

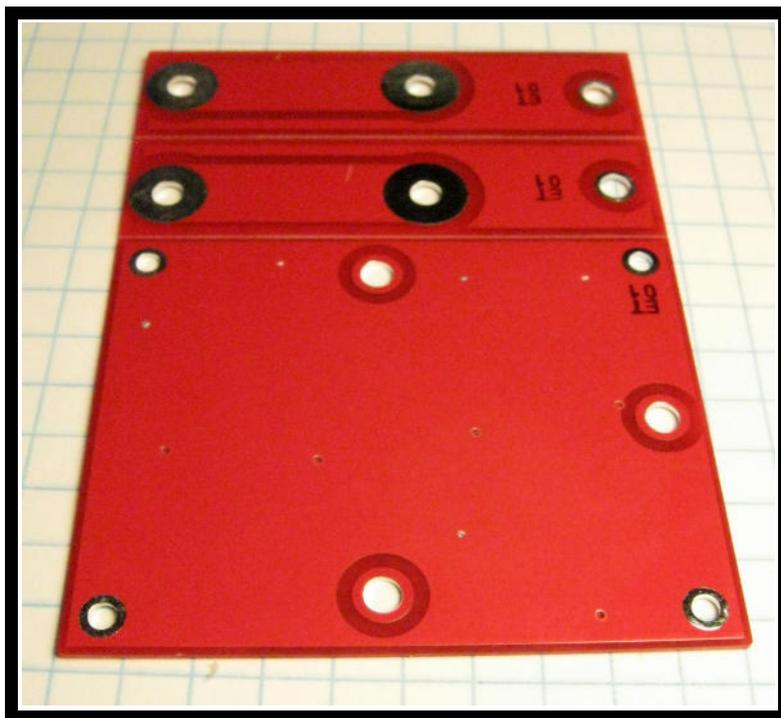
**The Limerick Paddles with built in PicoKeyer Kit**

**from  
QRPme**

**September 6, 2015**

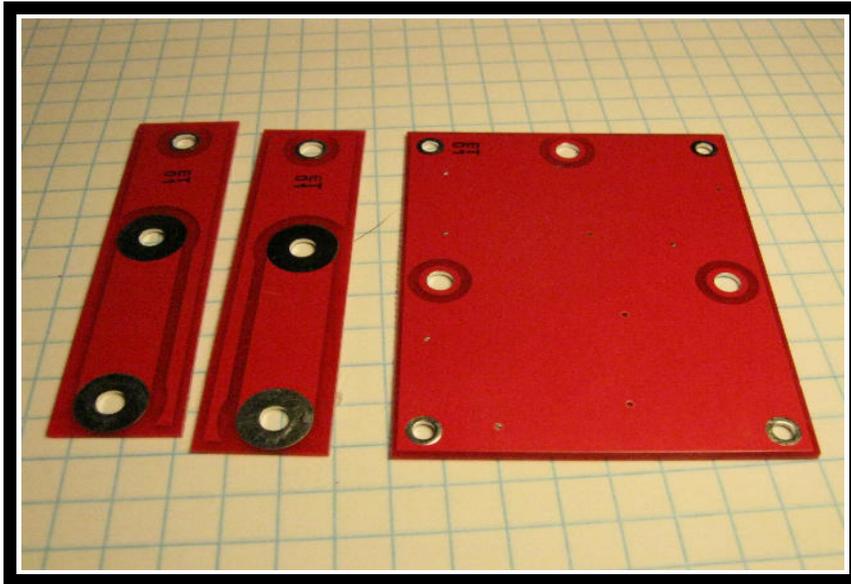
**Rex Harper, W1REX**

The Limerick Paddles kit is comprised of a single printed circuit board which is snapped apart along 2 v-score lines to create the 3 pcb pieces used in the kit. The circuit board is laid out using 'Limerick construction' style construction. Limerick Construction was created by W1REX and was inspired by both Manhattan and Pittsburg construction. Manhattan construction requires the builder to glue pads down onto a copper sheet to be used as solder points for building the circuit. Pittsburg construction was introduced by Joe Porter, WOMQY, who lived in Pittsburg KS. In Pittsburg construction, the pads and traces were etched onto a simple single sided copper pcb allowing for inexpensive pcbs for low run kits. Rex Harper, W1REX, created a line of kits where not only the pads and traces etched unto the board but the whole range of commercial pcb operations were used to create the boards: silk screen, solder mask, drilling and v-scores. The resulting commercial boards were similar to those used for surface mount devices but designed for through hole components.

