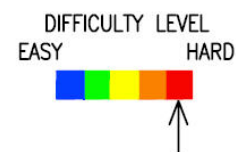




QRPGuys Iambic Keyer/Paddle



First, familiarize yourself with the parts and check for all the components. If a part is missing, please contact us and we will send one.

Parts List

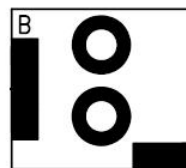
- 1 – QRPGuys Iambic Keyer PCB, 5 pieces
- 1 – U1, PIC 16F628A MPU, 18pin DIP
- 1 – U2, BS-170 field effect transistor
- 2 – D1, D2, 1N4148 diode, small glass, w/black band on one end
- 1 – C1, .1uF capacitor, marked 104
- 1 – 3.5mm stereo audio jack
- 3 – S1, S2, S3 momentary, N.O., PCB mount, pushbutton switch
- 1 – 18 pin DIP socket
- 1 – Piezo speaker
- 1 – CR2032 coin battery holder
- 4 – 3 position in-line header
- 4 – header jumper (Berg connector)
- 2 – SS paddle leaf
- 1 – 4-40 x 3/8"L SS pan head Phillips screw
- 1 - #4 SS flat washer
- 1 - #4 x .187"L nylon spacer
- 1 – 4-40 brass nut
- 1 - #4 lock washer
- 4 – 2-56 x .375"L SS pan head Phillips screw
- 4 – 2-56 SS nut
- 4 - #2 SS flat washer
- 4 - #2 SS lock washer
- 4 - #2 x .187"L nylon spacer
- 2 - 1/2" x 1" vinyl caplug
- 2 - 1/2" wide x 2"L plastic shim
- 4 – Silicone self-adhesive foot, 6mm

Even if you have done radio kit assembly before, please read through all the instructions before you start. This kit is a little different, in that the mechanical components are the part of the printed circuit board. The instructions give you the scope of the project and an understanding of the techniques we have employed. You will be assembling the kit from five pieces of PCB material, and when assembled, forms a portion of the electrical connections. The base also contains the circuitry for the keyer and battery holder to run the keyer. There are solder pads, registration marks, and letter coded parts, that match each other. When you tack and solder the components it will make a sturdy mechanical and electrical assembly.

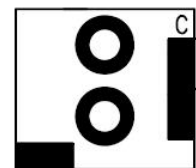
Refer to the figure below for identification of the individual PCB parts.



