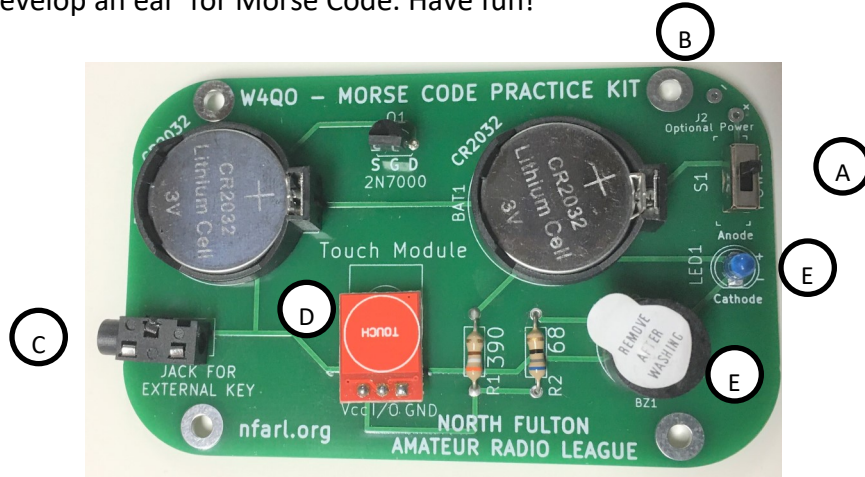




NFARL MORSE CODE PRACTICE OSCILLATOR KIT

Code Practice Oscillator— a great little device on which you can practice your Morse Code skills. It is simple to build and easy to use. All you need are two 3V coin batteries and your knowledge of Morse Code. Even if you are just beginning to learn Morse Code you'll probably find this practice oscillator is a handy way to practice timing and develop an ear for Morse Code. Have fun!



FEATURES:

- A** • Power switch
- B** • Mounting Pads (4)
- C** • External Key Jack
- D** • Capacitance Based On-Board “Key” pad
- E** • Sound & Visual indicators
- F** • Credit Card sized

INTERNATIONAL MORSE CODE

- The length of a **dot** is one unit.
- A **dash** is three units.
- The space between parts of the same letter is one unit.
- The space between letters is three units.
- The space between words is seven units.

NFARL Code Practice
Learn in this order
ESTONIA
DR MULCH
PFYBWG
JKQZXV

A B C D E F G H I J K L M N O P Q R S T



Reference Information

CAUTION!

WEAR EYE PROTECTION WHEN:

- SOLDERING AND
- CLIPPING LEADS FROM PARTS.

SOLDERING IRONS GET VERY HOT!

BE CAREFUL NOT TO COME IN CONTACT WITH TIPS!

SOLDER GETS VERY HOT! SOLDER MELTS AT 300° F OR HIGHER!