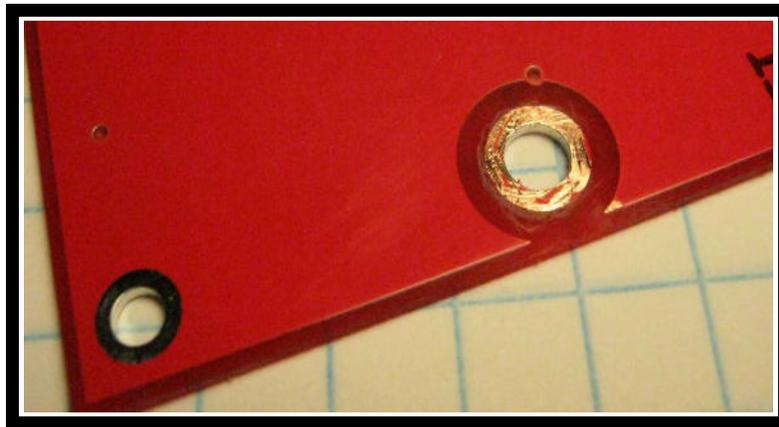


The Limerick Paddles pcb has 2 v-scores at the top of the board. There are also 3 large mounting holes, for mounting the paddle assembly, that have solder mask flowed over the pads.

The board is snapped along the score lines thereby creating the 3 separate pcb pieces to make the base and paddles.



Although the internal tooth lock washers should bite through the solder mask covering the 3 large mounting holes, it is advisable to scrape the solder mask off the pad portion of the mounting holes.



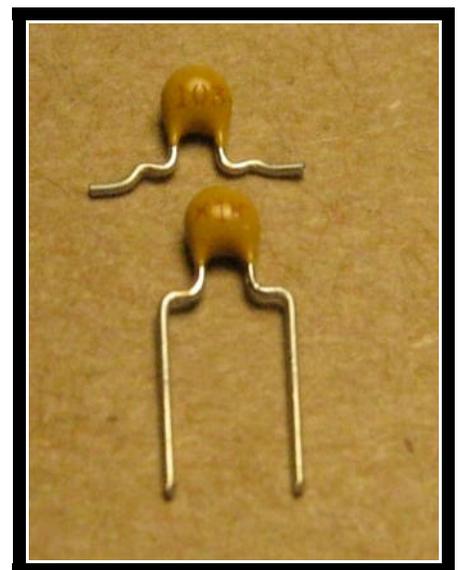
Once you have the 3 larger mounting holes have been scraped, it is now time to prepare the components for mounting Limerick style. The leads of each part need to be formed to fit the Limerick construction pads placed on the circuit board for that part. The easiest way to do this is to form the leads for each part BEFORE soldering anything to the printed circuit board.

Shorten the legs and form little tiny feet on the switch... The picture above shows both an original switch and another after forming the leads for Limerick style construction.



Form the tiny feet on the speaker....making sure the legs are even.

Reform the legs on the two caps....