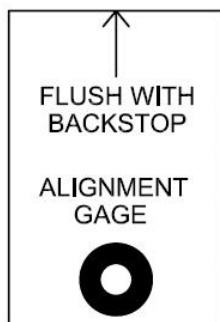
BACKSTOP



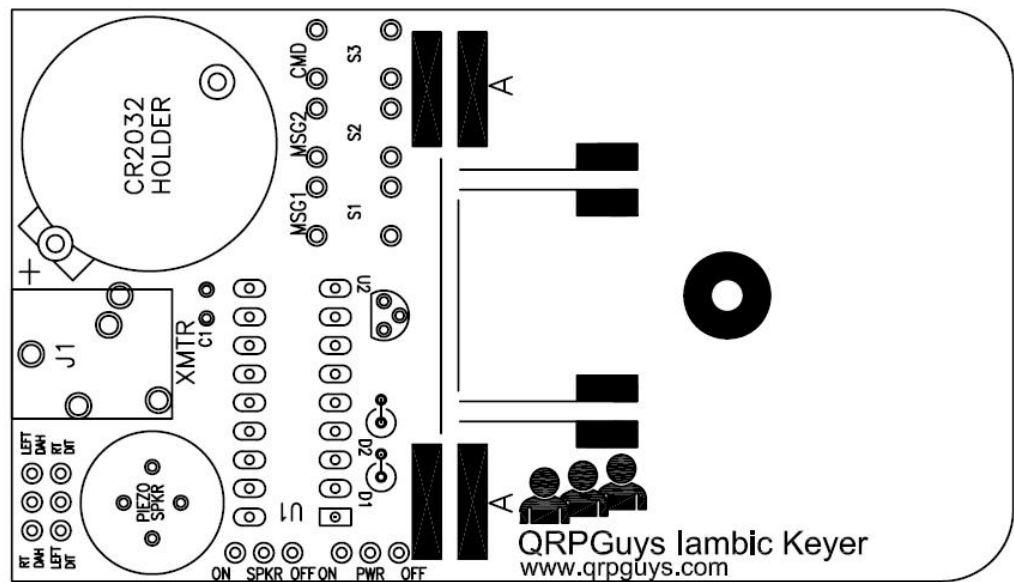
LEFT LEAF
HOLDER



RIGHT LEAF
HOLDER



ALIGNMENT
GAGE

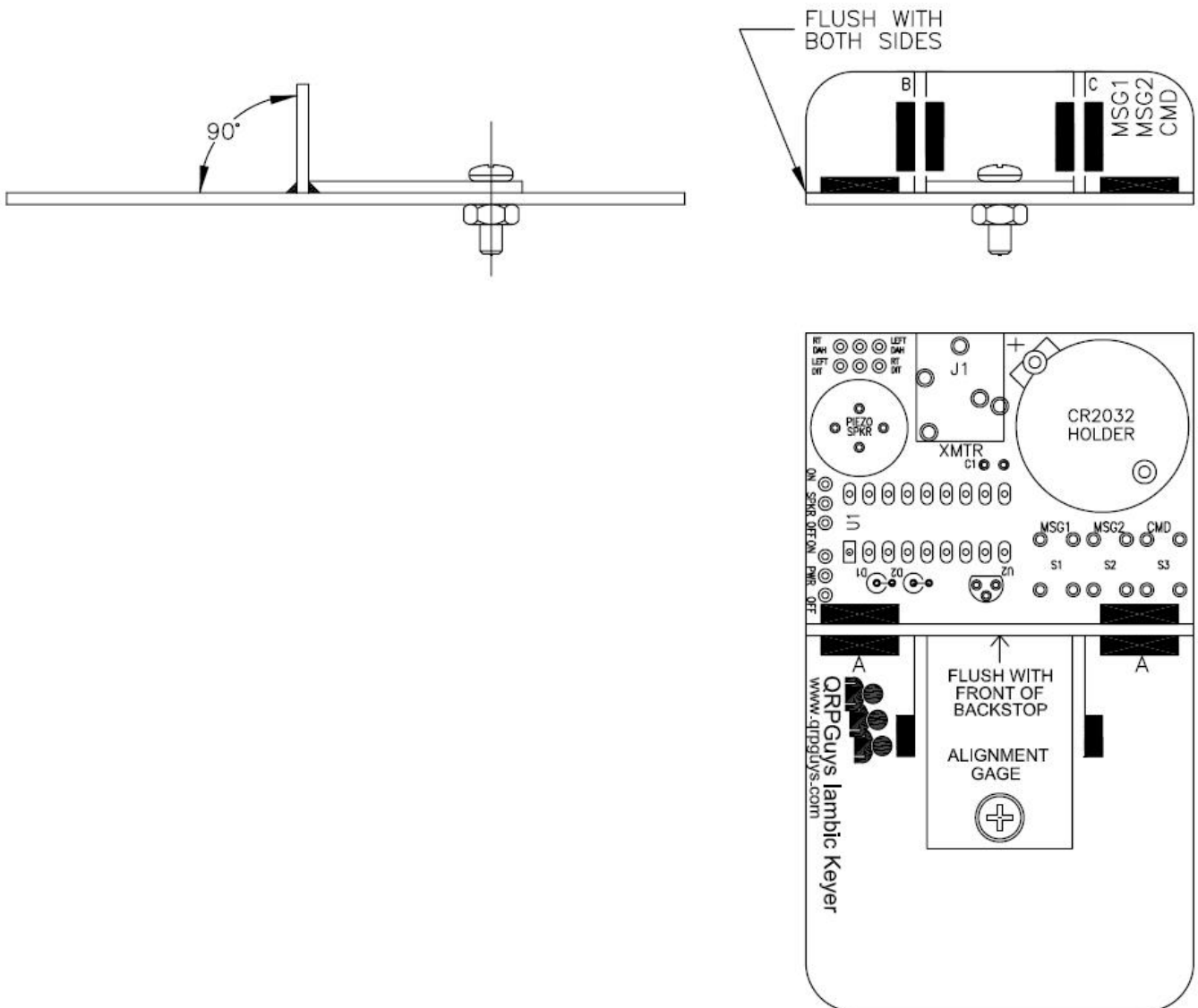


BASE

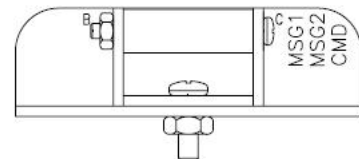
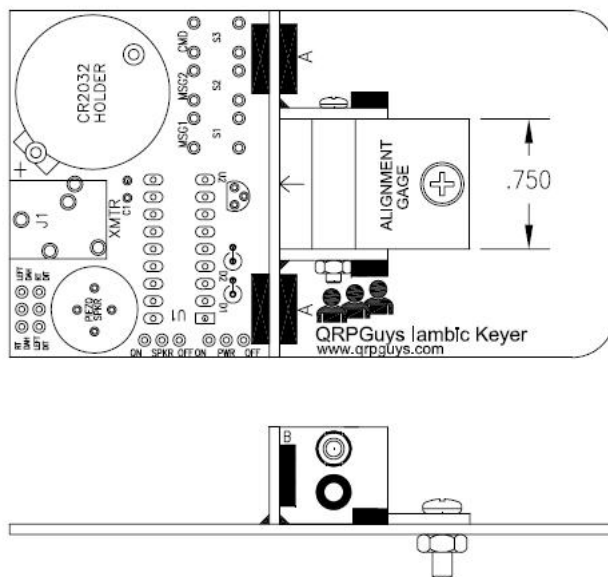
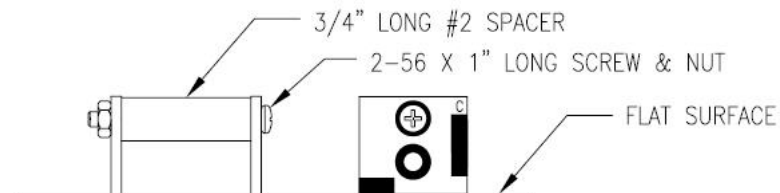
On all the mechanical assembly soldering you do, you will use the same technique. You tack a single tiny point first, and then check to see that it is square and aligned with the registration points. It is easy to re-heat the joint and adjust the alignment when there is only a single point. Then you tack the other pads, before you do the finish soldering.

Notice that the pieces are coded with letters that will match up when you have them in the correct alignment. The first two pieces to be joined are the **backstop** and the **base**.

