the + terminals of the battery holders because the AA Li-Ion batteries are just a bit shorter than normal alkaline AA batteries. I also added some extra solder on the other battery terminals. To date I have had no problems with this setup. As you can see above, I installed all this on the bottom cover of my KX1 without any problems. I have the internal antenna tuner and a K6XX Visual CW Indicator installed in my KX1. You might also fit the fuel gauge PCB on one wall of the KX1, but it's a real tight fit.

I now have my power source for my KX1 HT. Using this battery, I can now operate my KX1 HT in the field for days without a charge! If you decide to install this modification in your KX1, make sure you place the Protection PCB and reset switch close to the same locations as in the picture. Placing them anywhere else will cause you trouble as the PCBs will hit other components on the main board. KX1 External 12V Charger Connector The picture shows the bottom of my KX1. Note the new charger connector that I RTVed to the case. This is the same connector used to power the KX1. I now just plug in my charger until I see a green LED and then I have a fully charged 12V 1.5AH internal battery to power my KX1! I've used this setup many times in the woods etc without one problem. I also installed the power mod in my KX1. I now have 4w on 20m, 30m and 40m.



### Paddle for the KX1 HT

I now need a small, lightweight paddle to attach to the KX1. Paul, W0RW, came to the rescue and provided me with a source for a small SPDT lever switch available from Mouser Part Number 688SSCF210300. This switch is perfect to use as a small paddle for the KX1! I just glued two mechanical stops to the KX1 and I can now send at twenty plus words per minute with no problem!



Pictured is the installed paddle wired to a stereo plug.



### **KX1 Antenna**

I now need a small and lightweight antenna that will easily attach and detach. After a search on the internet, I found a great antenna. MFJ-1820T 20m Telescopic Antenna fits the bill! It's small, lightweight and has a BNC connector to easily attach and detach the antenna.

The antenna weighs-in at only around four ounces and when compressed down, it's only approximately ten inches in length. I also purchased the 30M version MFJ-1830T. It's about the the same size and also works great!

I have tested both the 20m and 30m antennas and the SWR on both antennas is less than 1.5:1 worst case with my KX1 HT.



### **Counterpoise Wire**

I found some #22 gauge black stranded wire so I cut off a 15-foot piece. On the end that attaches to the bottom screw of the KX1, I soldered a small lug. The other end I just leave as is because it just drags on the ground. I now just loosen the screw on the "bottom" of my KX1 and attach the lug and tighten the screw – counterpoise wire installed!

The complete Elecraft KX1 HT weighs-in at 1.5lbs! If you take two antennas for 20m and 30m, the total weight is 1.75lbs. I have had great results operating with this CW HT. Here's what Scot, N3SW, emailed me when he tried it out.

“Ed:

I tried out the "KX1 HT". I'm using an MFJ-1820T antenna, with a 16 foot long counterpoise wire which I have attached under the case screw on the back of the rig. I find with the counterpoise I can get the antenna SWR down to around 1.7 on my antenna meter, which the KX1 has no problem matching with its internal tuner. Today I worked Morocco and French Guiana on 20 CW at 2.5 Watts, from my living room. This will be a quick easy way to get on the air from a picnic table or a mountain top, without having to mess around with ropes, poles and trees.”

### **N3SW's version of my Elecraft KX1 HT**



**Life is Short – So Enjoy!**