Number of Bands

4 Band 5 Band 6 Band

Resistor Parameters

1st Band of Color: Blue 6

2nd Band of Color: Grey 8

Multiplier: Black $\times 1 \Omega$

Tolerance: Gold $\pm 5\%$

Output

Resistor: 68 Ohms 5%

Number of Bands

4 Band 5 Band 6 Band

Resistor Parameters

1st Band of Color: Orange 3

2nd Band of Color: White 9

Multiplier: Brown $\times 10 \Omega$

Tolerance: Gold $\pm 5\%$

Output

Resistor: 390 Ohms 5%



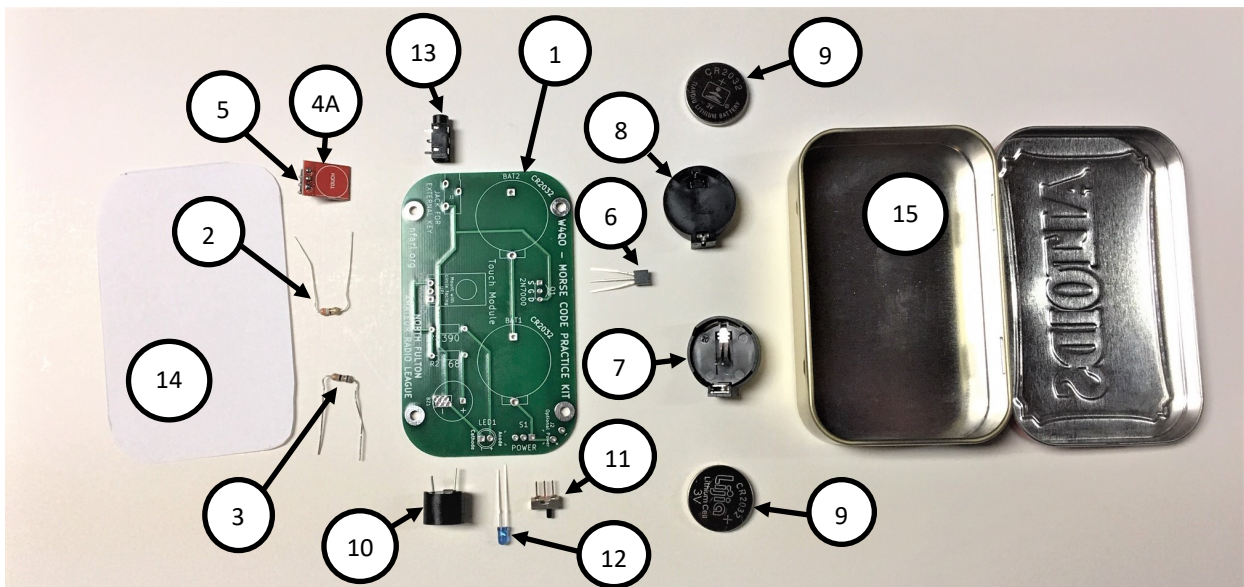
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AMATEUR RADIO LEAGUE
NFARL CODE PRACTICE OSCILLATOR

P. O. Box 1741
Historic Roswell, Georgia 30077

Instructions

1. Check to verify all parts in kit are present before you begin.
2. Arrange Parts on Parts Board so they are positioned like the photograph below.
Place all the parts in the parts board. Visually inspect each part as you place it on the board to ensure the part is not damaged.

ITEM	QUANTITY	DESCRIPTION	Assembly Step #
1	1	Morse Code Practice Kit printed circuit board	4 to 15
2	1	R1 390Ω resistor	4
3	1	R2 68Ω resistor	5
4A	1	Touch Module	3, 6
5	1	Touch Module Header	3, 6
6	1	Q1 2N7000 MOSFET	12
7	1	BAT1 Battery Holder	10
8	1	BAT2 Battery Holder	11
9	2	CR2032 Battery (x 2)	15
10	1	BZ1 Oscillator / Buzzer	13
11	1	S1 Power Switch	8
12	1	LED1 Blue LED	7
13	1	J1 External Key Jack	9
14	1	Morse Code Alphabet / Paper insulation	14
15	1	Altoids Tin (User supplied)	14
	1	Instruction Sheet	1



IT IS RECOMMENDED THAT YOU FOLLOW INSTRUCTION STEPS IN ORDER

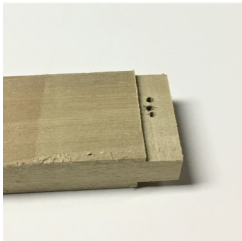


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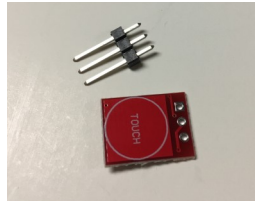
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3. Connect the Touch Module to the Touch Module Header

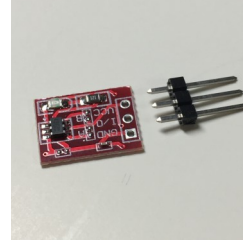
- a. Find the Touch Module Header on the Parts Board
- b. Place the long pins on the bottom of the header into the solder jig.
- c. Find the Touch Module on the Parts Board. The word “touch” is on the top surface of the Module. The Module circuit board components are on the bottom surface.
- d. Place the Touch Module onto the short pins on top of the Header so the word “Touch” faces up (is on the side opposite to the Header body).
- e. Solder the short pins to the Touch Module pads. Use only enough heat and solder to form a small dot on top of the pin/pad on the top side of the Module circuit board.
- f. Set the Touch Module Assembly back onto the Parts Board.