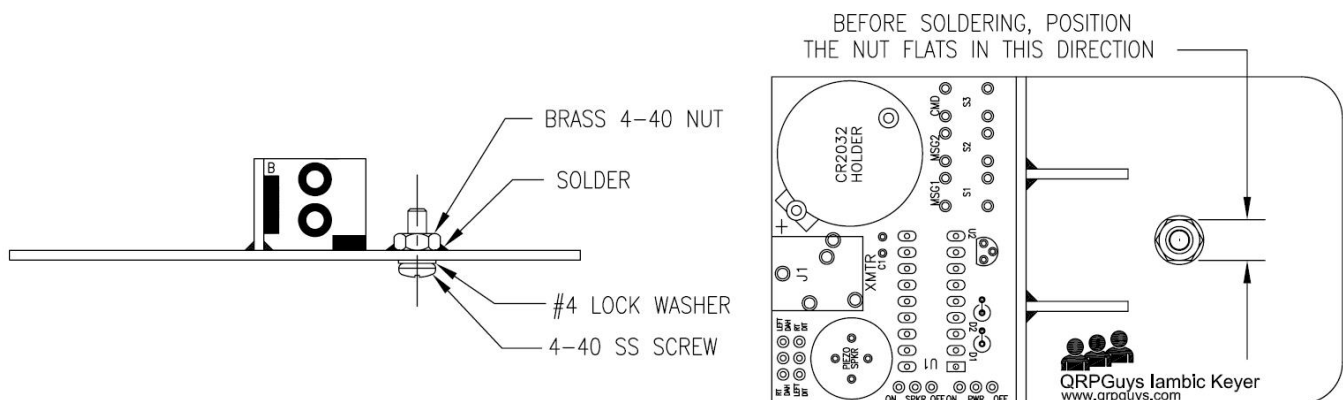
Attach the alignment gage to the base using a 4-40 screw and nut as shown in the figure below. Tighten the screw after you have placed the backstop against the gage and aligned it with the registration marks. The alignment gage should be centered between both leaf holder registration marks. The gage will stay in this position until the backstop and both leaf holders are soldered. You only slightly tack a point on one intersecting pad and then check to see that it is square to the base, aligned with the registration points, and flush with the sides. **If it is not, do not try the bend it to fix it, you will lift the pad off the surface.** You need to re-heat the tack and straighten it while the heat is applied. Once it is square, tack the opposite side pad. After a small tack is done on all the pads you can go back and touch up all the solder pads, and it will stay square and flush with the edges.



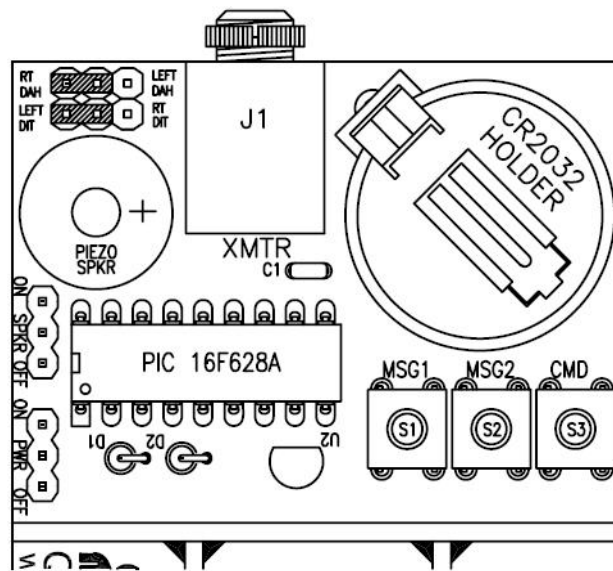
Use the same technique adding the **leaf holders**. Space the two leaf holders with the #2 x 3/4" long #2 nylon spacer, 2-56 x 1" long screw and one of the 2-56 nuts. Match the registration letters and alignment marks. Slide the leaf holder assembly between the alignment gage, up against the backstop and light tack the pad between the base and paddle leaves. Check for squareness. Adjust if needed by re-heating the tack. Once you are satisfied, tack both pads where they intersect the backstop. If all is in alignment, go back and finish soldering all of the pads. Remove the alignment gage, nylon spacer, 1" long screw, nut, and solder the inside pads between the base and leaf holders.



Solder the 4-40 brass nut to the assembly using the figure below as a guide. It is helpful to rub the brass nut on some scotchbrite or emery paper to remove any oxidation on the brass. Use the hardware as shown in the figure. The lock washer ensures the nut is square with the surface of the PCB when heated. Solder the brass nut to the base. Heat the nut from the side. Do not get any solder on the top of the nut. If you do, it must be cleaned off. Remove the holding screw and lock washer.