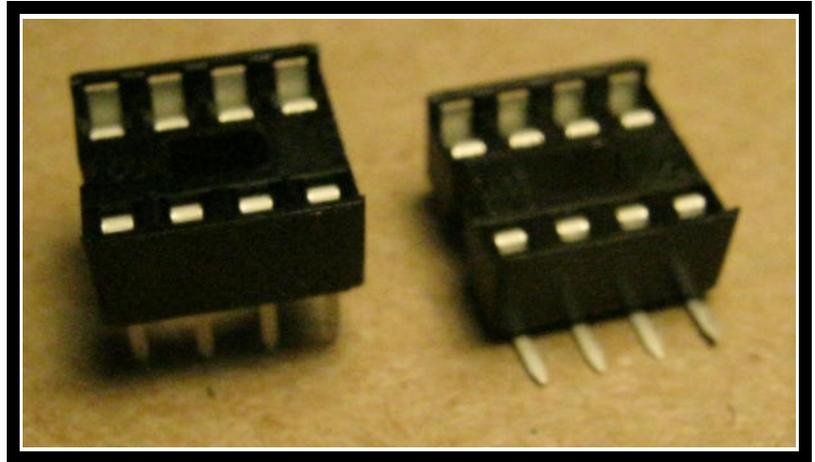


Pot leads bent for Limerick construction

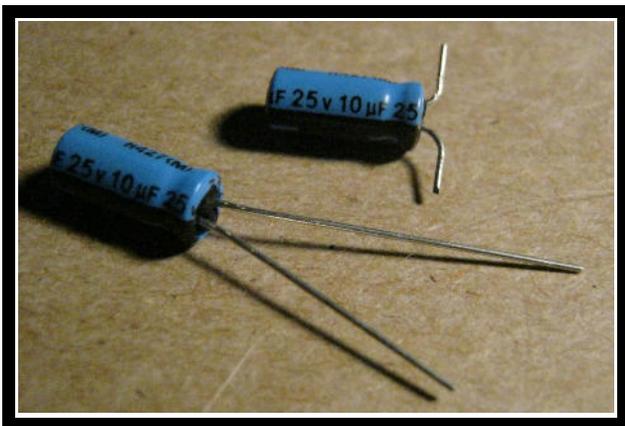
The potentiometer is the most complicated component to prepare for 'Limerick' style construction. The frame sides need to be bent at right angles and close to being in line with the pot leads which are bent back 90 degrees at the lead reduction point. The frame tabs need to be bent at 90 degrees back towards the pot shaft. You can see that the right tab is also cut a little short.

Check the fit of the part as supplied BEFORE making any adjustments. Get an idea as to which leads(s) to bend first. Make the bends one at a time and then check after each bend to make sure it fits as desired. There is nothing worse than making a bunch of bends and then discovering that something is wrong.

The DIP IC leads need to be bent out flush with the bottom.

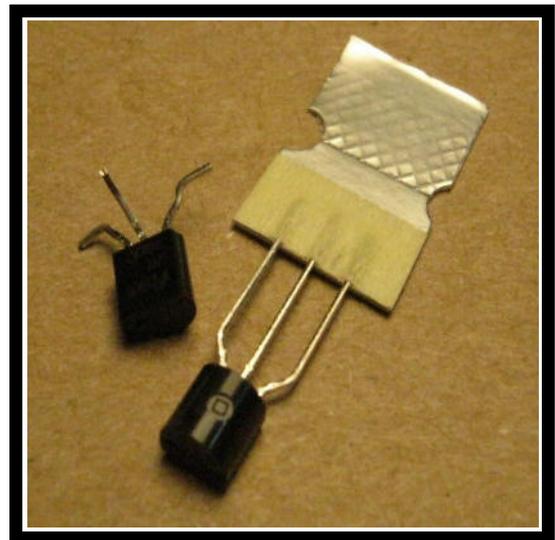


The IC socket needs to be mounted close to the board as it is under the connecting spacer at the back of the paddle assembly.



