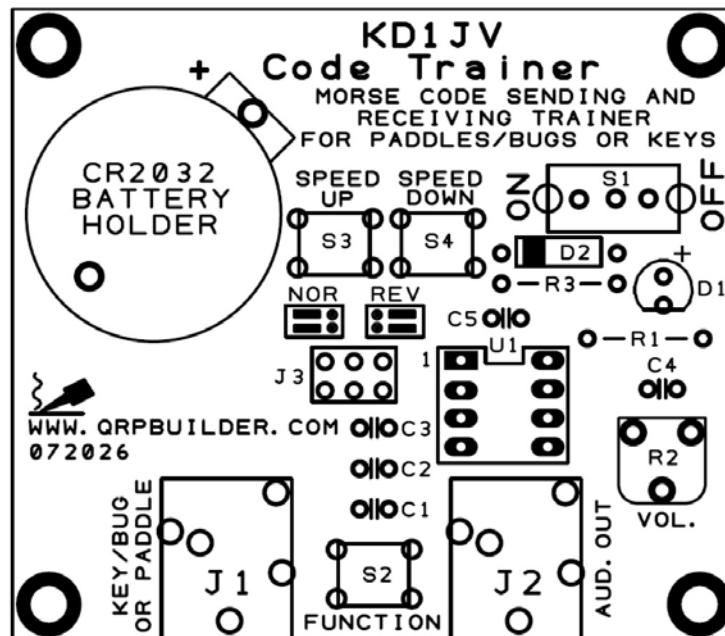




Please read all the instructions before starting the assembly.

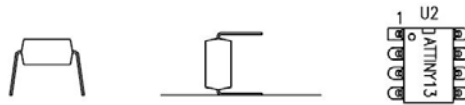
- 1 – KD1JV Code Trainer pcb
- 1 – U1, ATTiny13 dip IC
- 1 – D1, green led
- 1 – D2, 1N4148 diode, small glass with black band on one end
- 5 – C1,2,3,4,5, .1uF mono capacitor, marked 104
- 1 – R1, 4.7K resistor, (yellow-violet-red-gold)
- 1 – R2, 1K trimpot
- 1 – R3, 100K resistor, (brown-black-yellow-gold)
- 1 – S1, SPDT slide switch
- 3 – S2,3,4 pushbutton switch
- 2 – J1,2, 3.5mm audio jack
- 1 – 8 pin dip socket
- 1 – J3, 2x3 pin header
- 2 – header jumper (Berg connector)
- 1 – coin battery holder
- 4 – 3/8" dia. rubber foot

Refer to the graphic below and the PCB silk screening for the placement of the components.



You will start with the smallest components first and progress to the larger ones.

- [] Install C1,2,3,4,5, .1uF mono capacitor (marked 104)
- [] Install D2, 1N4148 diode, glass with black band on one end, *match board outline*
- [] Install R1, 4.7K resistor, (yellow-violet-red-gold)
- [] Install R3, 100K, (brown-black-yellow-gold)
- [] Install D1, green led, *observe polarity, long lead is positive*. This can be omitted if you do not need the visual code indication, and you will get better battery life.
- [] Install the 8 pin dip socket for U1
- [] Install J3, 2x3 pin header
- [] Install S1, SPDT slide switch
- [] Install R2, 1K trimpot
- [] Install J1,2, 3.5mm audio jack
- [] Install S2,3,4 pushbutton switch
- [] Install the coin battery holder as shown on the silkscreen.
- [] Install the four rubber feet on the bottom corners where indicated by the silkscreen.
- [] Install U1, ATTiny13 into the dip socket, observe the orientation of pin 1



When inserting the IC, the pins are flared so that they can be retained by auto insertion tools. Gently rock them on a flat surface so the pins are parallel and they will insert into the sockets more easily.

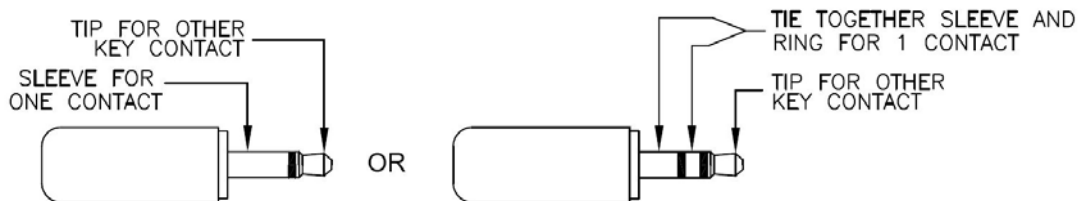
[] Install the four rubber feet on the bottom corners where indicated by the silkscreen.

[] Install 3V coin battery

This completes the assembly.