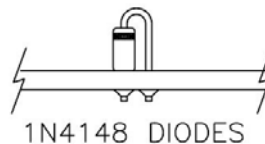


This completes soldering the mechanical pieces. Continue the building the kit by soldering the electronic components, starting with the smallest components first. Use the figure below for the part placement.



Parts placement figure

- [] Install D1 and D2, the small glass 1N4148 diodes, vertically, with the black cathode band **“UP”** as shown graphic below. The circle marking on the board must match the body of the diode to get the polarity correct.

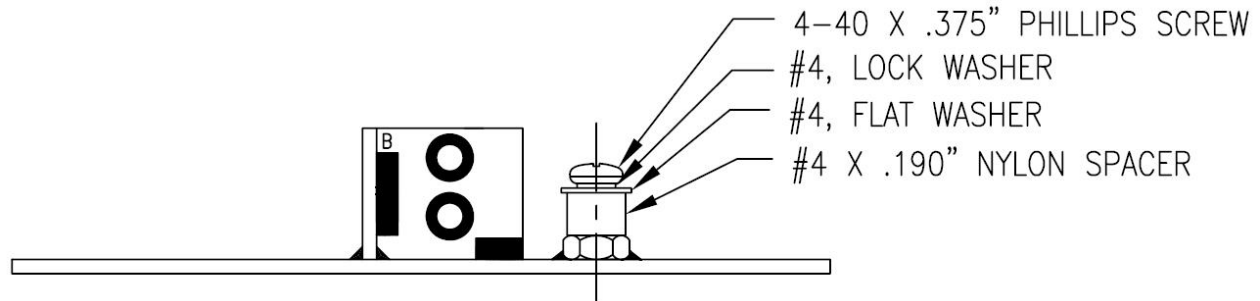


- [] Install C1, .1uF capacitor, marked 104
- [] Install U2, the BS-170 field effect transistor, observe the outline shown on the board and placement figure.
- [] Install the 18 pin DIP socket. Put the notched of the socket at the end of the row of holes with the rectangular pad.
- [] Install the 3 pin headers at the power, speaker, and paddle orientation positions.
- [] Install J1, the 3.5mm audio jack where indicated.
- [] Install S1, S2, S3, the pcb mounted switches, flush with the board.
- [] Install the piezo speaker where shown. Match the “+” polarity marked on the board and part when installing.
- [] Install the U1, the PIC16F628A into the DIP socket observing the pin1 location.
- [] Install the CR2032 battery holder, matching the outline.

This completes the electronic pcb assembly.