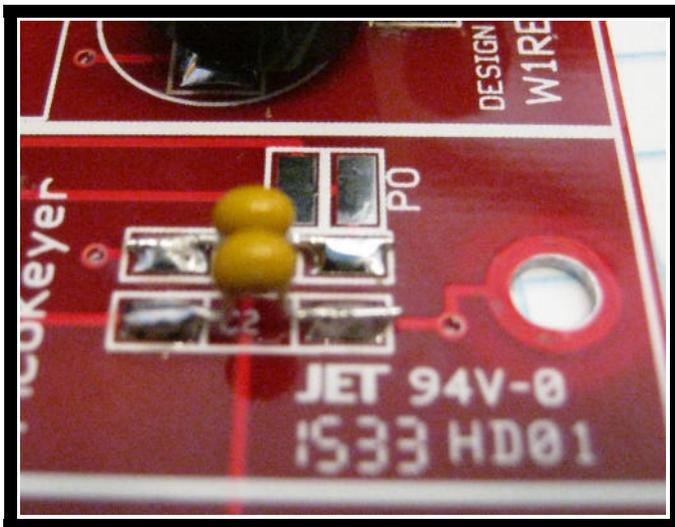
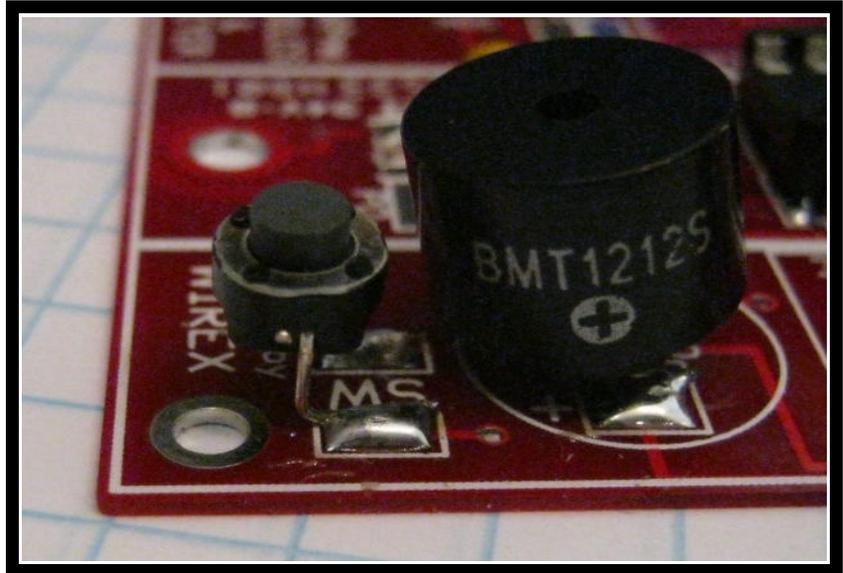
Bend the cap leads out and cut them off at the required length.

The 2N7000 FET needs a little bit of forming to fit the pads...



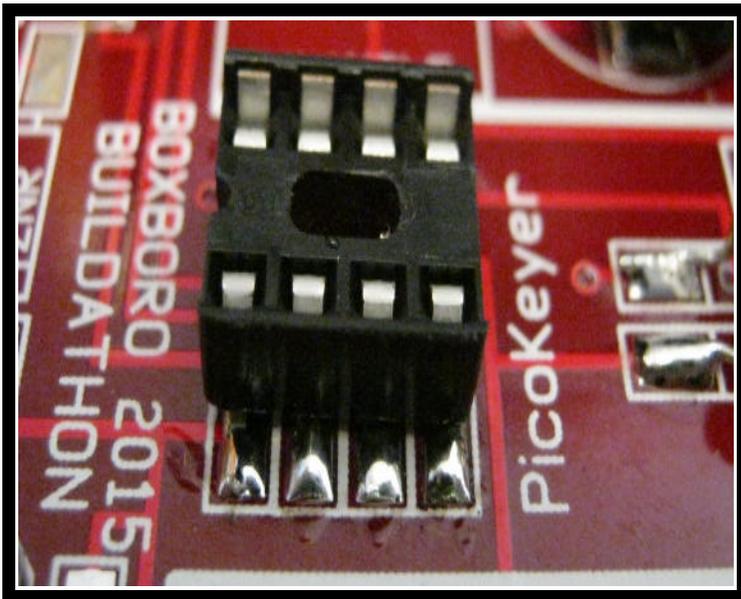
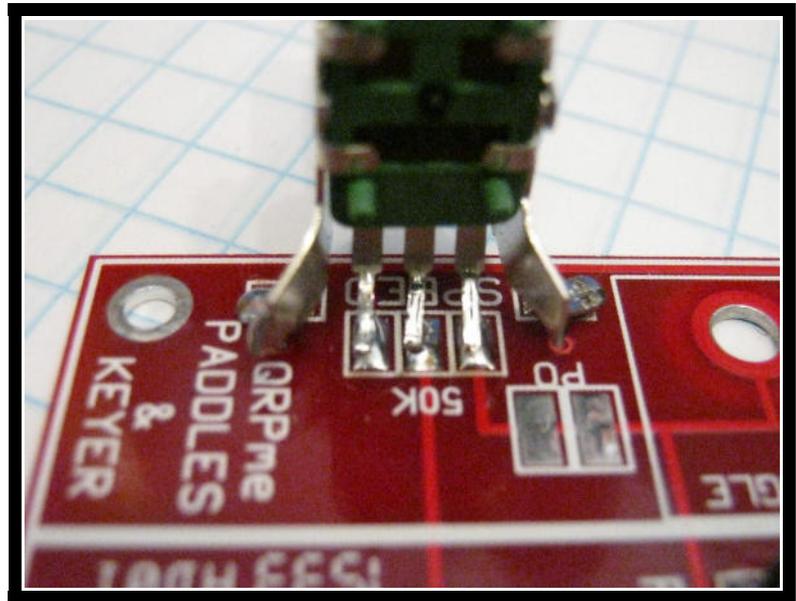
Now that you have all the components formed to fit the Limerick construction pads, you can now start soldering the components onto the board. I recommend that you build the board from the front end to the rear. This allows adequate clearance for the soldering iron as you build the board.