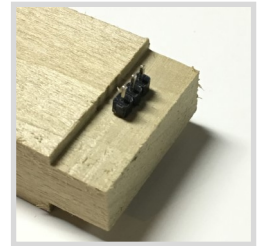
Jig—User supplied



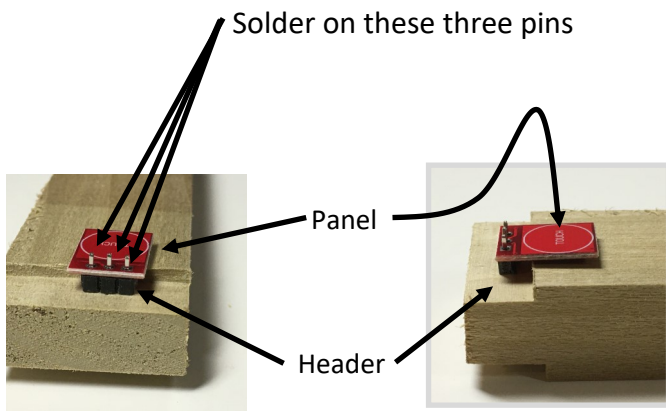
Panel and Header before solder—top view of Panel



Panel and Header before solder—bottom view of Panel

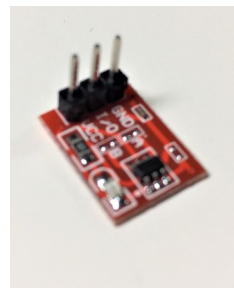


Header in jig—put long pins into jig



Panel and Header in jig—end view

Panel and Header in jig—side view



Bottom view after solder



Top view after solder



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4. Install R1

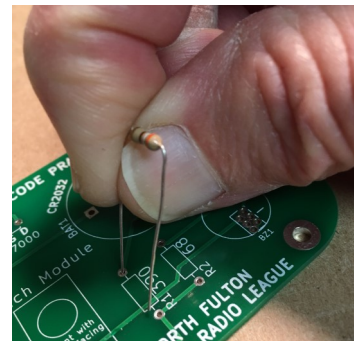
- Find the “W4QO – Morse Code Practice Kit” printed circuit board.
- Find R1, the 390Ω resistor, on the Parts Board. This resistor has the four bands; orange, white, brown and gold. If you are unsure of the colors, check the value with an ohmmeter.
- Gently bend the resistor leads so the two ends can be placed into the holes at the end of the “R1 390” box printed on the circuit board.
- Hold the printed circuit board in one hand. Hold the R1 390Ω resistor in your other hand and align the leads with the holes in the printed circuit board. The gold band on the resistor should be at the “0” in “R1 390” to make your assembly look uniform.
- Place the leads through the circuit board holes and gently push the resistor body down so it lies flat on the circuit board.
- Set the printed circuit board onto the table top so the wire leads face up towards you.
- Solder each wire lead to the pad on the printed circuit board.



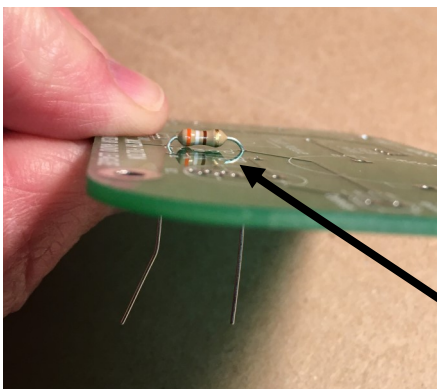
R1 390Ω resistor



Leads Bent
(Step “c”)



Step “d” - insert the resistor



R1 placed into position on Printed Circuit Board. Gold band is at “0” end of “R1 390” text on PCB (Step “e”)



Bottom view of PCB showing resistor leads solders but not trimmed yet . R1 & R2 are in place in this photo.

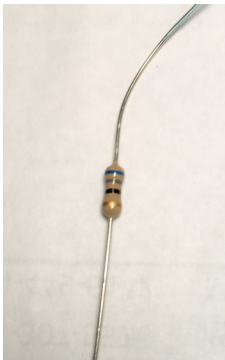


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5. Install R2

- a. Find the W4QO – Morse Code Practice Kit printed circuit board.
- b. Find R2, the 68Ω resistor, on the Parts Board. This resistor has the four bands; blue, grey, black and gold. If you are unsure of the colors, check the value with an ohmmeter.
- c. Gently bend the resistor leads so the two ends can be placed into the holes at the end of the “R2 68” box printed on the circuit board.
- d. Hold the printed circuit board in one hand. Hold the R2 68Ω resistor in your other hand and align the leads with the holes in the printed circuit board. The gold band on the resistor should be at the “8” in “R2 68” to make your assembly look uniform.
- e. Place the leads through the circuit board holes and gently push the resistor body down so it lies flat on the circuit board.
- f. Set the printed circuit board onto the table top so the wire leads face up towards you.
- g. Solder each wire lead to the pad on the printed circuit board.