Connecting:

In order for the device to detect a **straight key** or **bug**, wire a 3.5mm **mono** plug for the tip as one key contact and sleeve as the other key contact. If you use a **stereo** plug, wire the sleeve and ring together as one contact, and the tip as the other side of the key or bug as shown below.



Straight key/bug plug configuration

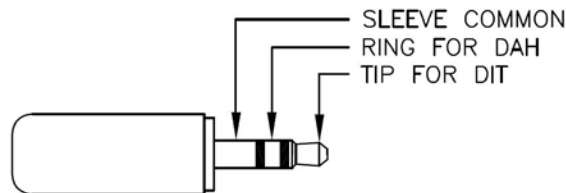
Turn off the device.

For **straight key** or **bug** operation, wire the mono plug as shown above.

Plug the mono plug into the key jack.

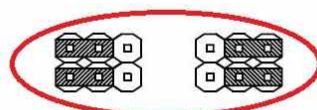
Turn on the device. The trainer will sense the mono plug and switch to the straight key mode.

For **paddles**, use a 3.5mm **stereo** plug. The key/paddle jack is designed for the tip to be “dit” and the ring to be “dah”, and the sleeve common. If your paddle is opposite, simply move the jumpers as shown on the board or graphic below.



Paddle plug configuration

JUMPERS
NORMAL REVERSED



**The jumpers go horizontally
not vertically**

After you have selected the paddle or key you want to use, plug in a set of ear buds, attach a small speaker, or cable to an amplified speaker. Adjust R3 (VOL.) for a comfortable audio level.

Operation:

Changing code speed:

The keyer code speed range is from about 5 WPM to about 33 WPM in about 1 WPM steps. The default power on speed is about 14 WPM.

- Momentary tap the FUNCTION button to enter speed adjust mode.
- The letter “S” will be annunciated and the LED will blink.
- To decrease speed, close the left paddle (normally DIT)
- To increase speed, close the right paddle (normally DAH)
- Continue to hold closed a paddle to scroll through the steps. A beep will be annunciated at each step and the LED will blink. The length of the beep and the delay between steps is based on the code speed for that step.
- Speed adjust mode will automatically exit after a 1 second pause in paddle use. A “I” will be annunciated when exiting.
- When using a straight key, bug, or in the absence of paddles the speed can also be changed with the board mounted “Speed Up” or “Speed Down” switches.

Iambic or “squeeze” keying

The keyer utilizes Iambic B. If both DIT and DAH paddles are closed, alternating elements will be sent as long as both paddles are closed. DIT-DAH-DIT-DAH.....

The first element to be sent, DIT or DAH, depends on which paddle was closed first. The last element to be sent depends on when the paddles are released

Iambic keying makes it possible to send some letters with less finger movement than would otherwise be required, such as:

- R = dit-dah-dit
- K = dah-dit-dah
- C = dah-dit-dah-dit
- . = dit-dah-dit-dah-dit-dah (period)

This mode also allows you to “insert” an opposite element into a string by tapping the opposite paddle at the right time, such as:

- Q = dah-dah-dit-dah – tap dit paddle during the second dah time or before the third dit
- F = dit-dit-dah-dit – tap the dah paddle during the second dit time or before the third dah.

Sending characters this way takes some practice in getting the timing right. The dot memory is active while the Dah is being sent and during the space following. Conversely, the dash memory is active while the dit is being sent and during the space following. Therefore, if you don't want to add an opposite element to a string, you must release the paddles during the next to last element to be sent. Because of this, sending an “A” or “N” is tricky with squeeze keying. In any event, as stated previously, it takes some practice at slow code speeds.

Random character code practice mode:

This mode generates groups of five mostly random characters for practice copy. The letters A through Z, numbers 0 to 9 and some punctuation, [.] [,] [/] [?]. The pseudo random number generator used to select characters seems to have favorite numbers, but eventually it finds all the characters.

The function key is disabled when there is a straight key in use. Therefore the code practice mode or the paddle speed adjustment is only active when using paddles or no key attached.

- To start the practice mode, hold closed the FUNCTION switch for about 1 second until the letter “P” is annunciated and release the switch. Character groups will begin to be sent. There is about a 1 second pause between groups.

Changing the code speed for receive practice:

- Use the “changing code speed procedure” to set the code speed *before* entering the practice mode.
- The code speed can also be changed using the paddles or switches *during the pause between character groups*.

Exiting the receive practice mode:

Turning the power off is one way to terminate this mode. The other is to hold the FUNCTION switch closed for about 1 second until the letter “X” is annunciated. This will return you to normal paddle mode.

Checking your copy and sending:

Find a Morse code reader app for your PC or phone and jumper the headphone over to the PC with a cable splitter. Fldigi is one such program.

Schematic:

