

V1.0.0 | October 2025

## Chatterbox MAKER GUIDE



### Overview

This document contains the necessary information to build the Chatterbox. The Chatterbox is a switch scanning communication device which provides auditory feedback to guide the user while scanning.



# Chatterbox

## MAKER GUIDE



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Volume .....	100
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When powered, the first two lights start blinking and nothing else will happen .....	100
Chatterbox does not turn on with battery, but did on USB-C power.....	100
An LED does not turn on .....	100
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The Chatterbox seems to skip playing a message while switch scanning, and goes right to the delay between messages.....	101
Nothing happens when I press a message button.....	101
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Nothing happens when I press the assistive switch attached to the Next jack.....	101

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### Maker Checklist

This list provides an overview of the steps required to build and deliver the Chatterbox

### Maker To Do List

- Read through the Maker Guide to become familiar with required components, tools, supplies, safety gear, and overall assembly steps.
- Talk to the User about customization options
  - What colour(s) they would like the Chatterbox printed in.
    - If they would like high contrast between the direct access switches and top of the enclosure.
  - If they would like any custom caps, or the regular flat top on the direct access switches.
  - How they would like to receive the “User Guide” (PDF or physical copy)
  - Ask if they would like the label holders connected or if they can connect them (having the label holders connected before shipping may make shipping more difficult)
- Order custom PCBs
- Order hardware components
- Gather tools, supplies, and safety equipment.
- Assemble the device
- Flash firmware to the Chatterbox
- Test the Chatterbox
- Print “User Guide” (if the User would like a physical copy)

### Items to Give to User

- Assembled Chatterbox in enclosure
- Label holders
- User Guide

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### Tool List

#### Tools / Equipment

Tool ID	Description	Required / Recommended	Notes
T01	Soldering iron	Required	Soldering components
T02	Flush cutters	Required	Trimming electronic components
T03	Wire strippers	Required	Stripping insulation off wires
T04	Phillips head screwdriver (#2)	Required	Assembling the Chatterbox
T05	Precision flathead screwdriver (2.5mm or smaller)	Required	Securing the speaker to the amp
T06	Two assistive switches	Required	For testing the switch scanning functionality of the Chatterbox

#### Supplies

Supplies ID	Description	Quantity	Notes
S01	Solder	-	Soldering components together
S02	Hot glue or super glue	-	Holding the direct access switches in place

#### Personal Protective Equipment (PPE)

PPE ID	Description	Notes
P01	Safety goggles	Trimming electrical components and soldering may cause flying debris, which could harm your eyes if not wearing safety glasses.

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### Customization Guide

The device can be printed in the user's desired colour(s). We recommend printing the enclosure top and button caps in colours with high contrast (ex: white and black) to make it easier for users with partial vision to locate the buttons, if they desire.

### Custom Printed Circuit Board (PCB) Guide

The Chatterbox uses three (3) custom printed circuit boards.

The custom PCBs can be ordered from one of a variety of PCB Manufacturers. Typically, the minimum quantity for a custom PCB is five. Shipping options vary significantly in cost and shipping time. Plan on at least a week from the time of order to the PCBs arrival.

### Ordering the Custom PCBs

1. Select a PCB Fabrication Company
  - a. [JLPCB](#)
  - b. [PCBWay](#)
  - c. [OSH Park](#)
  - d. [Seeed Fusion PCB](#)
2. Create an account or use a guest login.
3. Upload the Gerber Files (e.g., Chatterbox\_Main\_PCB\_YYYY-MM-DD.zip). TODO: update date
4. Select the fabrication options:
  - a. PCB Layers: 2 Layers
  - b. PCB Quantity:
    - i. Main PCB: 5 boards
    - ii. Secondary PCB: 5 boards
    - iii. LED PCB: 20 boards\*
  - c. PCB Thickness: 1.6 mm
  - d. Surface Finish: HASL with lead
  - e. PCB Color: Choose what you like. Note that certain colours may impact build time and cost.
  - f. The default settings for the other settings should work.
5. Select shipping option.
  - a. Shipping options and costs vary significantly. Select the best option based on your budget and timing.
6. Submit the order.

\*Note: we recommend ordering 20 LED PCBs as each Chatterbox requires four (4) LED boards. Ordering 20 boards lets you build up to five Chatterboxes on one PCB order, and the cost of 20 boards instead of 5 is negligible.

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### 3D Printing Guide

The device was originally printed on a Bambu P1S with Bambu Studio, with the default slicer profile.

#### 3D Printing Summary

Metrics	Single Unit
Total Print Time (hour min)	20h 10m
Total Number of Components	24
Typical Total Mass (g)	707
Typical Number of Print Setups	8

#### 3D Printing Settings

Note that the 3D printing material should be assumed to be PLA unless otherwise noted in the table below. The masses and print time are the total for each part (ex: each Label\_Holder.stl weighs 19g, so all four are listed as 76 g).

Print File Name	Qty	Total Print Time (hr:min)	Mass (g)	Infill (%)	Support (Y/N)	Layer Height/ Nozzle Diameter(mm)	Notes
Enclosure_Bottom_Left.stl	1	2:49	106	20	N	0.2/0.4	
Enclosure_Bottom_Right.stl	1	2:32	109	20	N	0.2/0.4	
Enclosure_Top_Left.stl	1	2:17	89	20	N	0.2/0.4	
Enclosure_Top_Right.stl	1	2:17	86	20	N	0.2/0.4	
Label_Holder.stl	4	2:04	76	20	N	0.2/0.4	
Button_Base.stl	4	2:44	104	20	N	0.2/0.4	
Button_Cap.stl	4	1:48	52	20	N	0.2/0.4	
Button_Insert.stl	4	1:28	28	20	N	0.2/0.4	
Center_Support.stl	2	1:38	48	20	N	0.2/0.4	
Volume_Knob.stl	1	0:13	2	20	N	0.2/0.4	
Battery_Cover.stl	1	0:20	7	20	N	0.2/0.4	

#### Post-Processing

Inspect the 3D printed parts for any printing defects, sharp edges, or burrs. Sharp edges and burrs can be removed with sanding or deburring tools.

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### Examples of Quality Prints

Compare your 3D prints to the images here. If there are significant differences, you may need to reprint the part.



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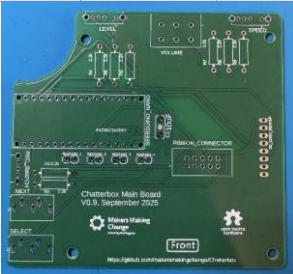
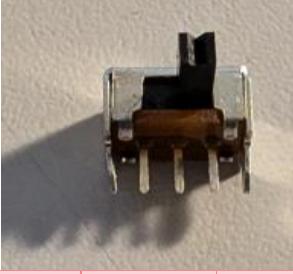
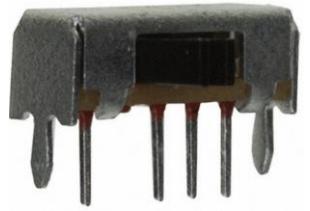
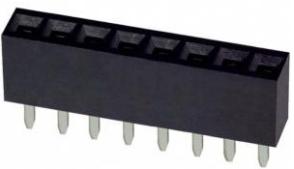
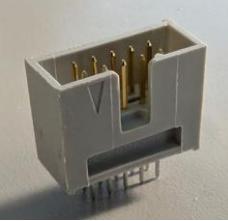
## Chatterbox MAKER GUIDE



# Chatterbox

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### Maker Component List

<b>Main PCB</b>								
A01	Main PCB	QTY: 1	A02	2.2k Ohm resistor	QTY: 8	A03	10uF Capacitor	QTY: 1
								
				Note: The resistor body colour may change, but the bands will be the same.				Note: The capacitor may be labelled with the number 106, and may be a different colour.
A04	Two position switch	QTY: 1	A05	Three position switch	QTY: 2	A06	8 position female header	QTY: 1
								
A07	15 position female header	QTY: 2	A08	3.5mm jack	QTY: 2	A09	Ribbon cable connector	QTY: 1
								
A10	Seeeduino Nano	QTY: 1	A11	Micro SD card reader	QTY: 1	A12	512 MB Micro SD Card	QTY: 1

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A13 24 AWG wire	QTY: 166 cm	A14 10 kOhm Logarithmic Potentiome ter
A photograph of a yellow 24 AWG wire with a stripped end showing the individual strands.		A photograph of a 10 kOhm logarithmic potentiometer with a blue plastic housing and metal shaft.

Secondary PCB								
B01 Secondary PCB	QTY: 1	B02	10uF Capacitor	QTY: 2	B03	Two position switch	QTY: 1	

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B04 	5 position female header QTY: 2	B05 	9V battery clip QTY: 1	B06 	Ribbon cable connector QTY: 1
			B07 Amp QTY: 1	B08 Microphone QTY: 1	B09 24 AWG wire QTY: 124 cm
			B10 Speaker QTY: 1		

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LED PCBs								
C01	LED PCB	QTY: 4	C02	2.2k Ohm resistor	QTY: 4	C03	5mm LED	QTY: 4
				A cylindrical resistor with red, gold, red, and gold color bands.			A blue LED with two long metal legs.	
C04	Completed Secondary PCB	QTY: 1		Note: The resistor body colour may change, but the bands will be the same.				

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Enclosure								
D01	Enclosure Bottom - Left	QTY: 1	D02	Enclosure Bottom - Right	QTY: 1	D03	Assembled Main PCB	QTY: 1
	A photograph showing the left side of the grey metal enclosure bottom, which has two circular cutouts for mounting.			A photograph showing the right side of the grey metal enclosure bottom, which also has two circular cutouts for mounting.			A photograph of the assembled Main PCB, showing the green board with various components and wires attached.	
D03	#4x3/8" machine screw	QTY: 20	D04	Centre support	QTY: 2	D05	Button base	QTY: 4

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	D07	Tactile switch	QTY: 4		D08	Enclosure Top - Left	QTY: 1		D09	Enclosure Top - Right	QTY: 1
	D10	Ribbon Cable	QTY: 1		D11	Assembled Secondary PCB and LED PCBs	QTY: 4		D12	Button insert	QTY: 4
	D13	Button cap	QTY: 4		D14	Label holder	QTY: 4		D15	9V battery	QTY: 1

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## Chatterbox MAKER GUIDE



### Assembly Guide

#### Assembly Section

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Files available at <https://github.com/makersmakingchange/Chatterbox>

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Part A: Main PCB	A photograph of the Chatterbox Main System's Main PCB. It is a green printed circuit board with various electronic components, a red breadboard, and a volume control potentiometer. Wires connect it to a blue ribbon connector and other parts.	
Part B: Secondary PCB	A photograph of the Chatterbox Secondary PCB. It is a green printed circuit board with a small blue component and some resistors. It is connected to a speaker and other wires.	
Part C: LED PCBs	A photograph of the Chatterbox LED PCBs. It shows a green printed circuit board with several small green components and wires connected to a larger blue component.	

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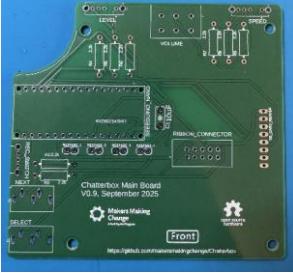
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<b>Part D: Enclosure Assembly</b>	
<b>Part E: Flashing Firmware</b>	

### Part A: Main PCB

#### Part A: Required Components

<b>Main PCB</b>								
A01	Main PCB	QTY: 1	A02	2.2k Ohm resistor	QTY: 8	A03	10uF Capacitor	QTY: 1
			<p>Note: The resistor body colour may change, but the bands will be the same.</p>			<p>Note: The capacitor may be labelled with the number 106, and may be a different colour.</p>		
A04	Two position switch	QTY: 1	A05	Three position switch	QTY: 2	A06	8 position female header	QTY: 1

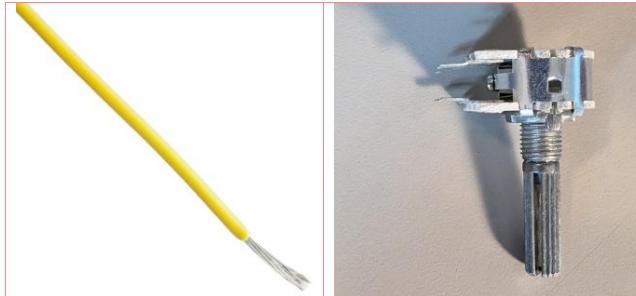
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	A07	15 position female header	QTY: 2		A08	3.5mm jack	QTY: 2		A09	Ribbon cable connector	QTY: 1
	A10	Seeeduino Nano	QTY: 1		A11	Micro SD card reader	QTY: 1		A12	512 MB Micro SD Card	QTY: 1
	A13	24 AWG wire	QTY: 166 cm		A14	10 kOhm Logarithmic Potentiometer	QTY: 1				

## Chatterbox MAKER GUIDE



### Part A: Required Tools and Supplies

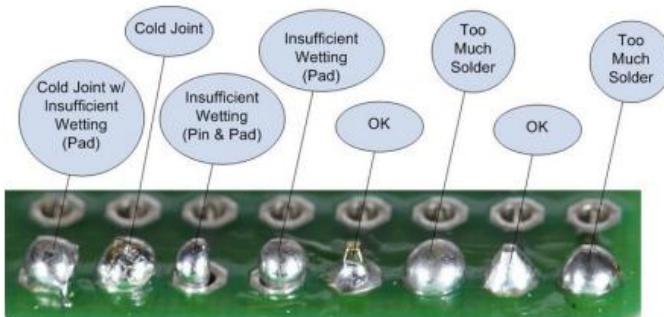
- Soldering Iron
- Solder
- Wire cutters/strippers
- Flush cutters

### Part A: Required Personal Protective Equipment (PPE)

- Safety glasses/goggles

### Soldering Image Guide

You can refer to this image guide throughout Parts A-C to check the quality of your solder joints.



The above image is from [Adafruit's soldering guide](#).

### Part A: Main PCB Assembly Steps

All electrical components will be inserted from the “Front” side of the board, and all soldering will be done on the “Back” side of the board.