R2 68Ω resistor



Leads Bent
(Step c)

See the photos in Step 4. Install R1 as reference to steps “d, e, f & g”



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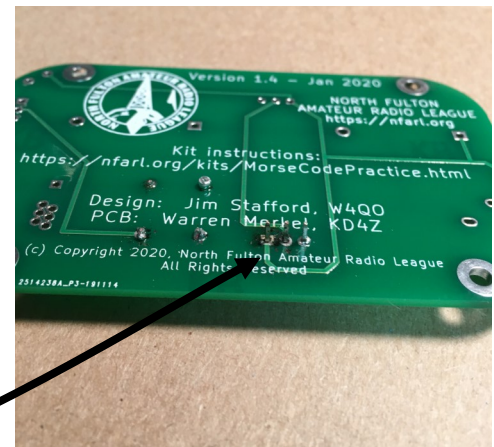
6. Install Touch Module Assembly

- a. Retrieve the Touch Module Assembly from Parts Board.
- b. Place the long pins on the Header into the printed circuit board so that the Touch Module is position as shown in Figure #. The holes in the printed circuit board are labeled "Vcc, I/O & GND".
- c. Place the printed circuit board onto the table with the Touch Module against the table top.
- d. Solder the three header pins to the pads on the printed circuit board.



Touch Module Assembly
mounted on PCB

Touch Module header
terminals after solder



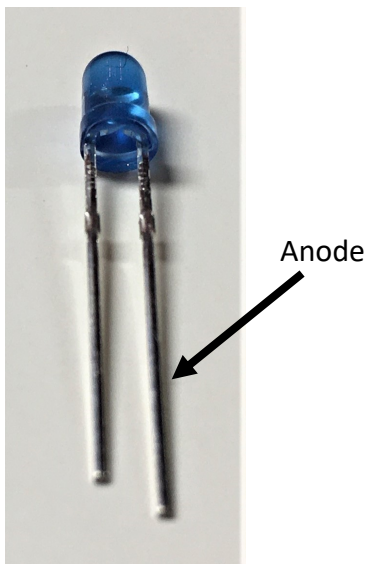


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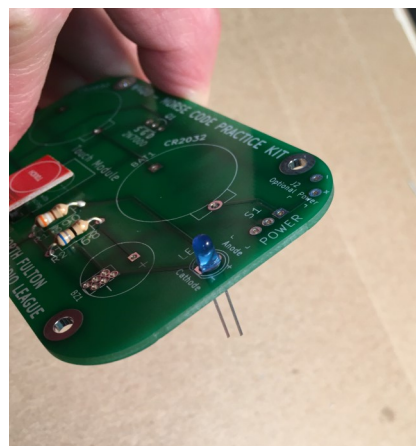
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7. Install LED1

- a. Retrieve LED1 from the Parts Board.
- b. Identify the anode (positive lead) on LED1 and align it with the hole in the printed circuit board marked “Anode (+)”. If the anode has not been trimmed and the LED has the factory lead lengths, then the anode is typically the longer of the two leads.
- c. Insert LED 1 into the printed circuit board so the cathode (negative lead) aligns into the printed circuit board hole marked “Cathode (-)”. If the LED has the factory length leads, the cathode will likely be the shorter of the two leads. Additionally, the cathode lead is typically designated with the flat across the edge of the rim base on the LED body.
- d. Push the LED1 down gently until the base sits flat on the printed circuit board.
- e. Place the printed circuit board on the table top with the LED1 facing the table top.
- f. Solder the two leads on LED1 to the pads on the printed circuit board.



LED1 before insertion



LED1 inserted into PCB (step “c” & step “f”)

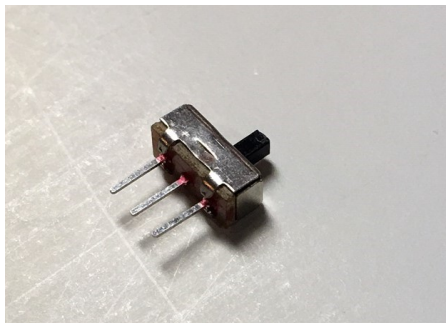


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8. Install S1 Power Switch

- a. Retrieve the slide switch "S1" from the Parts Board.
- b. Align the three leads on the bottom of the switch with the holes on the printed circuit board located between the characters "S1" and "POWER".
- c. Insert the switch leads into the holes so the switch base sits flat on the printed circuit board. The slide switch is a two position switch (the actuator post is at one end or the other of the slot in the switch surface plate). As a result it is not necessary to ensure the switch is oriented end to end when inserting it into the printed circuit board.
- d. Place the printed circuit board on the table top with the S1 actuator post facing the table top.
- e. Solder the three leads on switch S1 to the pads on the printed circuit board.