Solder the little switch first and then the speaker....



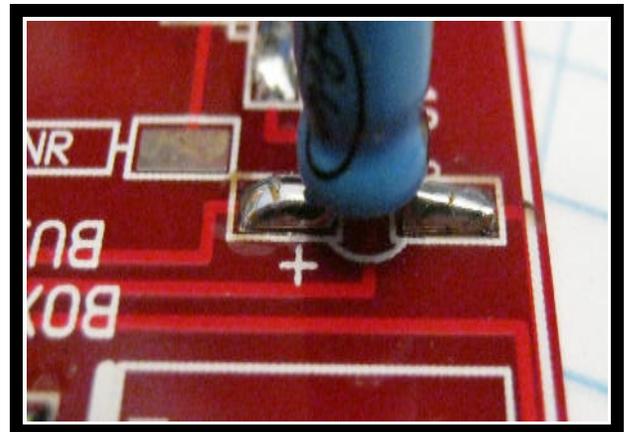
Next, solder in the two small caps marked 103.

The very re-worked pot can now be soldered in.



Now the socket. Don't use too much heat or too much solder. I tinned the leads and then a single pad. Then I soldered the lead to the single tinned pad using down pressure on the socket to make sure it lays flat. I then soldered the remaining leads

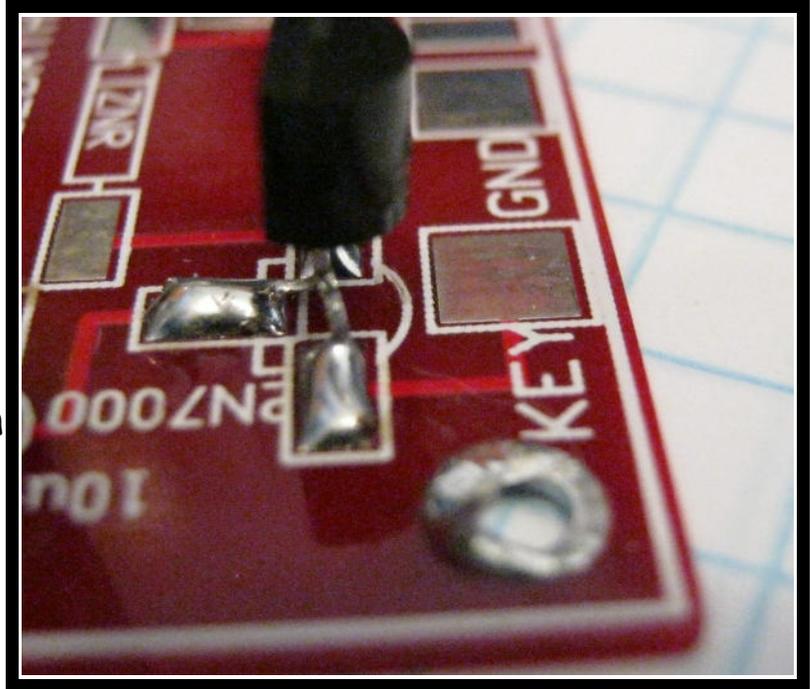
Now the 10uf electrolytic cap.