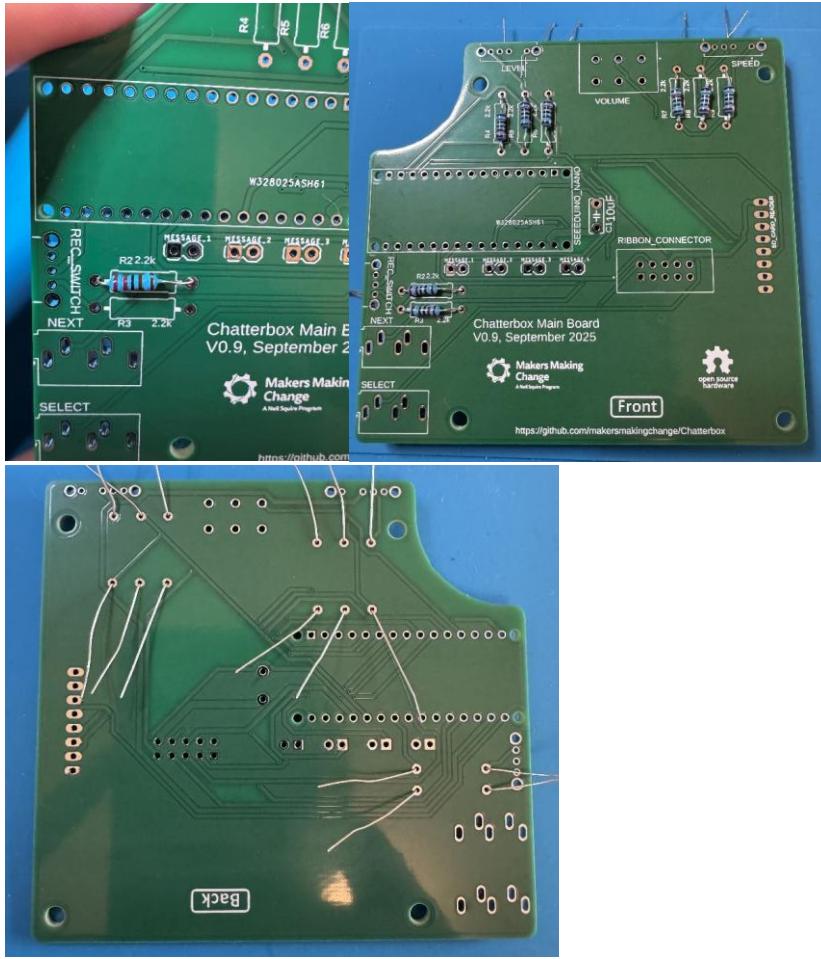
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### Step A-01: Add resistors to PCB

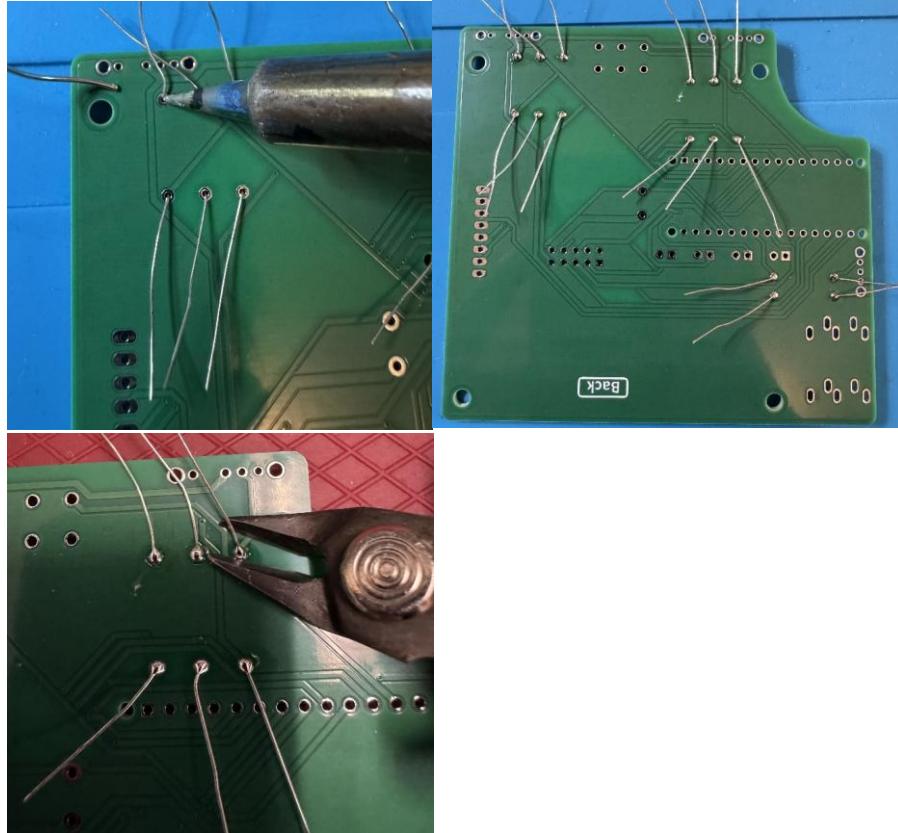
Insert the resistors (A02) into the spaces labeled R2-R8 on the Main PCB (A01). Make sure the resistors are lying flat on the board, and bend the leads to hold the resistors in place.



### Step A-02: Solder and trim all resistor leads

Solder both leads of each resistor to the PCB. Once the leads are soldered, trim the excess wire off using the flush cutters.

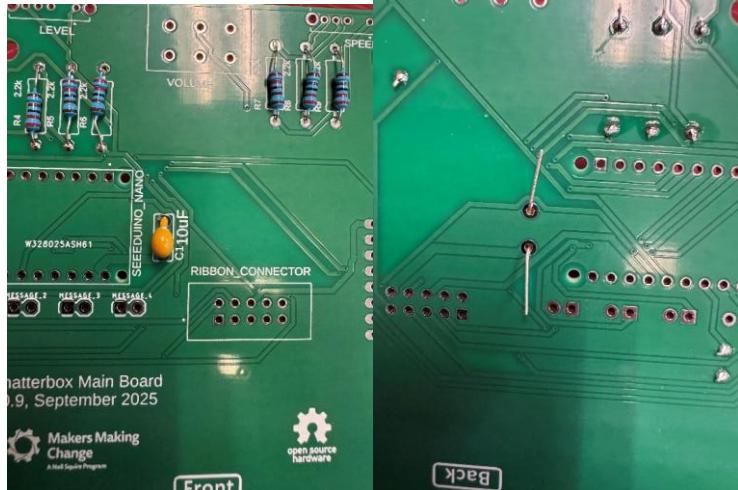
## Chatterbox MAKER GUIDE



### Step A-03: Insert capacitor

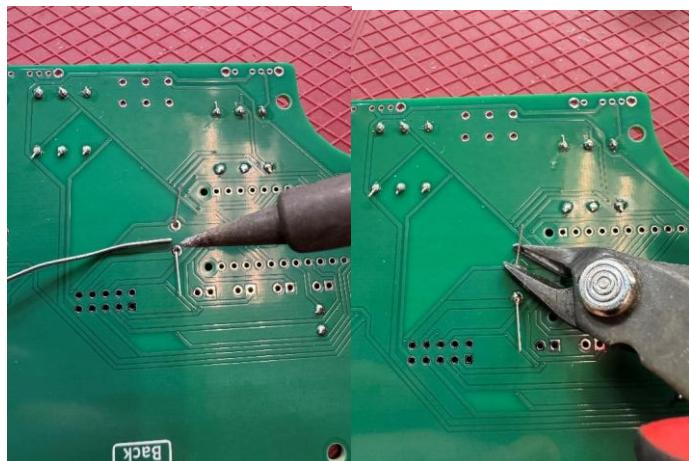
Insert the capacitor (A03) into the position labeled “C1” on the Main PCB. Make sure the capacitor sits flush to the PCB, then bend the leads to hold the capacitor in place.

## Chatterbox MAKER GUIDE



### Step A-04: Solder capacitor and trim leads

Solder both leads of the capacitor to the pads on the main PCB. Once soldered, trim the excess lead with the flush cutters.

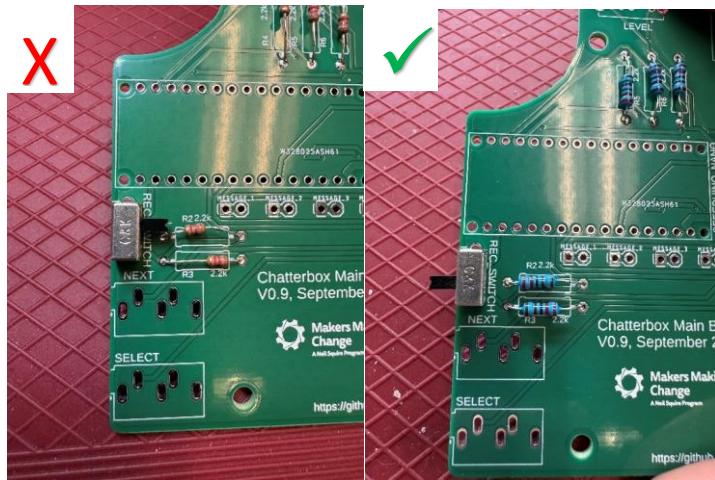


### Step A-05: Insert "Mode" switch

Insert the two position slide switch (A04) into the position labeled "REC\_SWITCH" on the main PCB. Make sure the slider on the switch (the black rectangle) is facing out of the board.

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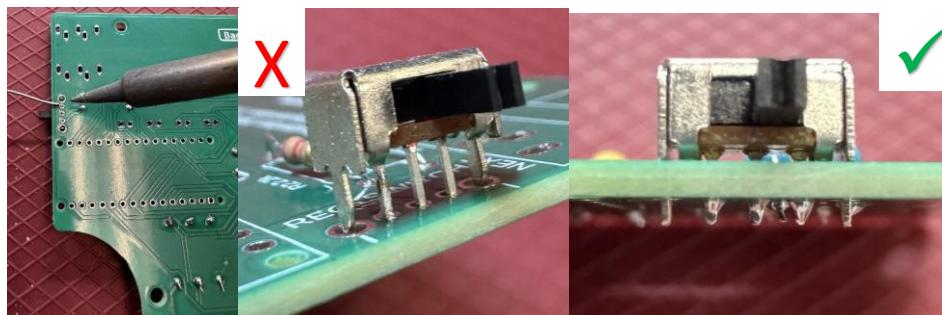
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### Step A-06: Solder one switch lead and check alignment

Solder one of the three leads of the two position slide switch to the main board. Double check that the switch is sitting flush and square to the board. If the switch is sitting flush, move to the next step.

If the switch is not sitting flush, you can reheat the soldered joint to melt the solder and realign the switch as needed.



### Step A-07: Solder the remaining switch leads

Once the switch is aligned properly, solder the remaining two leads to the main PCB.

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### Step A-08: Insert the "Level" switch

Insert one of the two three position switches (A05) into the position labeled "LEVEL" on the main PCB.

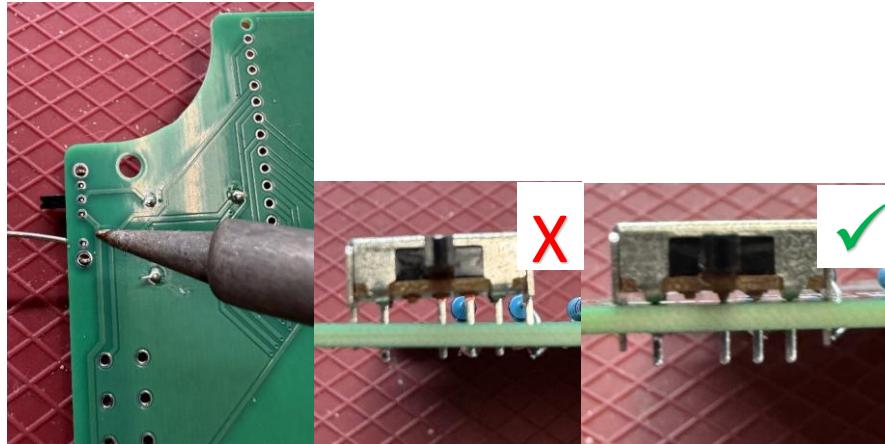


### Step A-09: Solder one switch lead and check alignment

Solder one of the four leads of the three position slide switch to the main board. Double check that the switch is sitting flush and square to the board. If the switch is sitting flush, move to the next step.

If the switch is not sitting flush, you can reheat the soldered joint to melt the solder and realign the switch as needed.

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### Step A-10: Solder the remaining switch leads

Once the switch is aligned properly, solder the remaining three leads to the main PCB.



### Step A-11: Insert the "Speed" switch

Insert the remaining three position switches (A05) into the position labeled "SPEED" on the main PCB.

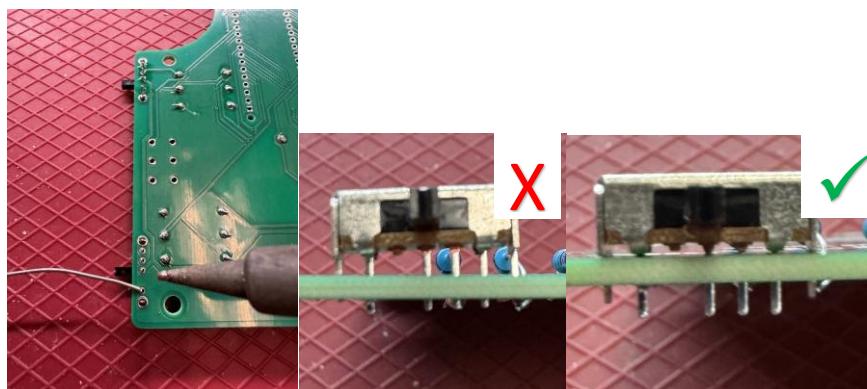
## Chatterbox MAKER GUIDE



### Step A-12: Solder one switch lead and check alignment

Solder one of the four leads of the three position slide switch to the main board. Double check that the switch is sitting flush and square to the board. If the switch is sitting flush, move to the next step.

If the switch is not sitting flush, you can reheat the soldered joint to melt the solder and realign the switch as needed.



### Step A-13: Solder the remaining switch leads

Once the switch is aligned properly, solder the remaining three leads to the main PCB.

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### Step A-14: Insert 8 position female header

Insert the 8 position female header (A06) into the position labeled “SD\_CARD\_READER” on the main PCB.

