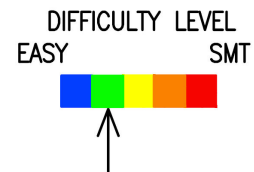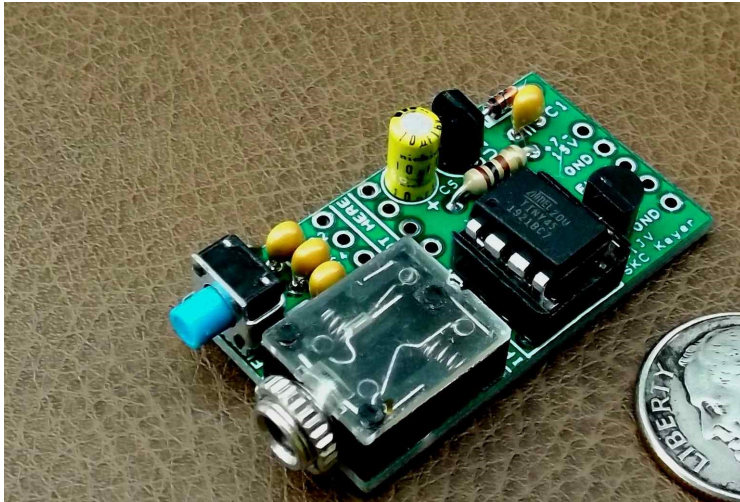# KD1JV SKC Keyer Kit Assembly

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. To request a part, please use qrpguys.parts@gmail.com.

*Please read all the instructions carefully before starting.*

Parts List

1 – KD1JV SKC Keyer pcb
1 – U1, ATtiny45 microcontroller, 8pin DIP
1 – U2, 78L05, TO-92 case
1 – Q1, 2N7000 mosfet
1 – D1, 1N4148 diode, small glass, w/black band on one end
1 – R1, 100 ohm resistor, (brown-black-brown-gold)
4 – C1,2,3,4, 10nF (.01uF) capacitor, marked 103, or (.1uF) marked 104, on earlier kits
1 – C5, 10uF electrolytic capacitor
1 - S1, 90º tactile pcb switch
1 – J1, 3.5mm stereo jack
1 – 8 pin dip socket

Two options for the finished envelope

Before starting, think about how much room you have to install the keyer in your chassis and where you want to place it. There are two flexible options for building the keyer, from more room available, to least room available in your chassis. Read thru the instructions carefully and decide which fits your situation the best.

Option 1 -   Single board, .85"W x 1.50"L x .38"H

Option 2 -   Split connector board and main board, for the most mounting flexibility, joined by 4 jumpers. Connector board .85"W x .56" L x .34"H. Main board .85"sq. x .34"H. The connector board mounts on the chassis wall, and the main board can mount anywhere there is access.
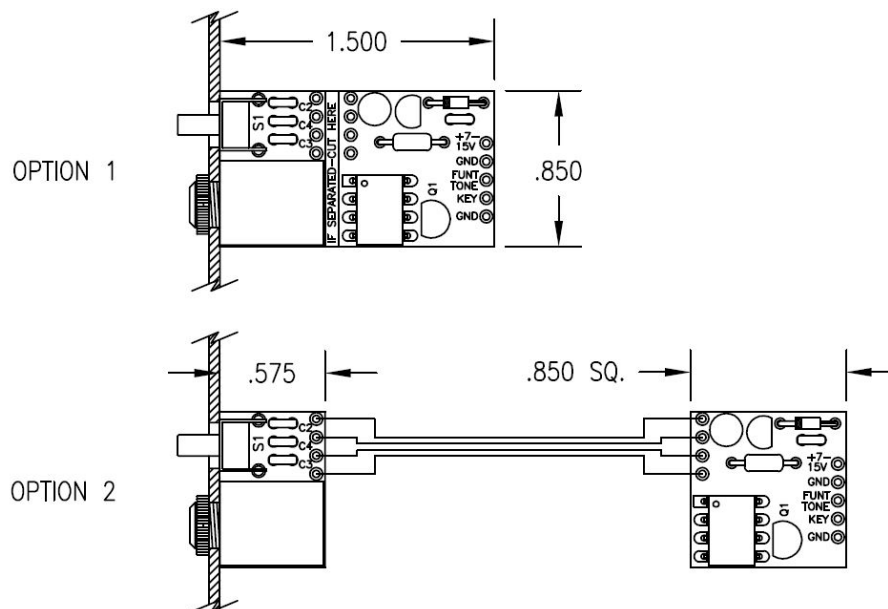
With either option, the jack for the keyer or straight key is secured to the chassis using the threaded ring for the 3.5mm jack, with a second hole for the function button. In option 2 you can simply secure the main board virtually anywhere inside the chassis using a small piece of foam double sided tape, and connect the two boards.
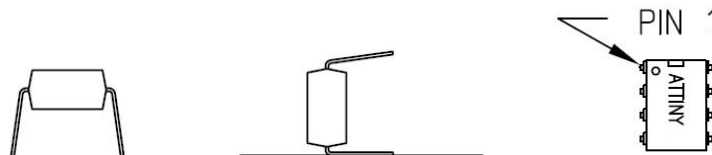
Option 1