2 more things....

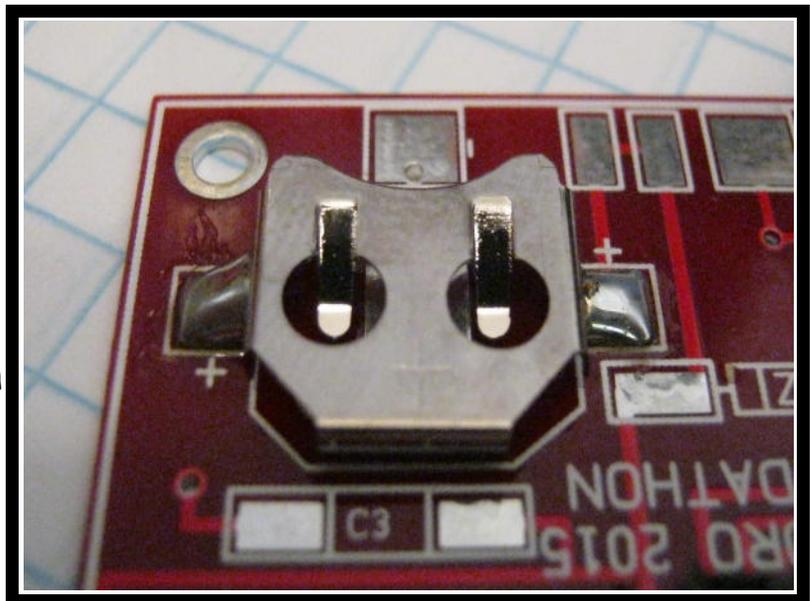
1 = 2N7000 FET

Make sure the orientation of the FET matches the silk screen designator.



2 = Coin cell battery holder

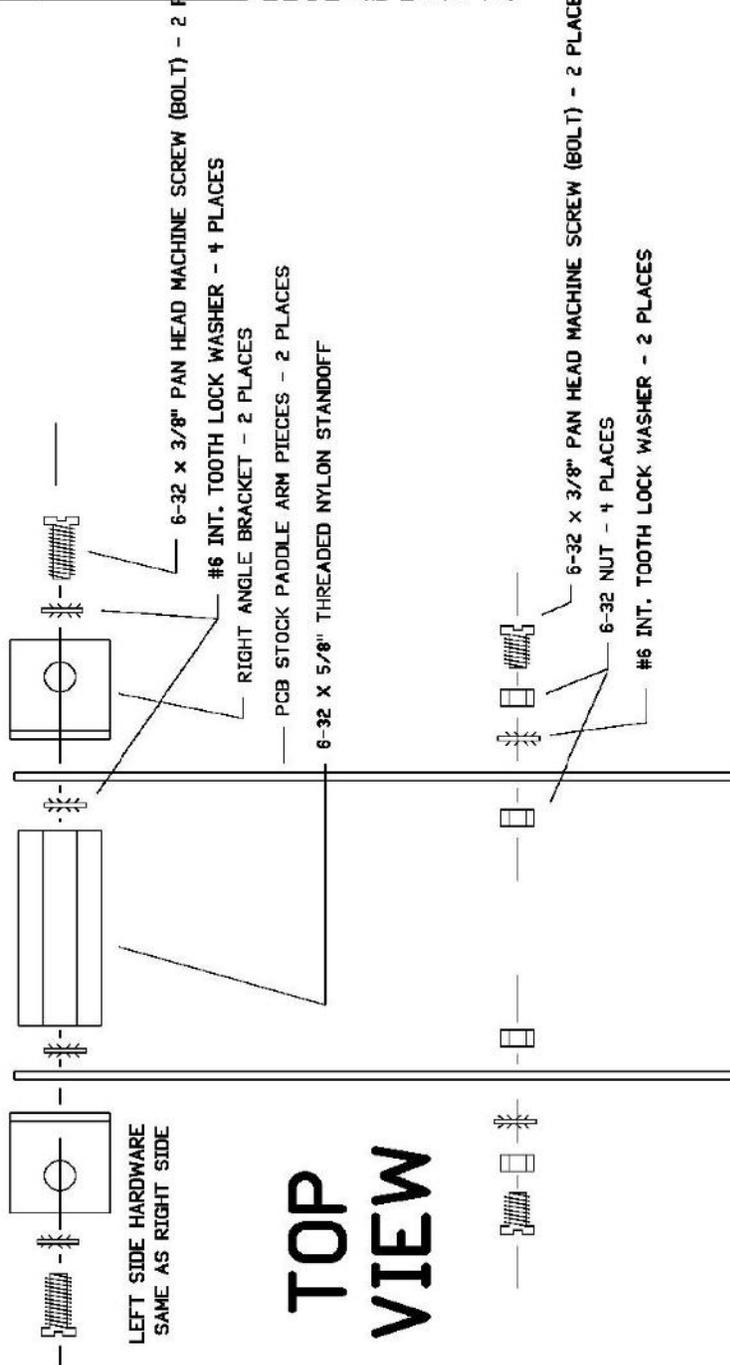
LIGHTLY tin the pads on the board and the tabs on the holder. Place the cell on the pads and add a hold down weight to the cell holder. Then you can



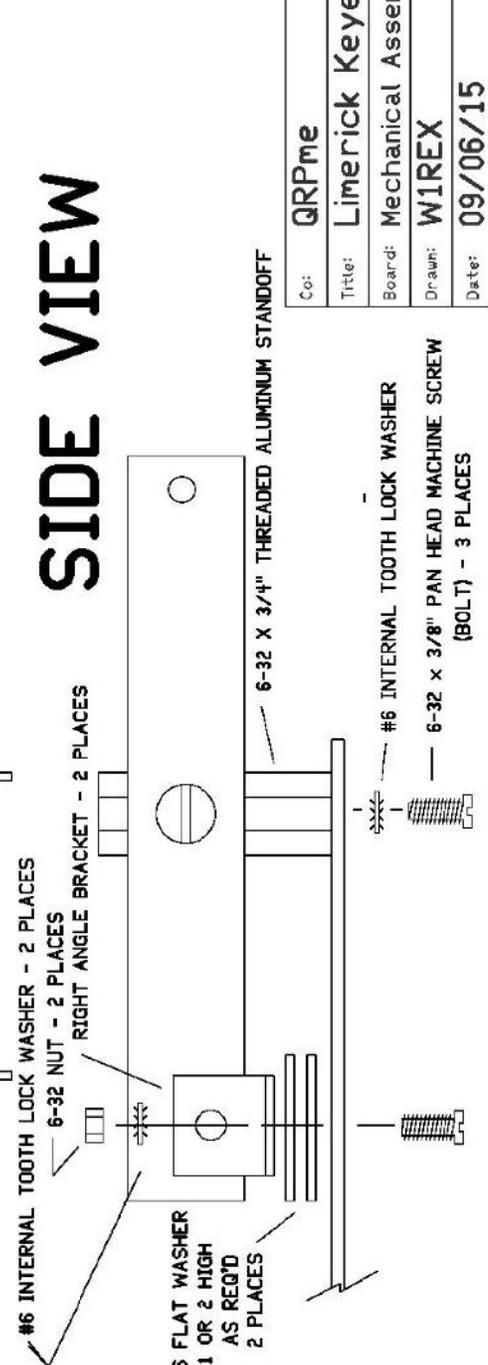
solder the tabs of the holder to the board without the holder sliding around. I use a cut down bamboo skewer in the jaws of my needle nose pliers with the grips closed and wrapped with a rubber band. All you need is a little weight to keep the cell holder from moving around while soldering it into place.