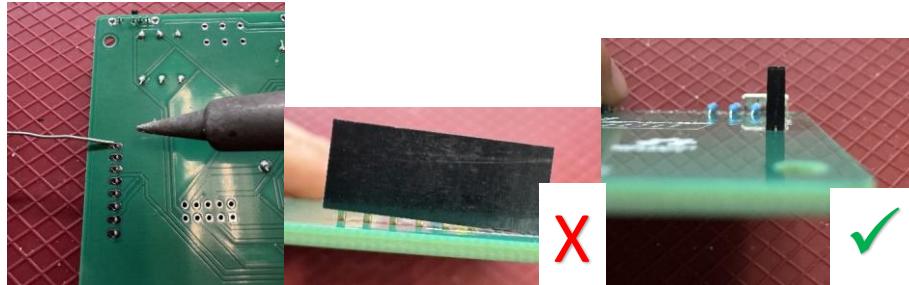


### Step A-15: Solder one lead on the headers and check alignment

Solder one of the 8 leads to the main PCB. Double check that the headers are sitting flush and square to the board. If the headers are sitting flush, move to the next step.

## Chatterbox MAKER GUIDE

If the headers are not sitting flush, you can reheat the soldered joint to melt the solder and realign the headers as needed.



### *Step A-16: Solder the remaining leads*

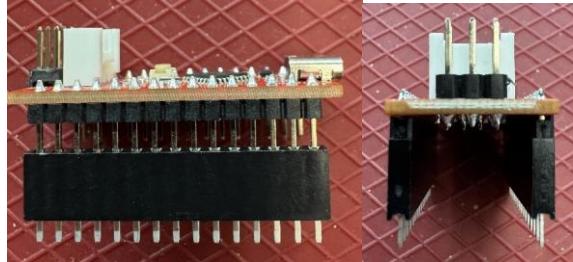
Once the headers are aligned properly, solder the remaining seven leads on the female header to the PCB.



### *Step A-17: Attach female headers to microcontroller*

Attach the 15 position female headers (A07) to the microcontroller (A10).

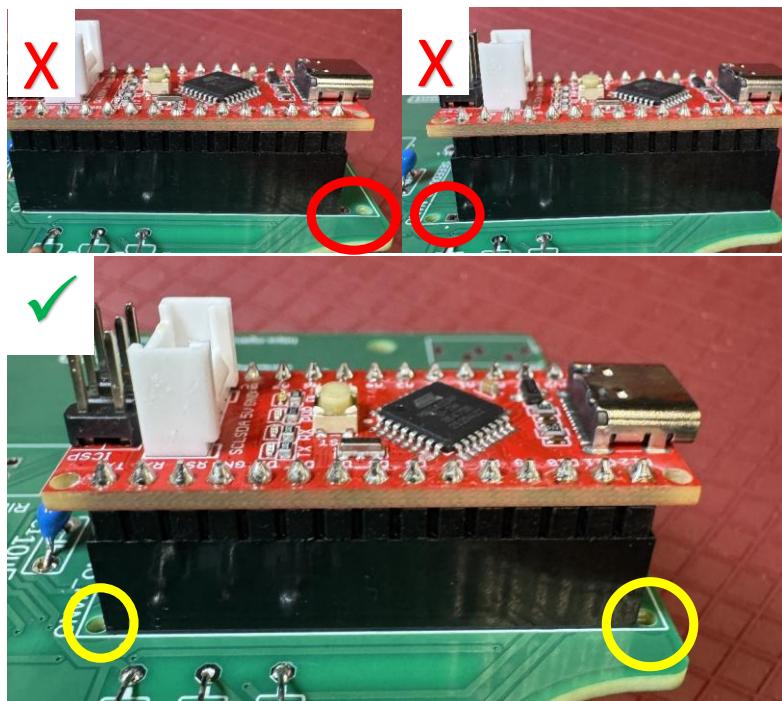
## Chatterbox MAKER GUIDE



### Step A-18: Insert female headers

Insert the female headers into the position labeled “SEEDEDUINO\_NANO” on the main PCB, while still attached to the microcontroller.

Make sure the leads are all in the holes with solder pads (metal circles or squares), not the screw holes at either end.



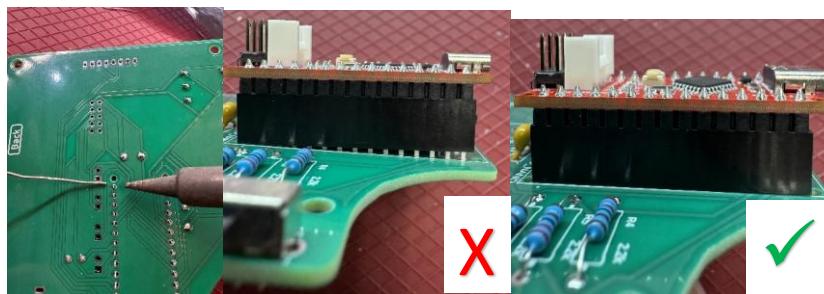
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### Step A-19: Solder one lead of the female headers and check alignment

Solder one of the 30 leads to the main PCB. Double check that the headers are sitting flush and square to the board. If the headers are sitting flush, move to the next step.

If the headers are not sitting flush, you can reheat the soldered joint to melt the solder and realign the headers as needed.



### Step A-20: Solder remaining leads and remove microcontroller

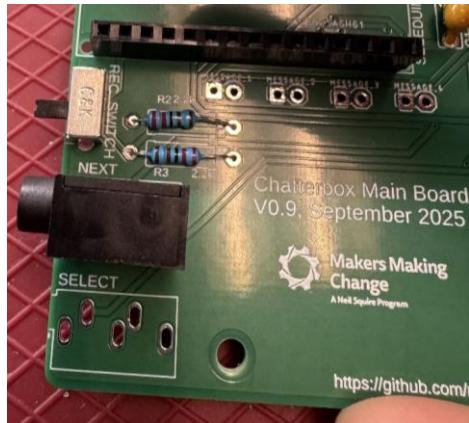
Once the headers are aligned properly, solder the remaining 29 leads on the female headers to the PCB. Once fully soldered, remove the microcontroller from the leads.



### Step A-21: Insert the "Next" jack

Insert one of the two mono jacks (A08) into the position labeled "NEXT" on the main PCB.

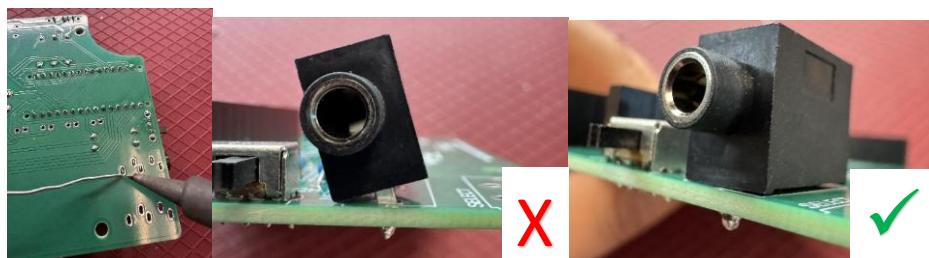
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### Step A-22: Solder one lead of the jack and check alignment

Solder one of the four leads to the main PCB. Double check that the jack is sitting flush and square to the board. If the jack is not sitting flush, move to the next step.

If the jack is not sitting flush, you can reheat the soldered joint to melt the solder and realign the jack as needed.



### Step A-23: Solder remaining leads

Once the jack is aligned properly, solder the remaining three leads to the main PCB.

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### Step A-24: Insert the "Select" jack

Insert remaining mono jack (A08) into the position labeled "SELECT" on the main PCB.



### Step A-25: Solder one lead of the jack and check alignment

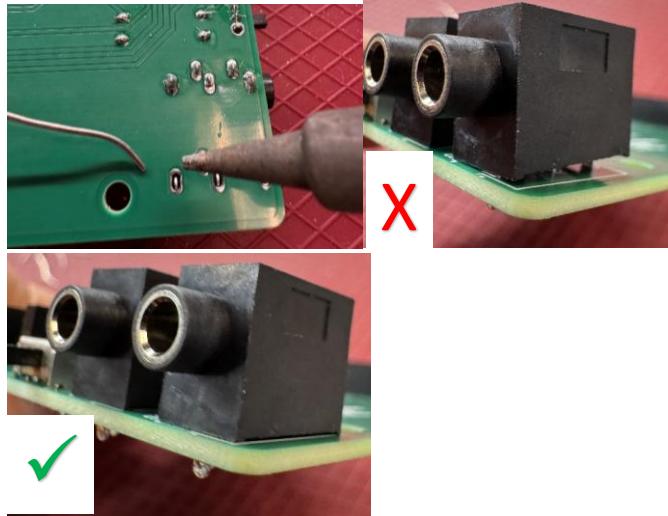
Solder one of the four leads to the main PCB. Double check that the jack is sitting flush and square to the board. If the jack sitting flush, move to the next step.

If the jack is not sitting flush, you can reheat the soldered joint to melt the solder and realign the jack as needed.

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Files available at <https://github.com/makersmakingchange/Chatterbox>

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### Step A-26: Solder remaining leads

Once the jack is aligned properly, solder the remaining three leads to the main PCB.



### Step A-27: Insert ribbon cable connector

Insert the ribbon cable connector (A09) into the position labeled “RIBBON\_CONNECTOR” on the main PCB. Make sure the slot in the top of the connector is on the same side as the opening on the outline on the PCB.

# Chatterbox

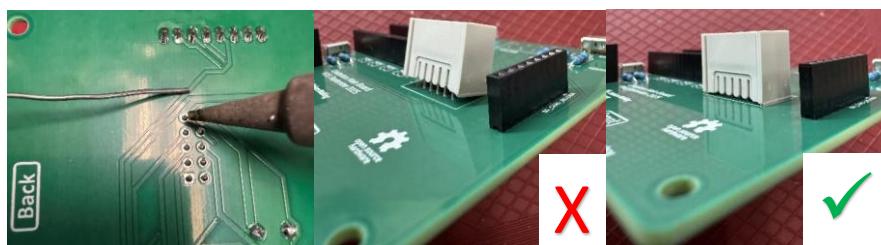
## MAKER GUIDE



### Step A-28: Solder one lead and check alignment

Solder one of the 10 leads to the main PCB. Double check that the connector is sitting flush and square to the board. If the connector is sitting flush, move to the next step.

If the connector is not sitting flush, you can reheat the soldered joint to melt the solder and realign the connector as needed.



### Step A-29: Solder remaining leads

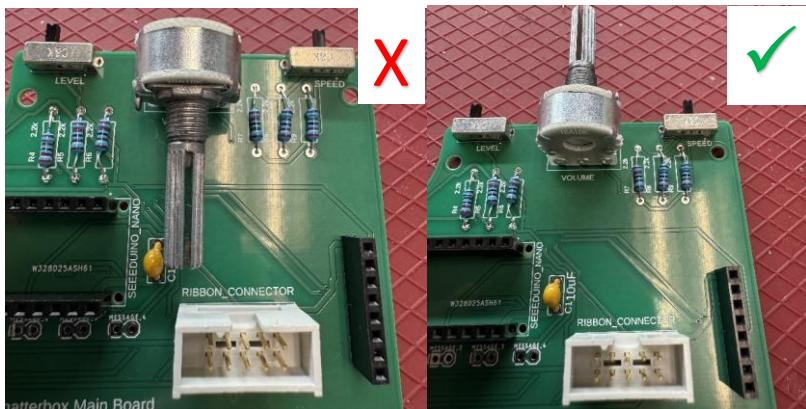
Once the connector is aligned properly, solder the remaining nine leads to the main PCB.

## Chatterbox MAKER GUIDE



### Step A-30: Insert potentiometer

Insert the potentiometer (A14) into the position labeled “VOLUME” on the main PCB. Make sure the adjustment knob of the potentiometer is pointing out of the PCB.

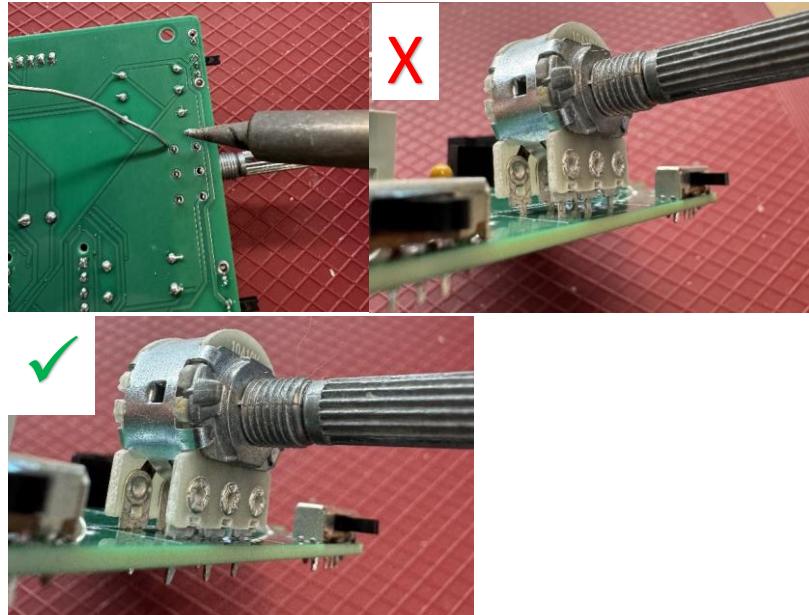


### Step A-31: Solder one lead and check alignment

Solder one of the six leads to the main PCB. Double check that the potentiometer is sitting flush and square to the board. If the potentiometer is sitting flush, move to the next step.

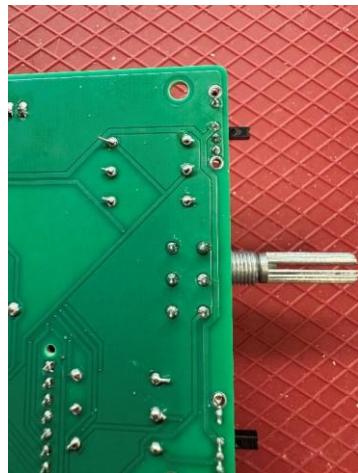
If the potentiometer is not sitting flush, you can reheat the soldered joint to melt the solder and realign the potentiometer as needed.

## Chatterbox MAKER GUIDE



### Step A-32: Solder remaining leads

Once the potentiometer is aligned properly, solder the remaining five leads to the main PCB.