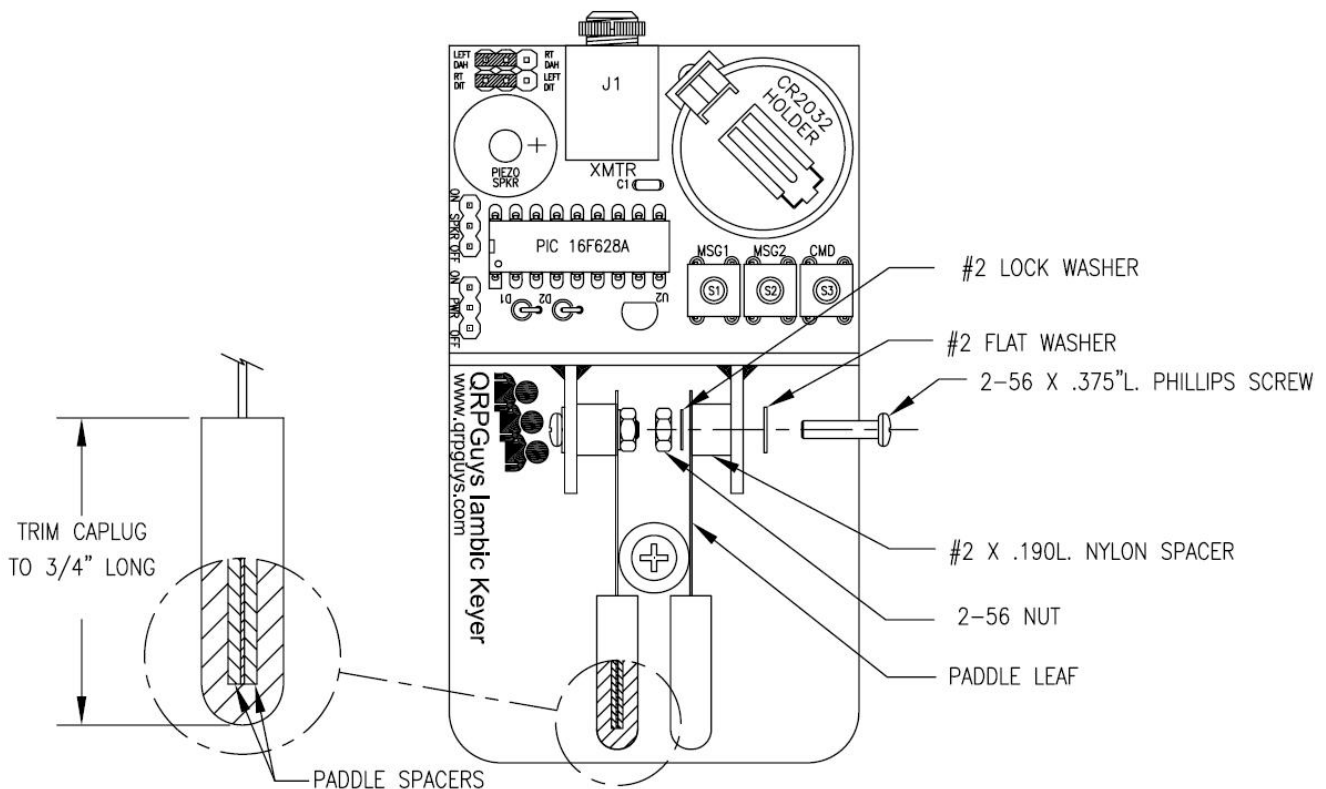
Assembling the center contact:

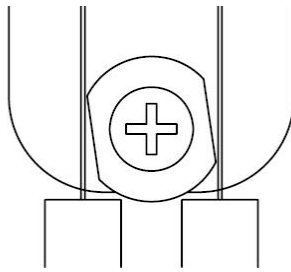
Finish the mechanical assembly of the center contact as shown in the figure below.



Assembling the paddle lever components:

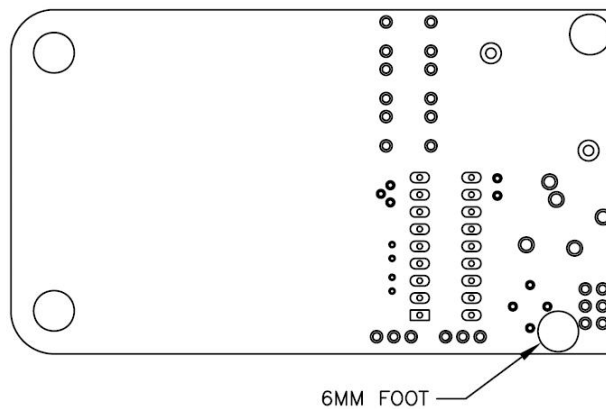
It's a good idea to assemble the hardware over a cookie sheet. Any hardware is difficult to find if dropped. Secure the paddle leaves to the holders using the hardware as shown. The hardware is small but with some patience and tweezers, can be assembled. It is easier to do the bottom screw first. Observe the order of the hardware. After assembly, if the paddle leaf holder is not perfectly square, the paddle leaf may be off to one side, or on an angle. Simply bend it to be close to the contact washer. The distance to the contact washer is a matter of personal preference and feel, and may need final adjustment prior to use. There is also some clearance between the contact washer and the O.D. of the holding screw allowing the washer to be moved to the side. The paddle leaves can easily be bent to accommodate different tensions and distances. The .010" thickness paddle leaves provide a light touch. A user could use thicker material for a stiffer touch.





You may opt to use a different diameter washer of your own choosing. You could experiment with a larger washer with some flats filed on it for a different feel and or spacing.

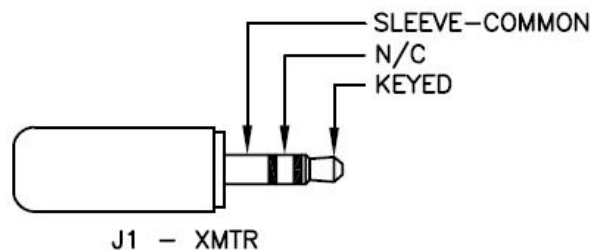
[] Attach the four self adhesive feet to the bottom corners.



This completes the assembly

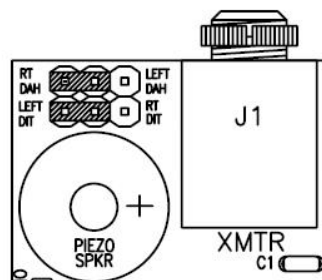
Cable configurations for connecting to XMTR (J1):

The XMTR output goes low when keyed



Test Drive

Set up the paddle response for which side you want the “dit” and “dah” to be on, by using the jumpers placed on the headers. *Shown is “RIGHT PADDLE DAH” and “LEFT PADDLE DIT”.*



Insert a 3v. CR2032 lithium coin battery, “+” side up. Set the power header to “ON”, and the speaker header to “ON”. Energy usage is very low (1mA active, 1uA standby) and the battery will last quite some time. The power jumper header is for storage only, in case the paddle lever gets pushed to one side, activating the keyer while not in use.

Try sending some code. You should hear your sending at the default speed of 15WPM. If you don't receive these responses, the most common errors are faulty solder joints. Inspect carefully for a bridged, or a missed solder joint. Verify that the PIC chip is installed with pin #1 in the correct position. The next most common mistake is the polarity reversed on a diode. It is helpful to have someone else look for errors, as you can easily miss your own mistakes.

The software for the PIC16F628A is in the public domain and used here with the consent of the author governed by the GNU General Public License, Version 2, June 1991. You are permitted to use and modify the PIC program for your own use. The chip is not locked, and can be reprogrammed. The complete documentation and files can be found at the URL

<http://www.strozzi.it/users/carlo/hamradio/iz4kbs-keyer/>

Using the keyer

The default speed of the keyer is ~15WPM. To change the speed you must enter the command mode. The command mode is initiated by pressing the “CMD” button for 1 sec., and the keyer will respond by sending “C” in a lower pitch tone. *All command responses are sent in the lower pitched tone, indicating that you are in the command mode.* Each touch of the “dah” side of the paddle will increase the speed one increment, “dit” will decrease the speed one increment. There are 31 increments to cover 6 to 45WPM. You exit the command mode by pressing the “CMD” button for 1 sec.,

or by sending a “D” character. The speed setting is stored in the PIC EEPROM, so it is not lost if you move the power jumper to off.

Most the commands listed, the keyer will respond with announcing an “R”. The exception to that are the speed and tune commands, (E, T, U).

Entering a message

Button labeled “MSG1” has about 63 characters stored in the PIC EEPROM, and is stored if the power jumper is disconnected. Button labeled “MSG2” has about 55 characters and is stored in the PIC internal RAM. This message will be deleted if you disconnect the power jumper.

To enter a message, press the message button you want for about 1/2 sec. until the keyer responds with an “M” for message record. Enter your message. Then press the same message button to store it. The keyer will respond with an “S” for stored. If you exceed the character limit, the keyer will respond with an “F” for full, indicating that you have exceeded your limit and stops recording.

To play your recorded message, lightly tap the appropriate button.

Commands:

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