Drill tape data			
Tool Code	Hole Size	Sym bol	Hole Count

Board type: FR4  
 Board thickness: .031"  
 Copper weight: 2oz  
 Layer count: 2  
 All dimensions are in inches.  
 Board should have RED solder mask over bare copper (SMBCC) with white silk screening on top.  
 View is from the top side of the board.



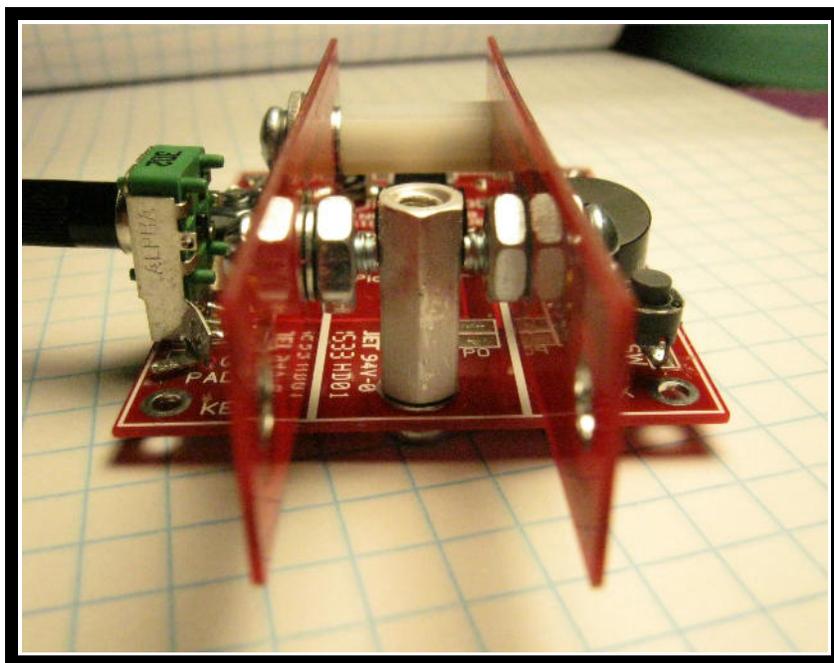
# TOP VIEW



# SIDE VIEW

Co:	GRPme
Title:	Limerick Keyer
Board:	Mechanical Assembly
Revision:	A
Drawn:	WIREX
Size:	A
Date:	09/06/15
Sheet	1 of 1

The mechanical paddles assembly can be built using the above diagram. Assemble the unit together but don't tighten the screws down real tight..especially the two screws being screwed into the nylon standoff. Those screws can strip the threads out of the standoff if over-tightened. Once the complete paddles unit is assembled, you can mount it on top of the main board using the noted screws, washers and nuts. Test units required double washers under the flanges in order to raise the nylon standoff high enough to clear the socket and micro.



The output of the keyer chip is at the KEY and GND pads at the rear of the main board. The usual keyer setup requires a cable with a mono plug into the key input connector of your rig. Tuna can rigs usually have an RCA jack as the key input so a cable with an RCA connector would be appropriate for tuna can rigs.

## MODS:

1. If you want to power the Limerick Paddles with something other than the coin cell provided, there are a couple of component locations on the main board that facilitate the mod. Use a 4.7 or 5.1 volt zener at the location marked ZNR and a .1uf cap at C3. There is a small trace between the 2 pads adjacent to the GND pad next to the KEY pad. You need to cut the trace and add a resistor between the pads. Remove the coin cell and attach your new battery leads at either + pad on the sides of the coin cell holder.  
Your new ground can be attached at any of the ground locations on the board: FET end of the Zener pads, the key GND pad, any of the mounting holes at the 4 corners of the main board or the grounded via pad on C3.
2. If you are mounting the Paddles in an enclosure, you could elect to not mount the switch, speaker and pot on the main circuit board. You could then use those pad locations as connections to the components mounted off the board.
3. If you want to use your kit as straight paddles instead of using the keyer output, you could remove the keyer chip from the socket, Then you could attach paddle output wires to the PO (paddle output) pad locations and the ground wire to any ground location.

I hope you enjoy your Limerick Paddles kit.

Rex W1REX