## Chatterbox MAKER GUIDE

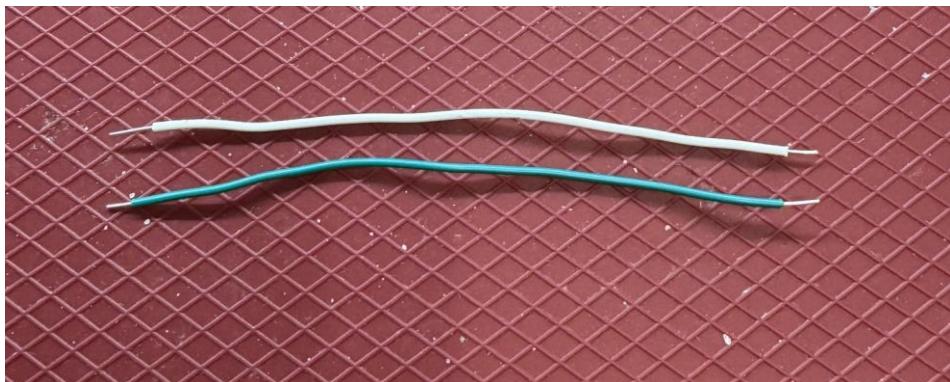


### Step A-33: Cut wire to length

Cut the 24 AWG wire (A13) into two sections each of the following lengths: 13, 17, 24, and 29 cm. You will have cut off eight pieces of wire from the main length.

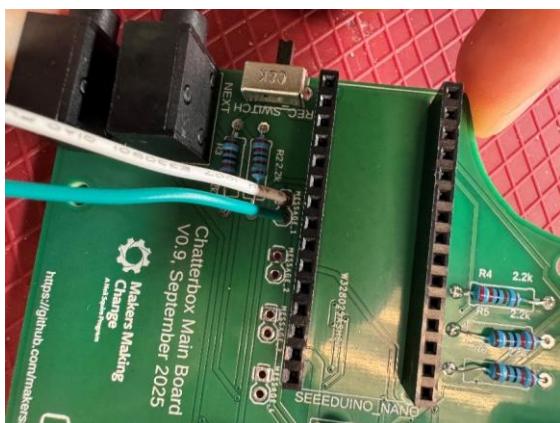
### Step A-34: Strip ends of wires

Use the wire strippers to strip 0.5 cm of the insulation off both ends of each wire section you cut in Step A-33.



### Step A-35: Insert message 1 wires

Insert both of the shortest wires (13 cm) into the positions labeled “MESSAGE\_1” on the main PCB. Bend the wires to hold them in place. Make sure the exposed ends of the wires are not touching each other.



## Chatterbox MAKER GUIDE

### Step A-36: Solder the wires and trim excess

Solder the wires to the main PCB. Trim the excess from the wires with the flush cutters.



### Step A-37: Insert message 2 wires

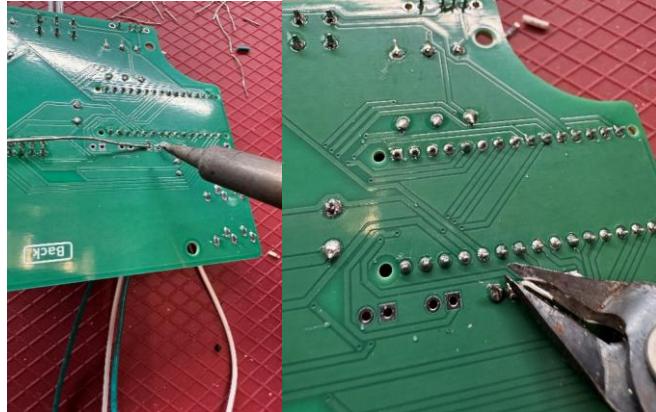
Insert both of the next shortest wires (17 cm) into the positions labeled “MESSAGE\_2” on the main PCB. Bend the wires to hold them in place. Make sure the exposed ends of the wires are not touching each other.



### Step A-38: Solder the wires and trim excess

Solder the wires to the main PCB. Trim the excess from the wires with the flush cutters.

## Chatterbox MAKER GUIDE



### Step A-39: Insert message 3 wires

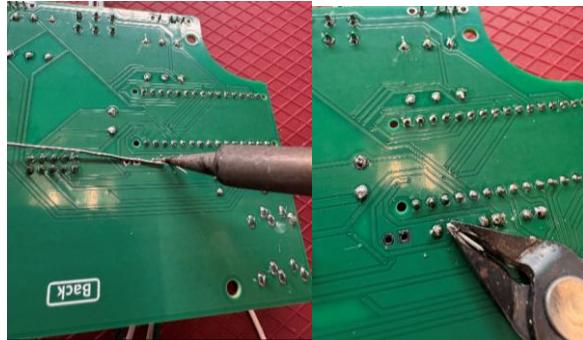
Insert both of the next shortest wires (24 cm) into the positions labeled “MESSAGE\_3” on the main PCB. Bend the wires to hold them in place. Make sure the exposed ends of the wires are not touching each other.



### Step A-40: Solder the wires and trim excess

Solder the wires to the main PCB. Trim the excess from the wires with the flush cutters.

## Chatterbox MAKER GUIDE



### Step A-41: Insert message 4 wires

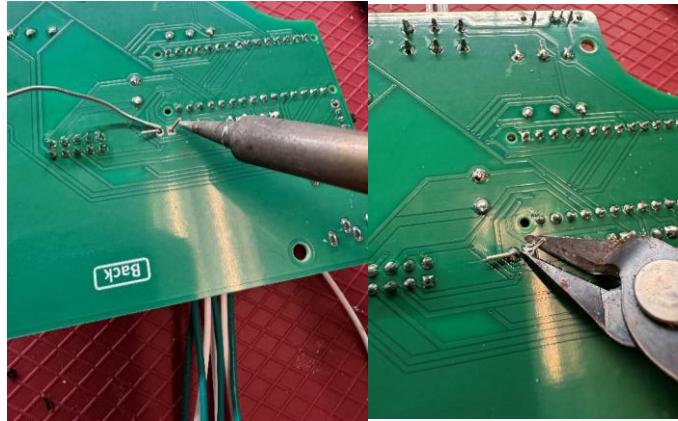
Insert both of the last wires (27 cm) into the positions labeled “MESSAGE\_4” on the main PCB. Bend the wires to hold them in place. Make sure the exposed ends of the wires are not touching each other.



### Step A-42: Solder the wires and trim excess

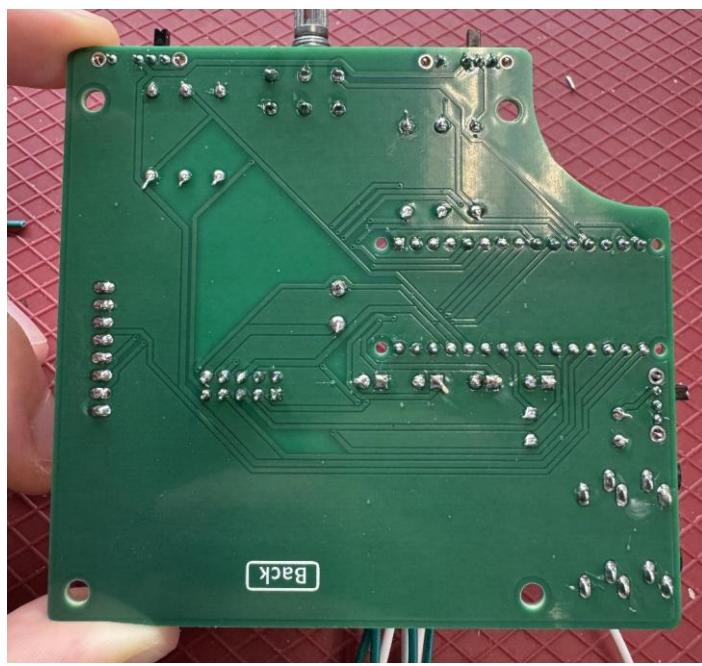
Solder the wires to the main PCB. Trim the excess from the wires with the flush cutters.

## Chatterbox MAKER GUIDE



### Step A-43: Double check all solder joints

Double check all the solder joints on the main PCB to ensure none have been missed, there are no shorts (solder connecting two or more leads together), and that all joints are good quality.

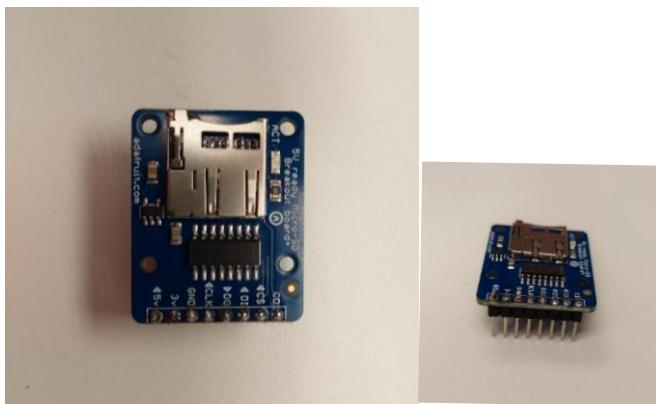


## Chatterbox MAKER GUIDE



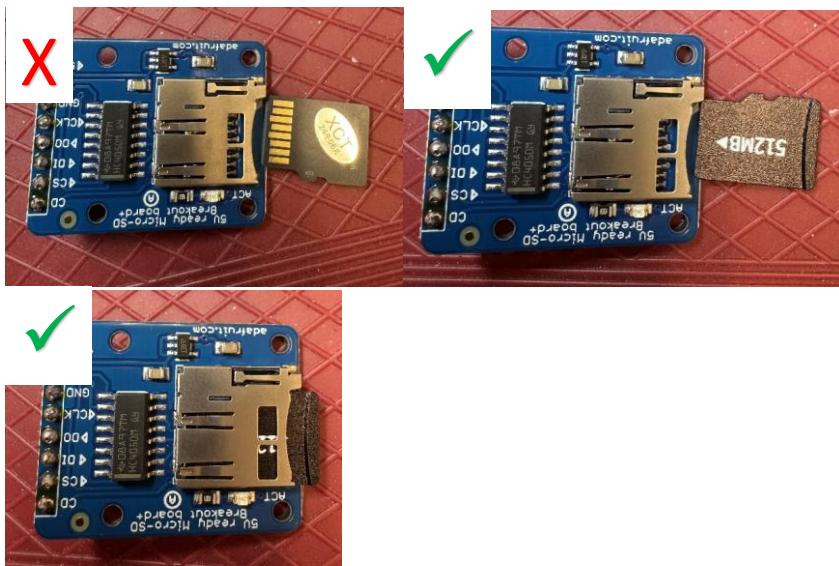
### Step A-44: Solder headers to SD Card Reader

Solder the male header that came with the microSD card reader (A11) to the reader with the short pins of the header in the microSD card reader and the long side of the pins facing away from the reader as shown in the below picture. Insert the microSD card (18) into the reader. You may need to trim one pin from the header that comes with the reader to get it to the correct number of pins.



### Step A-45: Insert SD card into reader

Insert the micro SD card (A12) into the slot in the micro SD card reader.



## Chatterbox MAKER GUIDE



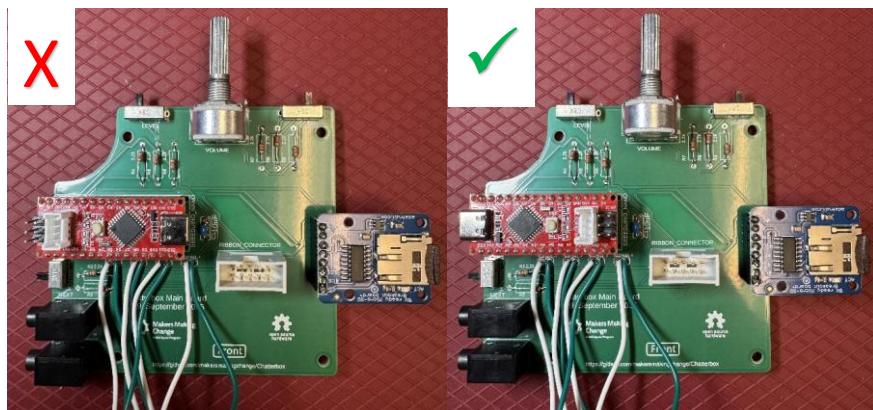
### Step A-46: Insert SD card reader into Main PCB

Insert the SD card reader into the female headers labeled “SD\_CARD\_READER” on the Main PCB. Make sure the reader points off the board and does not block the Ribbon Cable Connector.



### Step A-47: Insert Seeeduino Nano into female headers

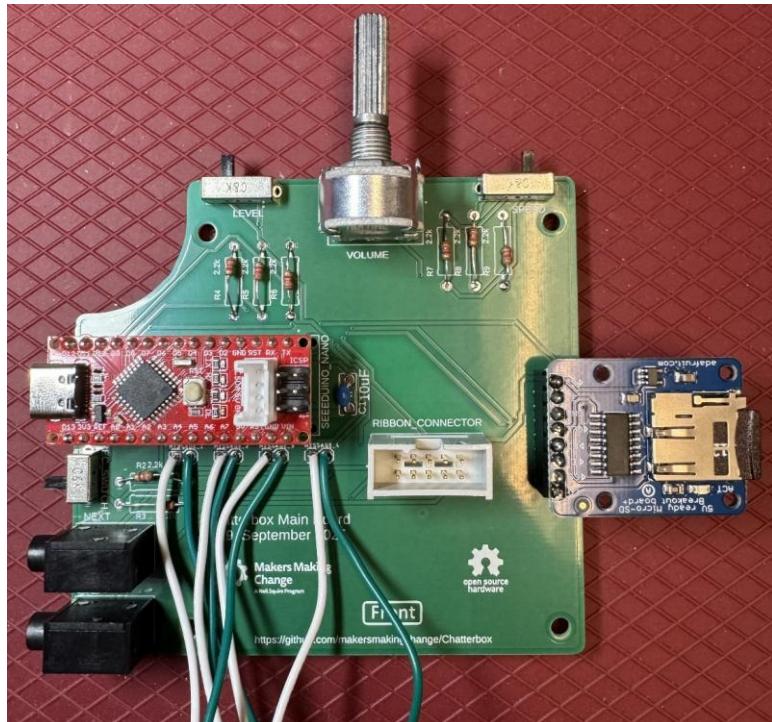
Insert the Seeeduino Nano (A10) into the female headers on the Main PCB. Make sure the USB-C connector is facing out from the Main PCB.



The Main PCB is now complete.

# Chatterbox

## MAKER GUIDE



### Part B: Secondary PCB

#### Part B: Required Components

##### Secondary PCB

B01	Secondary PCB	QTY: 1	B02	10uF Capacitor	QTY: 2	B03	Two position switch	QTY: 1
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# Chatterbox

## MAKER GUIDE



B04 	5 position female header QTY: 2	B05 	9V battery clip QTY: 1	B06 	Ribbon cable connector QTY: 1
B07 	Amp QTY: 1	B08 	Microphone QTY: 1	B09 	24 AWG wire QTY: 132 cm
B10 	Speaker QTY: 1				

## Chatterbox MAKER GUIDE



### Part B: Required Tools and Supplies

- Soldering iron
- Solder
- Flush cutters
- Wire strippers
- Precision flathead screw driver (2.5mm or smaller)

### Part B: Required Personal Protective Equipment (PPE)

- Safety glasses/goggles

### Part B: Secondary PCB Assembly Steps

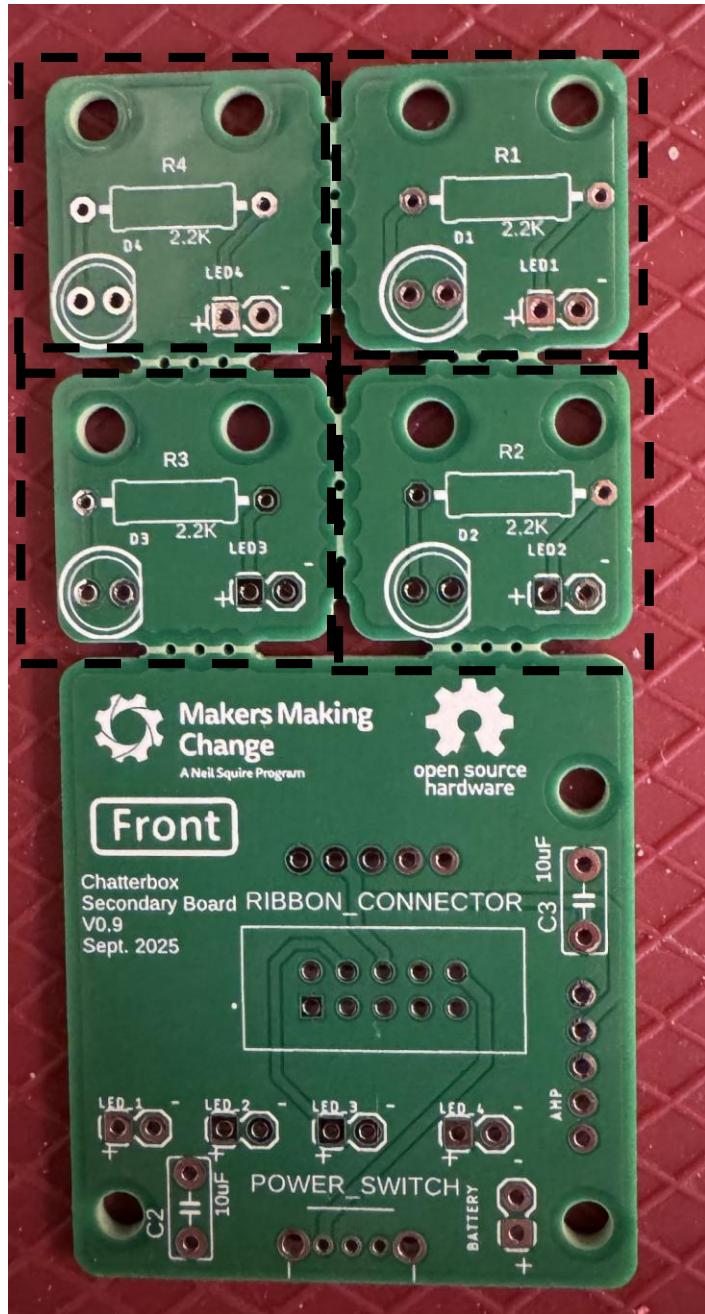
Note that different components will need to be soldered on different sides of the board. Each step will say from which side of the board (front or back) the part should be inserted.

#### *Step B -00: Break off LED PCBs*

Separate the four LED PCBs from the secondary PCB along the mouse bites (small holes). Separate the four LED PCBs from each other along the other mouse bites. In future, the LED PCBs will be separate so we will be able to remove this step.

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## Chatterbox MAKER GUIDE



## Chatterbox MAKER GUIDE



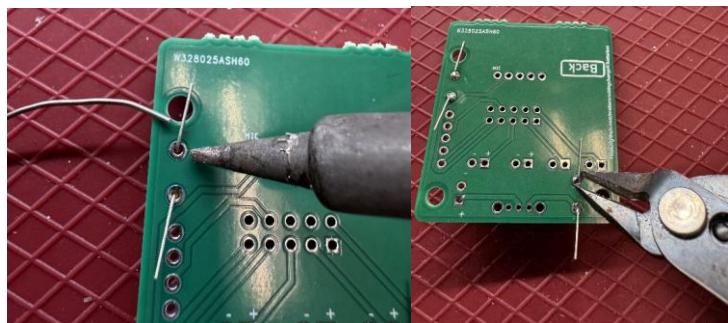
### Step B -01: Insert capacitors

Insert the capacitors (B02) into the positions labeled "C\_2" and "C\_3" from the Front side of the secondary PCB (B01). Bend the leads on the Back side of the board to hold them in place.



### Step B -02: Solder capacitor and trim leads

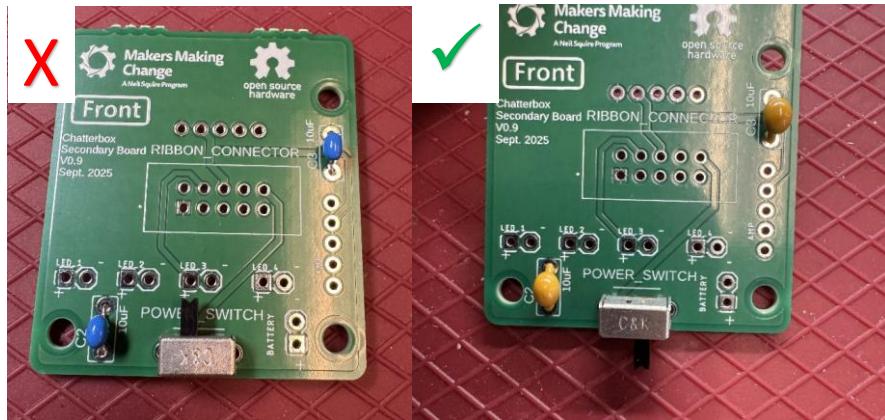
Solder both leads of the capacitor to the pads on the main PCB. Once soldered, trim the excess lead with the flush cutters.



### Step B -03: Insert "Power" switch

Insert the two position slide switch (B03) from the Front side of the board into the position labeled "POWER\_SWITCH". Make sure the slider on the switch (the black rectangle) is facing out of the board.

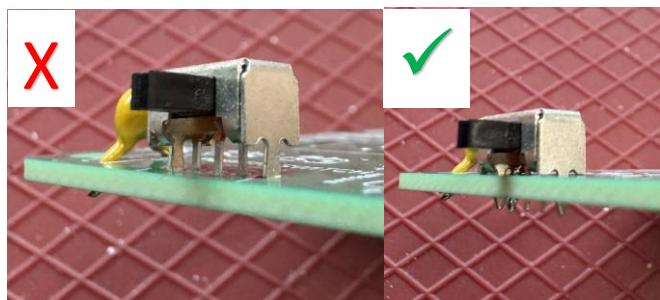
## Chatterbox MAKER GUIDE



### Step B -04: Solder one switch lead and check alignment

Solder one of the three leads of the two position slide switch to the main board. Double check that the switch is sitting flush and square to the board. If the switch is sitting flush, move to the next step.

If the switch is not sitting flush, you can reheat the soldered joint to melt the solder and realign the switch as needed.



### Step B -02: Solder the remaining switch leads

Once the switch is aligned properly, solder the remaining two leads to the PCB.

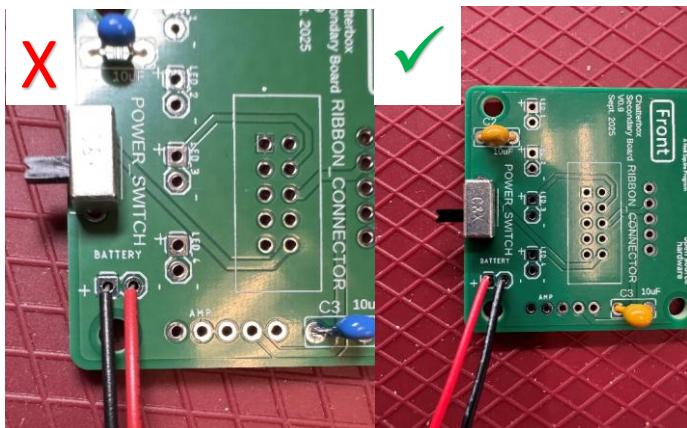
## Chatterbox MAKER GUIDE



### Step B -05: Insert battery cap wires

Insert the wires from the battery cap (B09) into the position labeled “BATTERY” from the Front side of the PCB. Make sure the exposed wires are not touching each other.

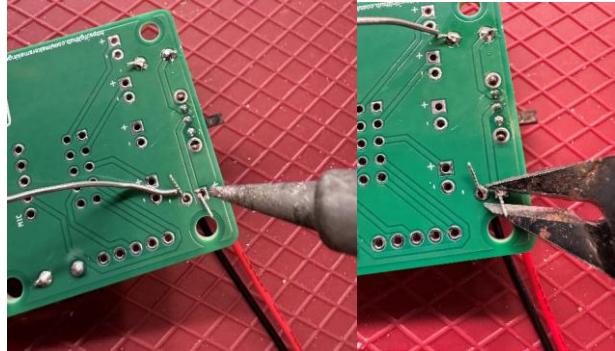
NOTE: It is critical that the red wire goes to the positive terminal (labeled with a “+”) and the black wire goes to the negative terminal (labeled with a “-”).



### Step B -06: Solder and trim the battery cap wires

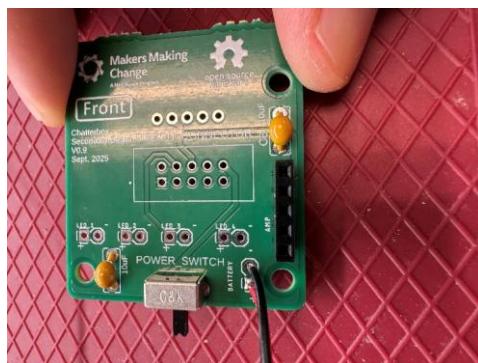
Solder the wires from the battery cap to the PCB. Make sure the exposed sections of the wires are not touching. Trim the excess wire after soldering.

## Chatterbox MAKER GUIDE



### *Step B -07: Insert amp female headers*

Insert one of the two sets of five position female headers (B04) into the position labeled “AMP” from the Front side of the PCB.

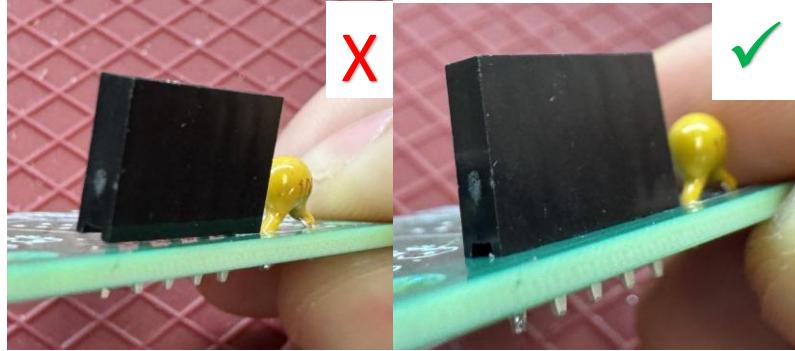


### *Step B -08: Solder one lead of the female headers and check alignment*

Solder one of the five leads to the PCB. Double check that the headers are sitting flush and square to the board. If the headers are sitting flush, move to the next step.

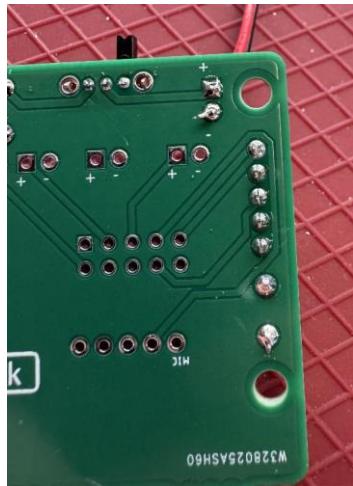
If the headers are not sitting flush, you can reheat the soldered joint to melt the solder and realign the headers as needed.

## Chatterbox MAKER GUIDE



### Step B -09: Solder the remaining leads

Once the headers are aligned properly, solder the remaining four leads on the female header to the PCB.



### Step B -10: Insert ribbon cable connector

Insert the ribbon cable connector (B06) into the position labeled "RIBBON\_CONNECTOR" from the Front side of the board. Make sure the slot in the top of the connector is on the same side as the opening in the outline on the PCB.

# Chatterbox

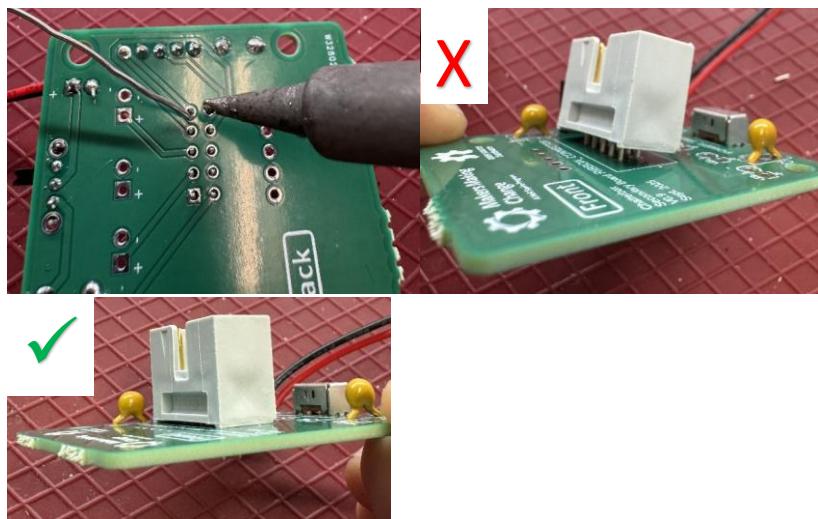
## MAKER GUIDE



### Step B -11: Solder one lead and check alignment

Solder one of the 10 leads to the PCB. Double check that the connector is sitting flush and square to the board. If the connector is sitting flush, move to the next step.

If the connector is not sitting flush, you can reheat the soldered joint to melt the solder and realign the connector as needed.

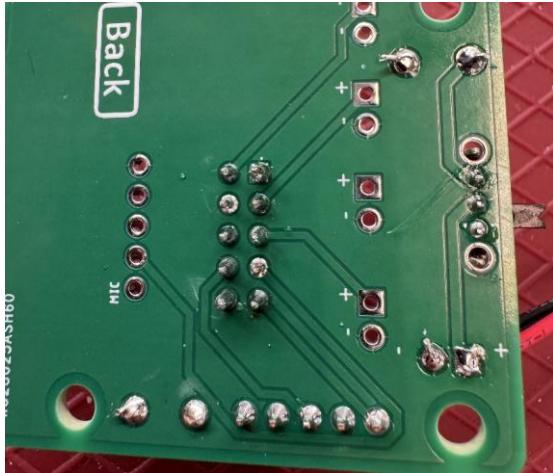


## Chatterbox MAKER GUIDE



### *Step B -12: Solder the remaining leads*

Once the connector is aligned properly, solder the remaining nine leads to the PCB.

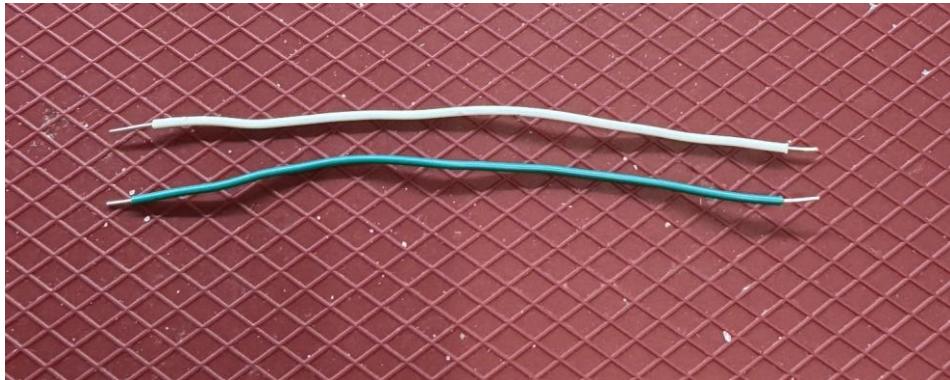


### *Step B -13: Cut wires to length*

Cut the 24 AWG wire (B09) into two sections each of the following lengths: 8, 14, 19, and 25 cm. You will have cut off eight pieces of wire from the main length.

### *Step B -14: Strip ends of wires*

Use the wire strippers to strip 0.5 cm of the insulation off both ends of each wire section you cut in Step B-07.



## Chatterbox MAKER GUIDE



### Step B -15: Insert LED 1 wires

Insert the shortest wires (8 cm) into the position labeled “LED\_1” from the Front of the PCB. Make sure the exposed ends of the wires are not touching.



### Step B -16: Solder the wires and trim excess

Solder the wires to the PCB. Trim the excess from the wires with the flush cutters.



### Step B -17: Insert LED 2 wires

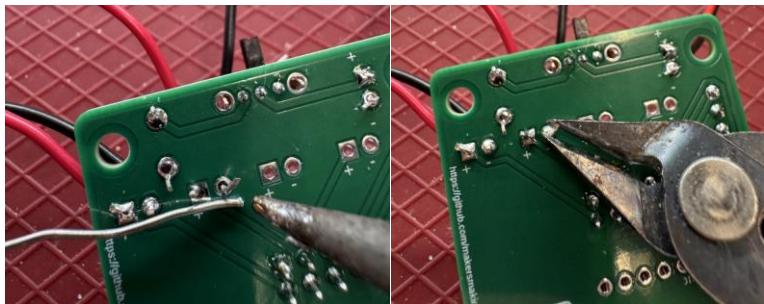
Insert the next shortest wires (14 cm) into the position labeled “LED\_2” from the Front of the PCB. Make sure the exposed ends of the wires are not touching.

## Chatterbox MAKER GUIDE



### Step B -18: Solder the wires and trim excess

Solder the wires to the PCB. Trim the excess from the wires with the flush cutters.



### Step B -19: Insert LED 3 wires

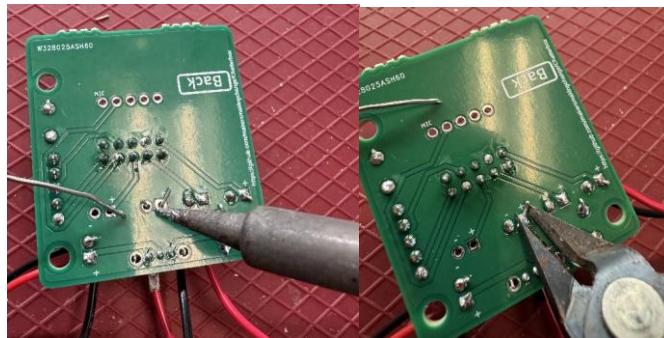
Insert the next shortest wires (19 cm) into the position labeled “LED\_3” from the Front of the PCB. Make sure the exposed ends of the wires are not touching.

## Chatterbox MAKER GUIDE



### Step B -20: Solder the wires and trim excess

Solder the wires to the PCB. Trim the excess from the wires with the flush cutters.



### Step B -21: Insert LED 4 wires

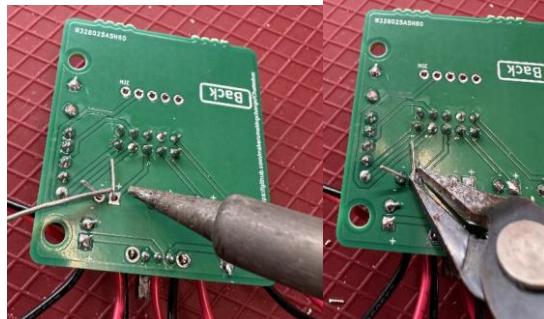
Insert the next longest wires (24 cm) into the position labeled “LED\_4” from the Front of the PCB. Make sure the exposed ends of the wires are not touching.

## Chatterbox MAKER GUIDE



### Step B -22: Solder the wires and trim excess

Solder the wires to the PCB. Trim the excess from the wires with the flush cutters.



### Step B -23: Insert microphone female headers

Insert the remaining set of five position female headers (B04) into the position labeled "MIC" from the Back side of the PCB.

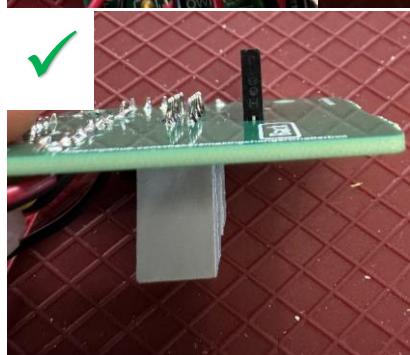
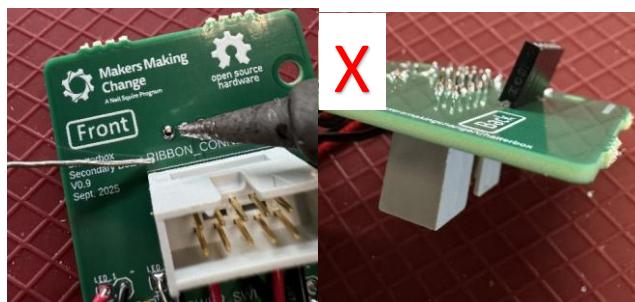
## Chatterbox MAKER GUIDE



### Step B -24: Solder one lead of the female headers and check alignment

Solder one of the five leads to the PCB. Double check that the headers are sitting flush and square to the board. If the headers are sitting flush, move to the next step.

If the headers are not sitting flush, you can reheat the soldered joint to melt the solder and realign the headers as needed.



## Chatterbox MAKER GUIDE



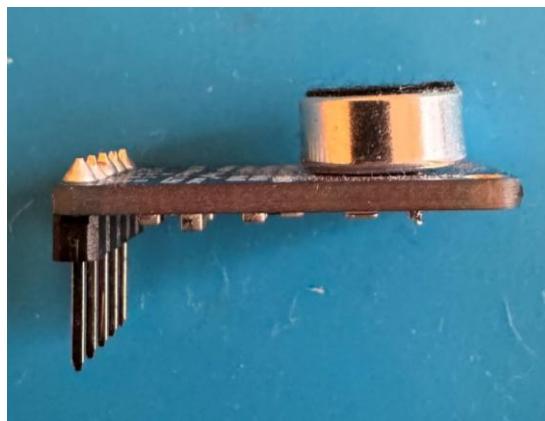
### Step B -25: Solder the remaining leads

Once the headers are aligned properly, solder the remaining four leads on the female header to the PCB.



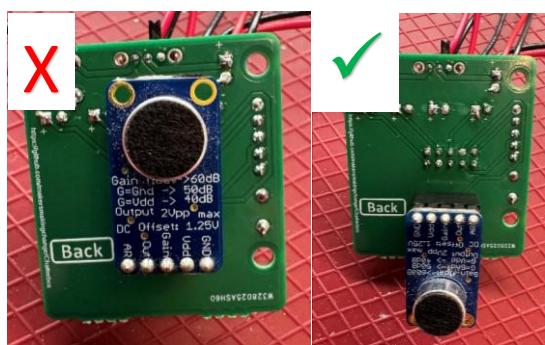
### Step B -26: Solder male headers to microphone

Insert the shorter side of the male headers through the microphone PCB (B08) from the side without the round microphone. Solder the headers so they are flush and square to the microphone PCB.



### Step B -27: Insert microphone into female headers

Insert the long end of the male headers from the microphone into the “MIC” female headers on the secondary PCB. Make sure the circular microphone is directed away from the secondary PCB.



## Chatterbox MAKER GUIDE

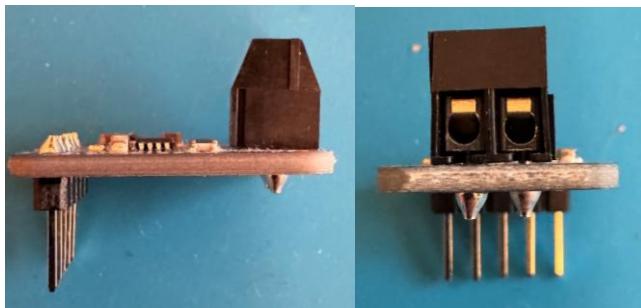
### *Step B -28: Solder male headers to amp*

Insert the shorter side of the male headers through the amp PCB (B07) from the side without any electronics on it. Solder the headers so they are flush and square to the microphone board.



### *Step B -29: Solder screw terminals to amp*

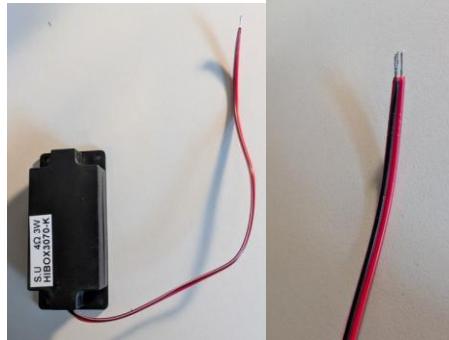
Insert the screw terminal into the amp PCB (B07) from the side with the electronics on it. Make sure the screw terminal openings face out from the board. Solder the screw terminals so they are flush and square to the amp PCB.



### *Step B -30: Trim and strip speaker wires*

Trim off the plug terminal from the speaker wires. Strip roughly 0.5 cm of the insulation from the ends of the speaker wires.

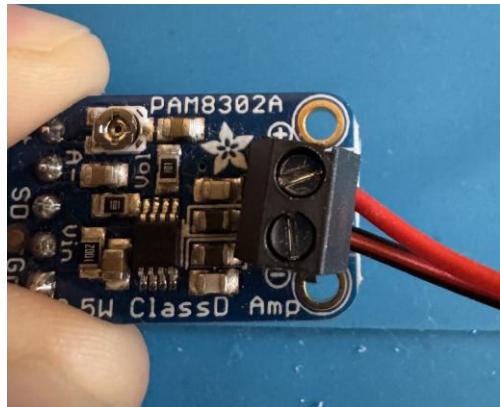
## Chatterbox MAKER GUIDE



### Step B -31: Connect speaker to amp

Take the stripped ends of the speaker wire, and screw them into the terminal blocks on the amp using the small flathead screwdriver.

It is critical that the red wire is connected to the terminal labeled with a "+" and the black wire is connected to the terminal labeled with a "-". You may notice the black wire has some red on it, but the red wire will only have red.



### Step B -32: Insert amp into female headers

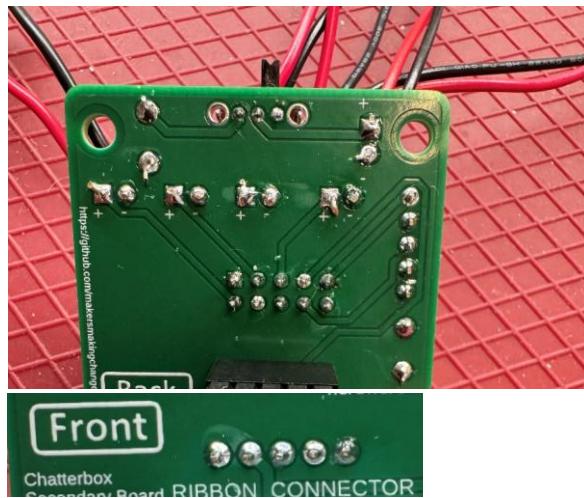
Insert the long end of the male headers from the amp into the "AMP" female headers on the secondary PCB. Make sure the amp is facing away from the secondary PCB.