Install the smallest components first. All the components mount on the front of the board. Use the placement guide below.
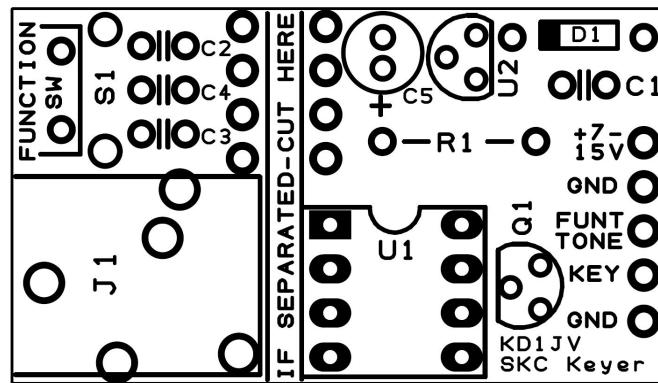
Parts placement figure

[ ]   Install D1, the small glass 1N4148 diode, Match the black end with the silkscreen outline.

[ ]   Install R1, 100 ohm resistor, (brown-black-brown-gold). See note in General Design Notes, concerning function button volume.

[ ]   Install C1,2,3,4, 10nF (.01uF) capacitor, marked 103, or 100nF (.1uF), marked 104 capacitor, for earlier kits

[ ]   Install 8 pin dip socket

[ ]   Install C5, 10uF electrolytic capacitor. *Observe polarity marked on the board. Long lead is "+".*

[ ]   Install U2, 78L05, observe the outline shown on the board. *Mount U2 very close to the board, so that the top is no more than 1/4" above the board.*

[ ]   Install Q1, 2N7000 mosfet, observe the outline shown on the board. *Mount Q1 very close to the board, so that the top is no more than 1/4" above the board.*

[ ]   Install S1, 90º tactile pcb switch where indicated.

[ ]   Install J1, 3.5mm audio jack where indicated.

[ ]   Clip all the leads flush on the back of the board.

[ ]   Install the ATtiny45 IC. Be sure of pin 1 orientation, the pad is rectangular.


When inserting IC's, 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 socket more easily. Be sure of pin 1 orientation.

Option 2

Option 2 mainly involves splitting the pcb into two pieces, and interconnecting them with 4 jumpers. This option allows the most flexibility for difficult tight quarters. The main board can be virtually anywhere inside the chassis, as you can attach it using a small piece of double side foam tape. The connector board is attached to the chassis wall after drilling two holes, and securing with the 3.5mm threaded ring.