S1 Power Switch



S1 Power Switch mounted on PCB



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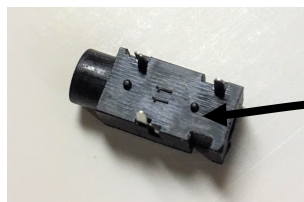
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9. Install J1 Jack

- a. Retrieve J1 Jack from the Parts Board.
- b. Place J1 Jack on the table with the three leads facing up.
- c. Closely examine the surface of the jack body that sits on the top surface of the printed circuit board. You will observe two very small “bumps” sticking up from the surface. These are for locating the jack in other applications. The bumps are not used on the NFARL Morse Code Practice Kit. You can choose to remove them before you install the jack on the printed circuit board. Removing the bumps will let the jack body sit flat against the printed circuit board surface and make the jack stable. Removal of the bumps is recommended but not required.*
- d. Insert J1 Jack into the three holes in the printed circuit board just above the characters “JACK FOR EXTERNAL KEY”. The barrel section should be hanging slightly over the edge of the printed circuit board.
- e. Place the printed circuit board on the table top with the J1 Jack body facing the table top.
- f. Solder the three leads on J1 Jack to the pads on the printed circuit board.

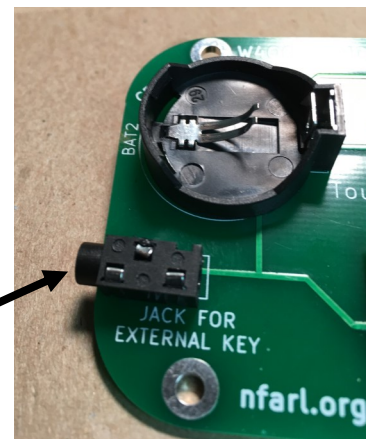
*To remove the bumps from the jack body surface, either:

1. use a sharp knife to cut and scrape the bump from the surface, or;
2. use the tip of a heated soldering iron to flatten the bump enough without distorting the body surface, or;
3. Perform steps 1 & 2 then scrape any remaining melted protrusion from the body surface with a knife.



J1 Jack bottom view- two
“bumps” shown

J1 Jack soldered in place.
Barrel end is positioned on
side of PCB





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10. Install BAT1

- Retrieve BAT1 (one of the two battery holders included in the kit) from the Parts Board.
- Place the BAT1 holder onto the printed circuit board so the box section aligns with the printed outline and the two terminals sit in the two holes.
- Place the printed circuit board on the table top with the BAT1 body facing the table top.
- Solder the two leads on BAT1 holder to the pads on the printed circuit board.

11. Install BAT2

- Retrieve BAT2 (remaining one of the two battery holders included in the kit) from the Parts Board.
- Place the BAT2 holder onto the printed circuit board so the box section aligns with the printed outline and the two terminals sit in the two holes.
- Place the printed circuit board on the table top with the BAT2 body facing the table top.
- Solder the two leads on BAT2 holder to the pads on the printed circuit board.



BAT1 & BAT2 Battery Holders



BAT1 soldered in place



BAT2 Battery Holder soldered in place



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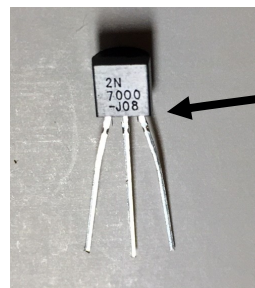
12. Install Q1

- Retrieve transistor Q1 from the Parts Board.
- Gently spread the two outboard terminals so all three terminals align with the three holes on the printed circuit board located between characters "Q1" and "S G D" (Source Gate Drain terminals).
- Align the Q1 body so the flat side is facing the line just above characters "S G D".
- Insert the Q1 terminals into the three holes and gently push the Q1 body down until the top surface is roughly the same height or just a bit taller than BAT2.
- Place the printed circuit board on the table top with the Q1 body top facing the table top.
- Solder the three leads on Q1 to the pads on the printed circuit board.



Q1 Soldered in place

Q1 is placed in PCB with the "flat" side facing the text "S G D"



Bottom view of Q1 on PCB after solder

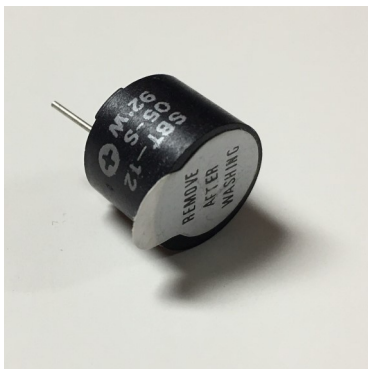


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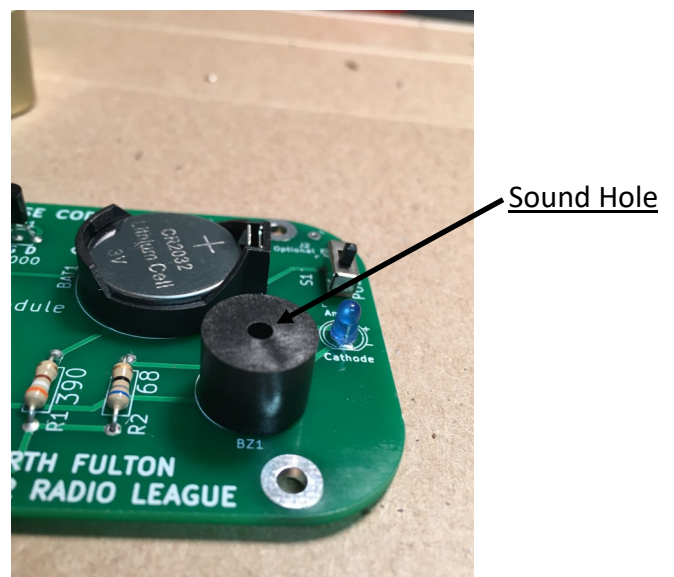
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13. Install BZ1

- a. Retrieve buzzer BZ1 from the Parts Board.
- b. Leave the protective label on the BZ1. The label controls the sound level. Just peel the label back a little to partially expose the sound hole underneath. If the label comes all the way off and will not stick to the BZ1, use a piece of tape to control sound.
- c. Examine the body on BZ1 and locate the terminal next to the printed “+” character.
- d. Align the “+” terminal with the hole marked “+” on the printed circuit board and align the other terminal with one of the six holes in the rectangle on the printed circuit board that allows the BZ1 body to sit flat when the device is positioned on the board. (There are six holes to allow various manufacturer and parts to be used for the BZ1).
- e. Insert the BZ1 terminals into the two holes and gently push the BZ1 body down until the body feet sit against the printed circuit board.
- f. Place the printed circuit board on the table top with the BZ1 body top facing the table top.
- g. Solder the two leads on BZ1 to the pads on the printed circuit board.



BZ1



BZ1 soldered on PCB, shown with label removed. Note Sound Hole in top surface.



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14. You have completed the installation of all components except batteries. Before you install the batteries;

- Visually inspect all solder joints to ensure they look to be completed properly (no “cold joints”, no bridges between pads, sufficient solder in place but not more than needed, etc.). Perform any solder re-work if necessary.
- Trim all wire lead length to top of solder joint if they have not been trimmed yet.
- DO NOT** Remove the protective label from BZ1. Just peel it back a little to control sound volume. Use a piece of tape if label peels off.
- IMPORTANT:** Cut the two Paper Insulation sheets from page 15 of instructions. Paste / attach them to inside top & bottom surfaces in the metal Altoids case so it will prevent the circuit from shorting.

15. Install the batteries with the “+” terminal facing up.

- The LED1 should light when the switch S1 is in the “ON” position.

16. Have fun sending Morse Code messages!

- Use the alphabet sheet to create your CQ call and messages!



When “Keyed” the LED1 illuminates



When “Keyed” the LED on the bottom of the Touch Module illuminates



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Morse Code Alphabet / Paper insulation

Cut these two inserts out with a pair of scissors and fit them into the inside of bottom and top sections of your Altoids tin. If you cut carefully along the line, the sheets fit nicely into the Altoids tin. You can use a drop of white paper paste on the back of each to secure the paper to the tin surfaces.