## Chatterbox MAKER GUIDE



### Step B -33: Double check all solder connections

Double check all the solder joints on the secondary PCB to ensure none have been missed, there are no shorts (solder connecting two or more leads together), and that all joints are good quality.



The secondary PCB is now complete.

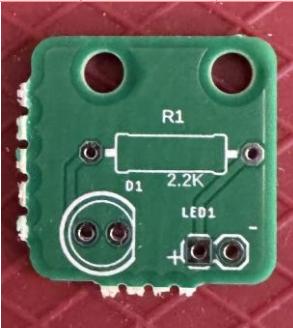
# Chatterbox

## MAKER GUIDE



### Part C: LED PCBs

#### Part C: Required Components

LED PCBs									
C01	LED PCB	QTY: 4	C02	2.2k Ohm resistor	QTY: 4	C03	5mm LED	QTY: 4	
				  Note: The resistor body colour may change, but the bands will be the same.					
C04	Completed Secondary PCB	QTY: 1							

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# Chatterbox

## MAKER GUIDE



### Part C: Required Tools and Supplies

- Soldering iron
- Solder
- Flush cutters

### Part C: Required Personal Protective Equipment (PPE)

- Safety glasses/goggles

### Part C: LED PCB Assembly Steps

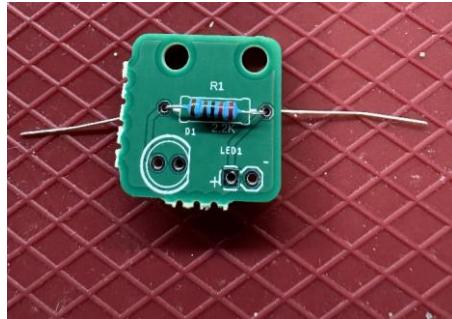
#### *Step C-00: Sort LED PCBs*

Currently, there are four LED PCBs which have slight differences which mean they must be connected to their corresponding number on the Secondary PCB (i.e. LED 1 to LED 1). Start with LED 1, and work up to LED 4, making sure when you connect the correct boards on Step C-06. In future, the four boards will be identical, so we can remove this step.

#### *Step C-01: Insert resistor*

Insert the resistors (C02) into the spaces “R\_1” on the LED PCB (C01). Make sure the resistor is lying flat on the board, and bend the leads to hold the resistor in place.

## Chatterbox MAKER GUIDE



### Step C -02: Solder and trim resistor leads

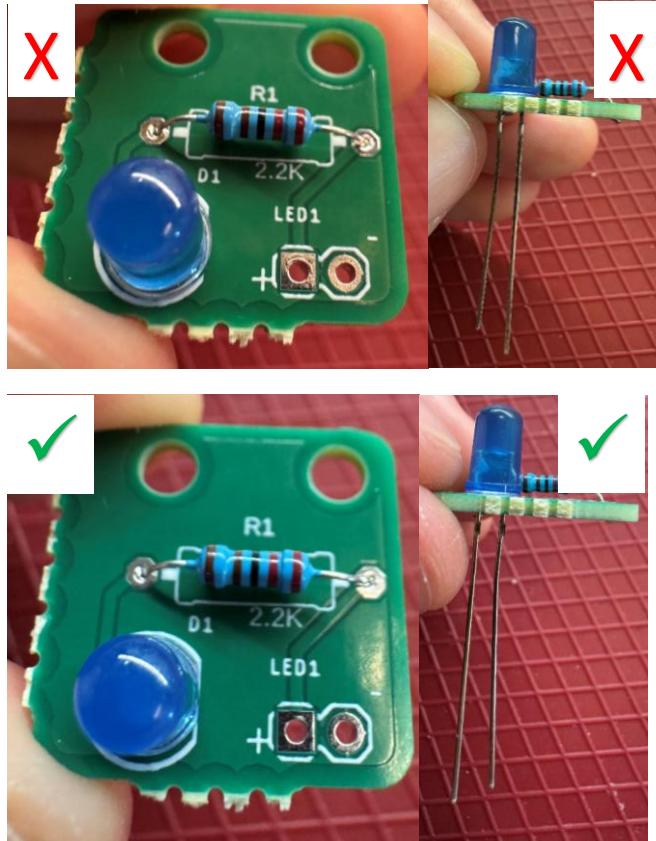
Solder both leads of the resistor to the PCB. Once the leads are soldered, trim the excess wire off using the flush cutters.



### Step C -03: Insert the LED

Insert the LED (C03) into the position labeled "D1". It is critical that the LED is oriented properly. There are two ways to check the orientation: a flat section on the LED, and the length of the leads. The flat section on the LED should line up with the flat side on the outline of the LED on the PCB. The leads are different lengths, and the longer lead should be closest to the edge of the PCB.

## Chatterbox MAKER GUIDE

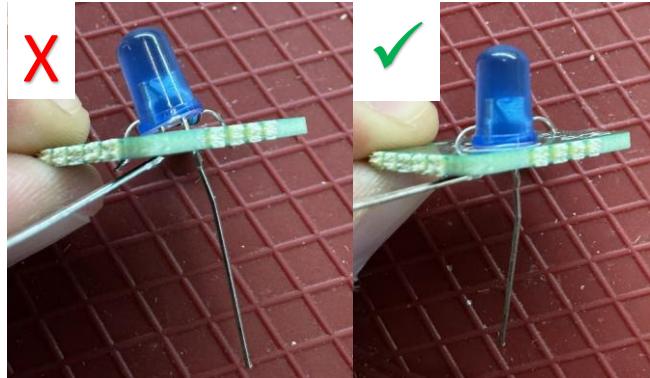


### Step C -04: Solder one lead and check alignment

Solder one of the two leads to the PCB. Double check that the LED is sitting flush and square to the board. If the LED is sitting flush, move to the next step.

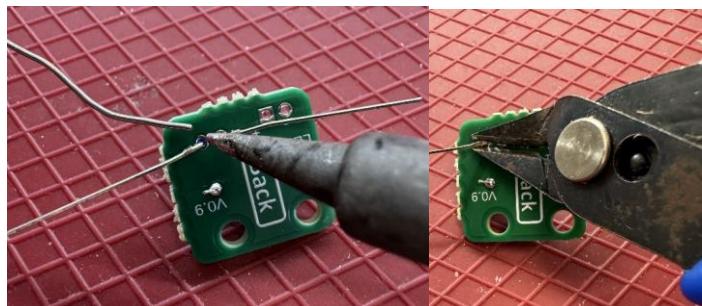
If the LED is not sitting flush, you can reheat the soldered joint to melt the solder and realign the LED as needed.

## Chatterbox MAKER GUIDE



### Step C -05: Solder the remaining lead and trim excess

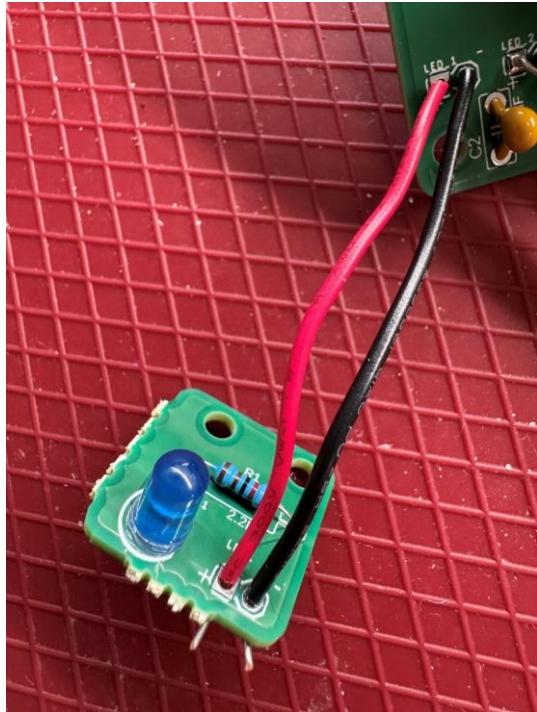
Once the LED is aligned properly, solder the remaining lead to the PCB. Trim the excess from both leads.



### Step C -06: Connect LED PCB to the Secondary PCB

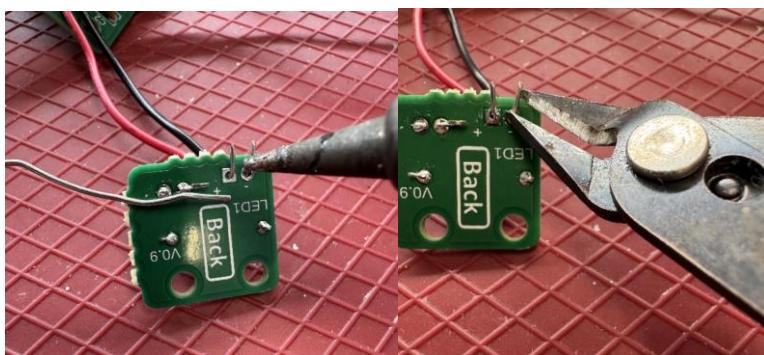
Connect the wires from the Secondary PCB (C04) to the LED PCB. It is critical that the polarity (positive and negative) of the wires is the same on LED PCB as it is on the Secondary PCB. Make sure the wire coming from the position labeled “+” on the Secondary PCB goes to the “+” on the LED PCB, and the “-“ goes to the “-“.

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### Step C -07: Solder the wires to the LED PCB and trim excess

Make sure the exposed ends of the wires are not touching, then solder the wires to the LED PCB. Trim any excess exposed wire after soldering.

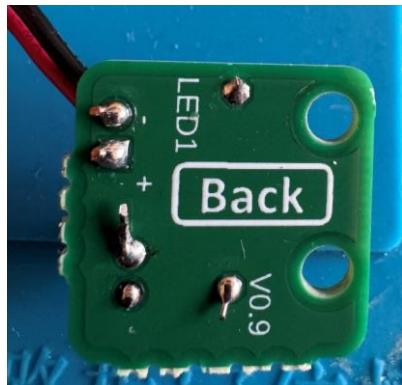


## Chatterbox MAKER GUIDE



### Step C -08: Double check all solder connections

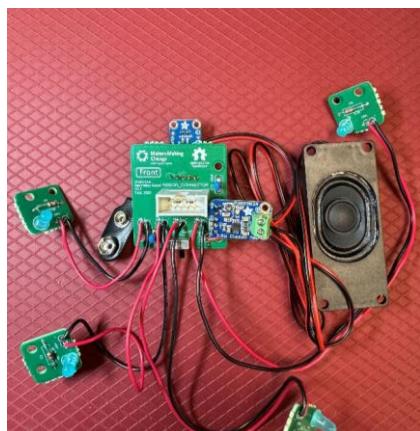
Double check all the solder joints on the LED PCB to ensure none have been missed, there are no shorts (solder connecting two or more leads together), and that all joints are good quality.



### Step C -09: Repeat Steps C-01 to C-08 for the remaining three LED PCBs

Repeat Steps C-01 to C-08 for the remaining three LED PCBs. By the end, all the wires from the Secondary PCB should be connected to LED PCBs.

Once all LED PCBs have been connected to the Secondary PCB, this section is complete.



# Chatterbox

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### Part D: Enclosure Assembly

#### Part D: Required Components

Enclosure								
D01	Enclosure Bottom - Left	QTY: 1	D02	Enclosure Bottom - Right	QTY: 1	D03	Assembled Main PCB	QTY: 1
D03	#4x3/8" machine screw	QTY: 20	D04	Centre support	QTY: 2	D05	Button base	QTY: 4
D07	Tactile switch	QTY: 4	D08	Enclosure Top - Left	QTY: 1	D09	Enclosure Top - Right	QTY: 1

Commented [JM3]: Swap out with LipSync-style table?

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D10	Ribbon Cable	QTY: 1	D11	Assembled Secondary PCB and LED PCBs	QTY: 4	D12	Button insert	QTY: 4
D13	Button cap	QTY: 4	D14	Label holder	QTY: 4	D15	9V battery	QTY: 1

# Chatterbox

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D16	Battery Cover	QTY: 1	D17	Volume knob	QTY: 1

### Part D: Required Tools and Supplies

- Phillips head screwdriver (#2)
- Flush cutters
- Soldering iron
- Solder
- Hot glue gun and glue/Super glue

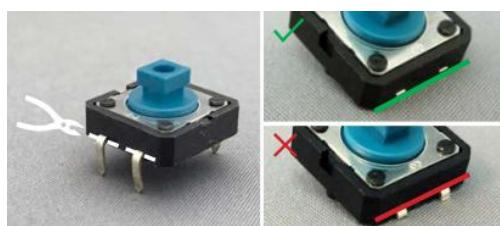
### Part D: Required Personal Protective Equipment (PPE)

- Safety glasses/goggles

### Part D: Enclosure Assembly Steps

#### Step D -01: Trim switch leads

Use a flush cutter to trim off the leads on one side of each of the tactile switches (D07). Make sure the leads are cut flush against the side of the switch and do not extend below the bottom of the switch.

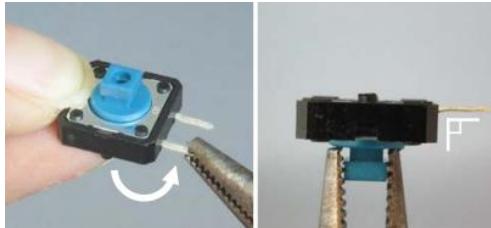


## Chatterbox MAKER GUIDE



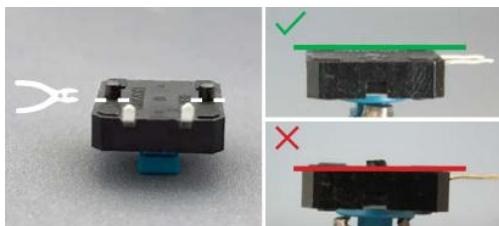
### Step D -02: Straighten remaining switch leads

Straighten the remaining switch leads, ensuring they stick straight out from the side of the switches.



### Step D -03: Trim mounting lugs

Use the flush cutters to trim the plastic mounting lugs (the plastic cylinders) off the bottom of the switches. Make sure the lugs are cut flush, with no remaining bumps.