[ ]   First, cut the board where indicated with a hacksaw, or tin snips as shown below. Be careful to keep it between the lines. You may carefully dress the edges with a file or rub on piece of emery paper to smooth the cut edge. *Do not dress beyond the edge of the silkscreen.*
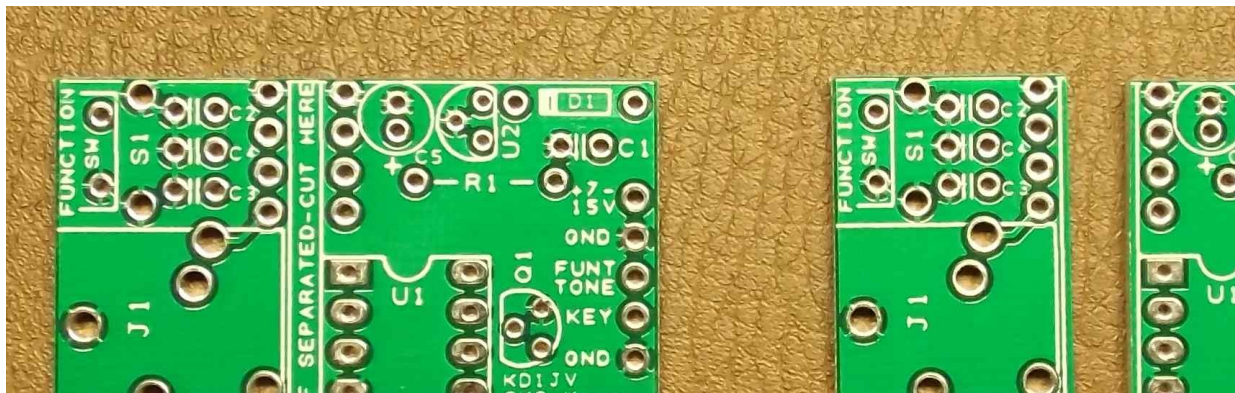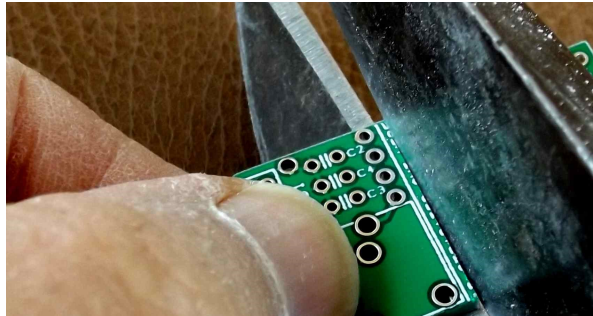
As received   Split and dressed
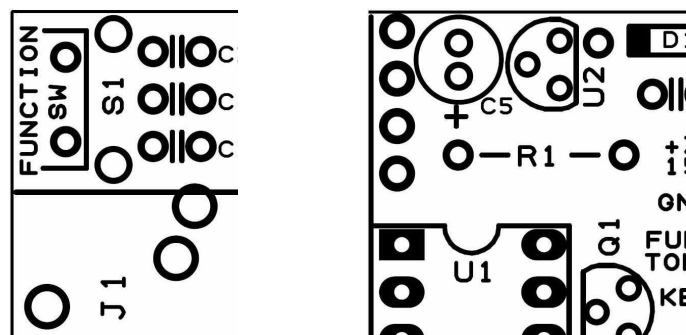
Parts placement figure

Install the smallest components first. All the components mount on the front of the board.

[ ]   Install D1, the small glass 1N4148 diode, Match the black end with the silkscreen outline.

[ ]   Install R1, 100 ohm resistor, (brown-black-brown-gold). See note in General Design Notes, concerning function button volume.

[ ]   Install C1,2,3,4, 10nF (.01uF) marked 103, or 100nF (.1uF) capacitor, marked 104, for earlier kits

[ ]   Install 8 pin dip socket

[ ]   Install C5, 10uF electrolytic capacitor. *Observe polarity marked on the board. Long lead is "+".*

[ ]   Install U2, 78L05, observe the outline shown on the board. *Mount U2 very close to the board, so that the top is no more than .25" above the board.*

[ ]   Install Q1, 2N7000 mosfet, observe the outline shown on the board. *Mount Q1,2 very close to the board, so that the top is no more than .25" above the board.*

[ ]   Install S1, 90º tactile pcb switch where indicated.

[ ]   Install J1, 3.5mm audio jack where indicated.

[ ]   Clip all the leads flush on the back of the main board.

[ ]   Install the ATtiny45 IC. Be sure of pin 1 orientation, the pad is rectangular.
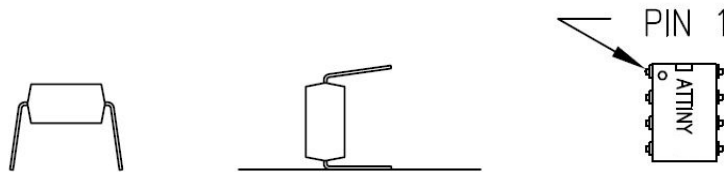

When inserting IC's, the pins are flared so that they can be retained by auto insertion tools. Gently rock them on a flat surface so the pins are parallel and they will insert into the socket more easily. Be sure of pin 1 orientation.

In option 2, the two boards must be interconnected with each other by four jumpers, replacing the four traces you removed with the cut and trim operation.

It is usually easiest to decide where you want to mount the two boards, solder longer than needed interconnecting wires to the main board, and secure it in place with some double sided foam tape. This includes the four wires to the connector board and any connections to your radio you need from the main board. Then cut, trim, and solder to the appropriate point. *Be sure you have trimmed all the leads off the bottom of the main board before attaching the foam tape. If mounting on a conductive surface, leads can stick thru the double side and short against the chassis.*

Mounting options
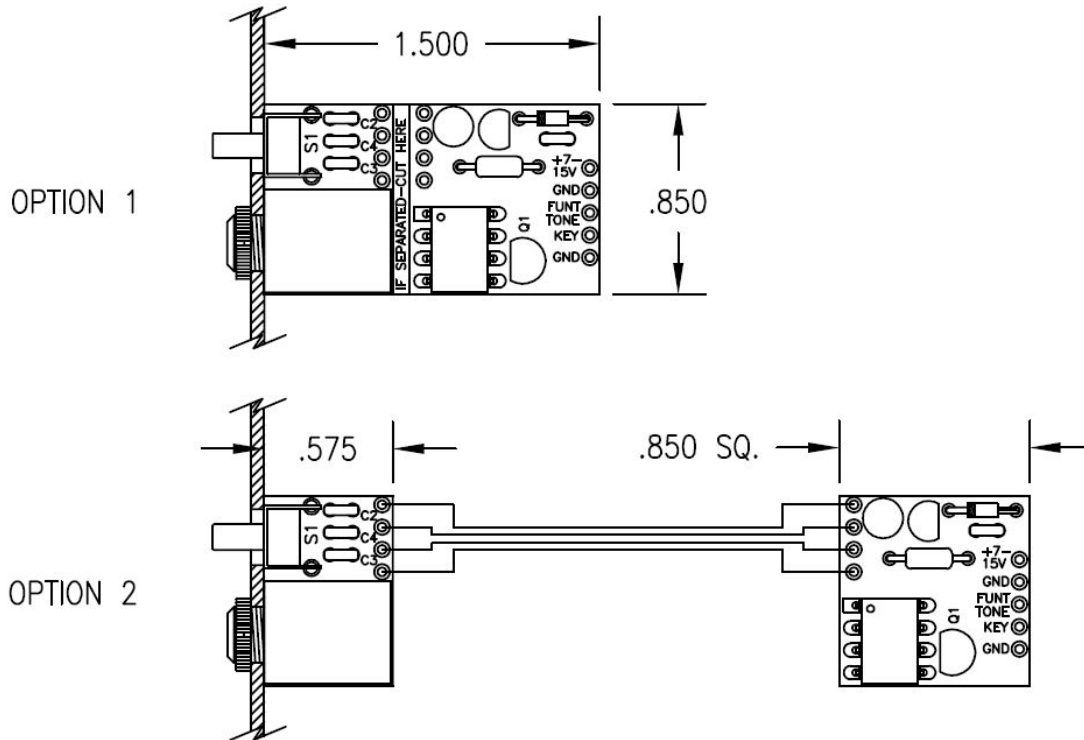
In both mounting options the one piece keyer board or separate connector board are designed to mount to the 1/16" thick wall of your chassis, and is held in place by the threaded ring supplied with the 3.5mm jack. All that is needed is to drill two holes, as described below and mount the keyer board or connector board directly with the 3.5mm jack that is soldered to the pcb. The pushbutton is slightly higher than the 3.5mm jack.
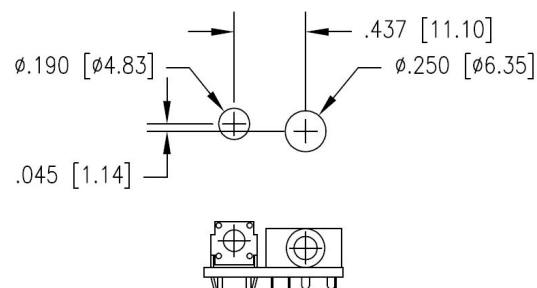
As viewed from the outside

General operation notes:

The paddle input connections to the keyer are set up for the tip being "dit", the sleeve to be "dah" on a 3.5mm stereo plug, and the barrel is ground.

Connect the "Function Tone" pad to your audio output device, so you can hear the function prompts.

Basic Keyer Operation:

Iambic "B" mode

Jack wiring: DOT = Tip, DASH = Ring

Function switch:

This is a timed switch. Which function is enabled depends on how long the switch is held closed. Functions are selected in the following order:

1 - Send message

2 - Change code speed

3 - Enter/store message

Send message/code speed selection:

These two functions are combined.

After a short "TAP" of the switch:

Send a stored message:

- Within 1 second -
- Tap DOT paddle to send message 1 (M1)
- Tap DASH paddle to send message 2 (M2)

OR

Change Code Speed

Wait 1 second

- The letter "S" will sound by the side tone, indicating you can now change the code speed.
- Speed is changed in 1 WPM increments, 5 to 30 WPM. Initial default = 20 WPM
- DOT paddle reduces speed.
- DASH paddle increases speed.
- "E" is sounded by the side tone at the new code speed.
- Auto exit after 1 second of inactivity. A beep will sound to indicate the exit.
- New code speed is saved in EEPROM and becomes the default power on speed.

Entering and Storing messages:

1. Hold the Function switch closed for 4 seconds, until the letter "M" is sounded by the side tone.

- If you didn't want to enter a new message, this function can be exited by pushing the Function button again.

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2. Key in your message via the paddle.
   - Ideal space timing is used to automatically detect the end of a letter group and insert word spaces.
     - A letter group is formed after a 3 dot length pause.
     - A word space is inserted after a 7 dot length pause.
     - If your message comes out all garbled, your not leaving enough space between letter groups and words.
   - Messages can be up to 120 characters, which includes word spaces and the end of string character.
   - If the character limit is reached, the message review mode will start and sound the message. You can then decide to store as is, or start again.
   - When you have completed entering the message, tap the Function switch to start the message review. The message is repeated via side tone to verify it was entered correctly and sounds right.

To store the message:

   - Tap the DOT paddle to store in location 1 – side tone [MS]
   - Tap the DASH paddle to store in location 2 – side tone [MS]
   - normal operation will resume.
   - To re-enter a message, TAP the function switch. - side tone [EM] You can now repeat the process.

Sending a message:

   - Tap the function switch, then within 1 second
     - Tap the DOT (M1) paddle
     - Tap the DASH (M2) paddle.

   - The message can be paused by using the DASH paddle.
   - The message is terminated by using the DOT paddle.

Beacon Mode:

Message 1 can be set to repeat. The pause between repeats is set to 1 seconds and is fixed.

   - To set Beacon mode, press the function switch while message 1 is active. The switch is detected between letters, so hold the switch until "B" is sounded by the side tone.
   - The message can be paused by using the DASH paddle.

The message is terminated by using the DOT paddle.

<u>Straight key mode:</u>

Grounding the DASH input on power up will put the SKC into straight key mode. This is most easily done by inserting a mono plug into the paddle jack. In this mode, the Tx keying output and side tone will follow the input to the DOT pin. The Function switch is disabled in this mode, as the paddle is needed to control the functions it enables.

Schematic
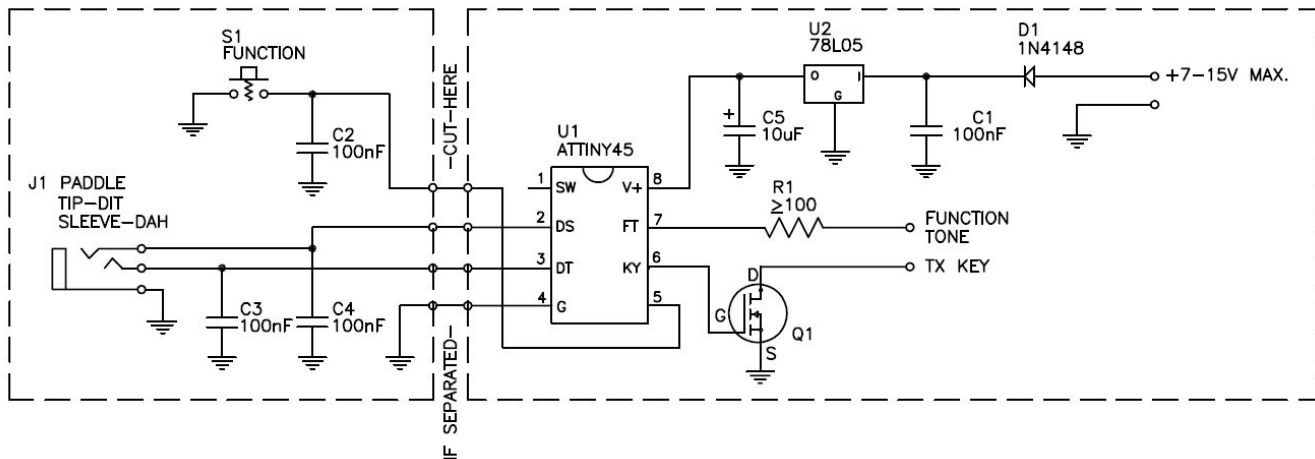
C1,2,3,4 may be 10nF (.01uF) on newer kits

General design notes:

Tx keying output from chip is active high. The 2N7000 mosfet is supplied to invert the signal as most rigs key and mute with active low signal. It also allows for switching voltages greater than the 5 volts the SKC operates at.

R1 controls the volume of the function tone sent to the speaker/earbud. We supply 100 ohm resistor for max. volume. Do not use a value less than 100 ohms. At 2.2K resistor the volume gets faint.

C2, 3 and 4 are required for static protection and help de-bounce the switch and paddle inputs.

Connect the "Function Tone" pad to your audio output device, so you can hear the function prompts.

Both voltage and temperature will affect the clock speed. For proper side tone pitch and keyer speeds, the supply voltage must be near 5 volts and be stable, hence the 78L05 regulator. The input voltage is 7-15VDC max.

You do not hear your code on the "Function Tone" pin. The function tone pin is only for feeding audio of the functions into your audio chain so you can program the keyer for speed changes or messages. If your are testing the keyer for operation, hook it up to your transceiver. Alternately, you can put an led in series with a 10K resistor from the keyer output to +V and you will see it flash as you send code. Make sure you have the polarity correct for the led.

Notes:

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