### Step D -04: Solder switches to message wires from Main PCB

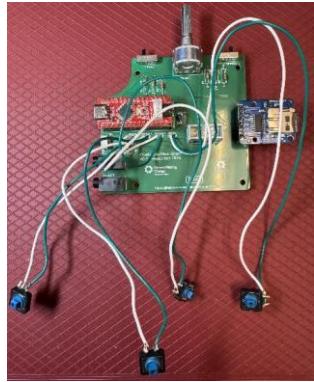
Starting with the wires leading from “MESSAGE\_1” on the Main PCB (D03), solder one wire from the PCB to one of the leads on one switch. Solder the other wire to the other lead, making sure not to connect the two sides together with touching exposed wire or solder.



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Repeat this step for the remaining switches and sets of wires.



### *Step D -05: Connect bottom parts of the enclosure*

Take the Enclosure Bottom – Left (D01) and Enclosure Bottom – Right (D02) and line up the connection snaps in the centre. Keeping your fingers out of the way, push the two parts together firmly, until they snap into place. It may help to angle the pieces while pushing together.

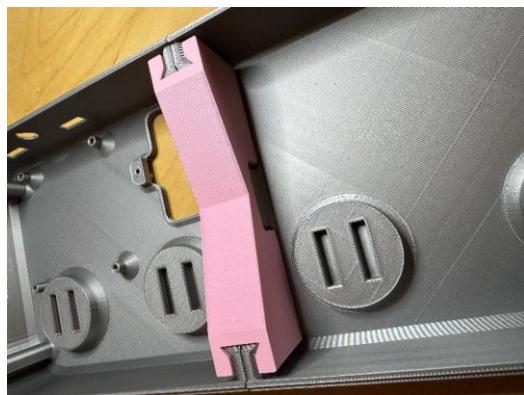
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### Step D -06: Insert centre support

Take one of the two Centre Supports (D05) and slide it into position.



## Chatterbox MAKER GUIDE



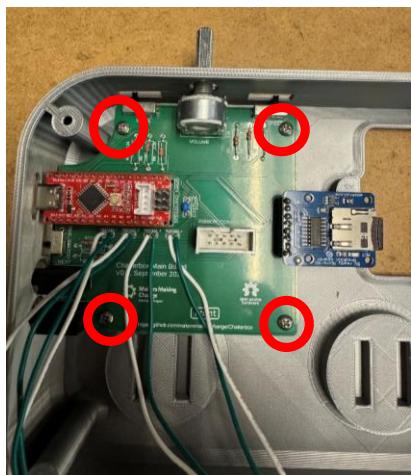
### Step D -07: Position Main PCB

Insert the Main PCB (D03) into the enclosure. The volume knob will stick out the back, and the switches at the side will stick out slightly.



### Step D -08: Screw down main PCB

Use four of the #4 screws (D04) to connect the main PCB to the enclosure bottom.

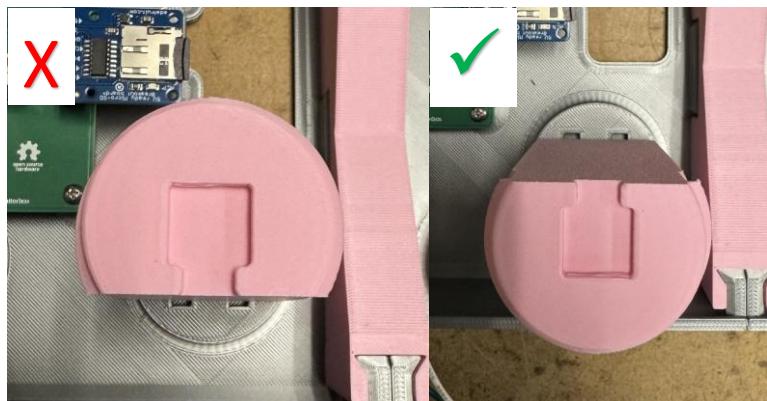


## Chatterbox MAKER GUIDE



### Step D -09: Insert button bases into enclosure

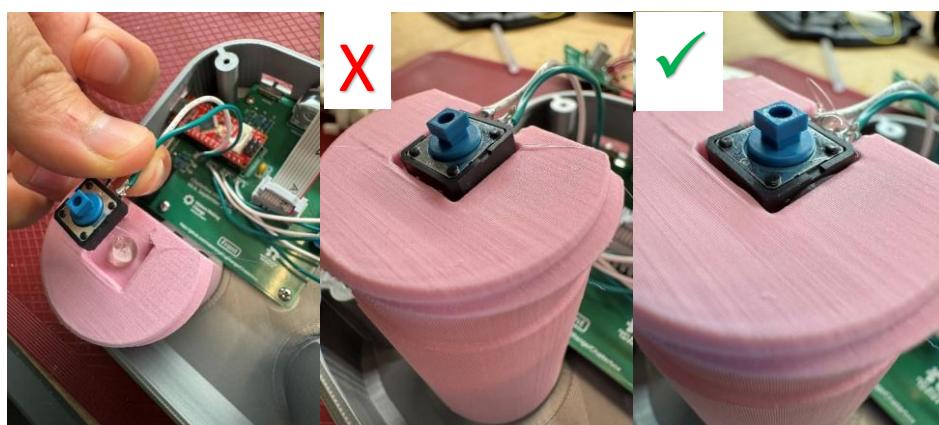
Insert each of the four Button Bases (D06) into the Enclosure Bottom. Make sure the flat side of the bases are closest to the inside of enclosure, and the rounded side is closest to the outside edge. Press the bases firmly until they snap into place.



### Step D -10: Glue message switches to bases

Working one switch at a time, glue the switches to their corresponding bases. The messages go from 1 to 4 from left to right (i.e., the switch connected to “MESSAGE\_1” on the Main PCB should be in the left-most base, closest to the Main PCB, and the “MESSAGE”4” switch will be on the furthest right base). The wire lengths have been cut to make it so a switch cannot be attached to a base further down from its correct position (ex: the wires from “MESSAGE\_1” are too short to reach the second base).

Make sure that the switches are glued flat to the base and are not sitting proud or at an angle.



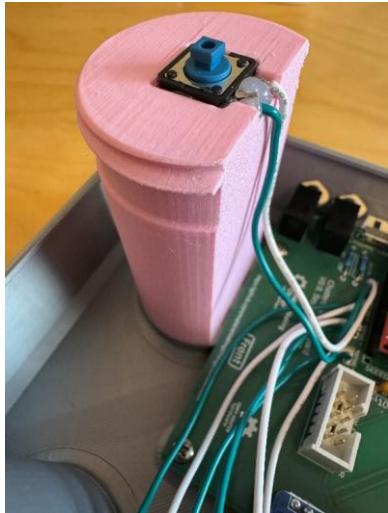
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### Step D -11: Bend wires flat to bases

Bend the wires from each switch so they sit flat against the flat side of the button bases.



### Step D -12: Connect ribbon cable

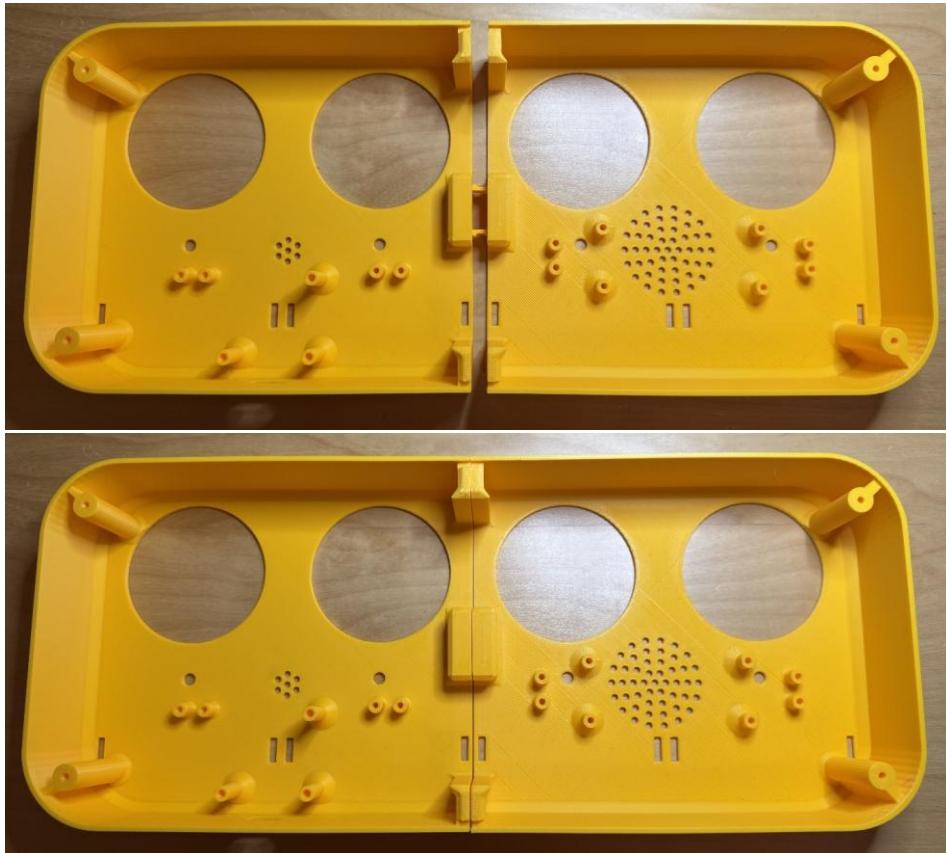
Connect the ribbon cable (D10) to the ribbon cable connector on the Main PCB.



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### *Step D -13: Connect top parts of the enclosure*

Take the Enclosure Top – Left (D08) and Enclosure Top – Right (D09) and line up the connection snaps in the centre. Keeping your fingers out of the way, push the two parts together firmly, until they snap into place. It may help to angle the pieces while pushing together.



### *Step D -14: Insert centre support*

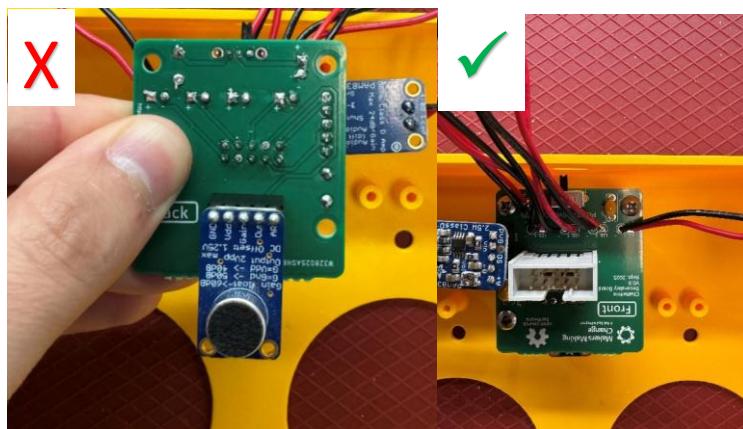
Take the remaining Centre Support (D05) and slide it into position.

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### Step D -15: Insert Secondary PCB

Insert the Secondary PCB (D11) into position on the enclosure top. The power switch should stick out from the edge of the enclosure, and the mic should be facing toward the holes in the enclosure top.



### Step D -16: Screw down Secondary PCB

Use three of the #4 screws (D04) to fix the Secondary PCB to the enclosure top.

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### Step D -17: Attach LED PCBs to enclosure top

Working one LED PCB at a time, position the PCBs to the LEDs line up with the holes in the top of the enclosure and the screw holes line up with the posts on the top of the enclosure. Like the message wires, the LED wires are cut to lengths to make it so the PCB will not reach a position too far from its required position.

Once the PCB is aligned correctly, secure it to the enclosure with two of the #4 screws.



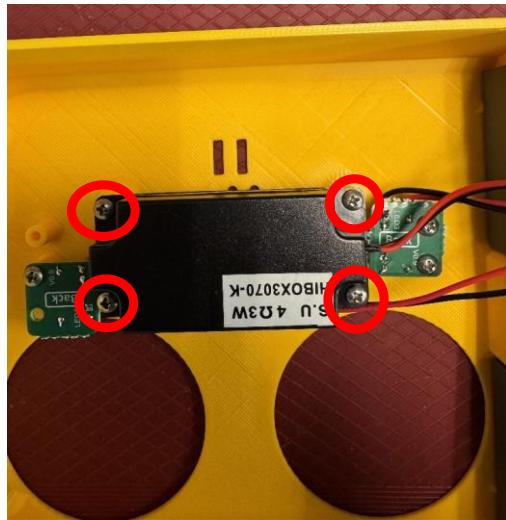
Repeat this step for the remaining three LED PCBs.

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### Step D -18: Connect speaker to enclosure top

Use four of the #4 screws to connect the speaker to the enclosure top. Make sure the speaker faces toward the holes in the top of the enclosure top.



### Step D -19: Connect ribbon cable to Secondary PCB

Plug the ribbon cable into the ribbon cable connector on the Secondary PCB.

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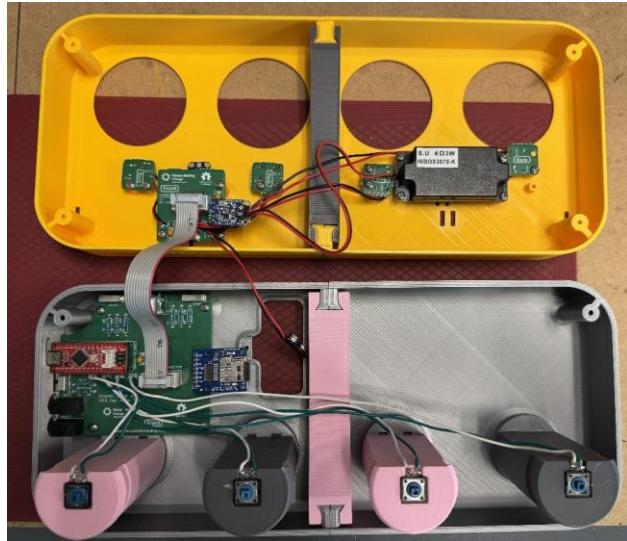
NOTE: You may want to move to Part E: Flashing the Firmware to the Chatterbox before completely assembling the enclosure. Some issues you may encounter when flashing the firmware may require you to access the electronics to troubleshoot.

### *Step D -20: Connect top and bottom halves of the enclosure*

Line up the two halves of the enclosures, and fold them together. Use four of the #4 screws to connect the top and bottom halves.

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### Step D -21: Connect the battery

Connect the 9V battery (D15) to the battery cap.

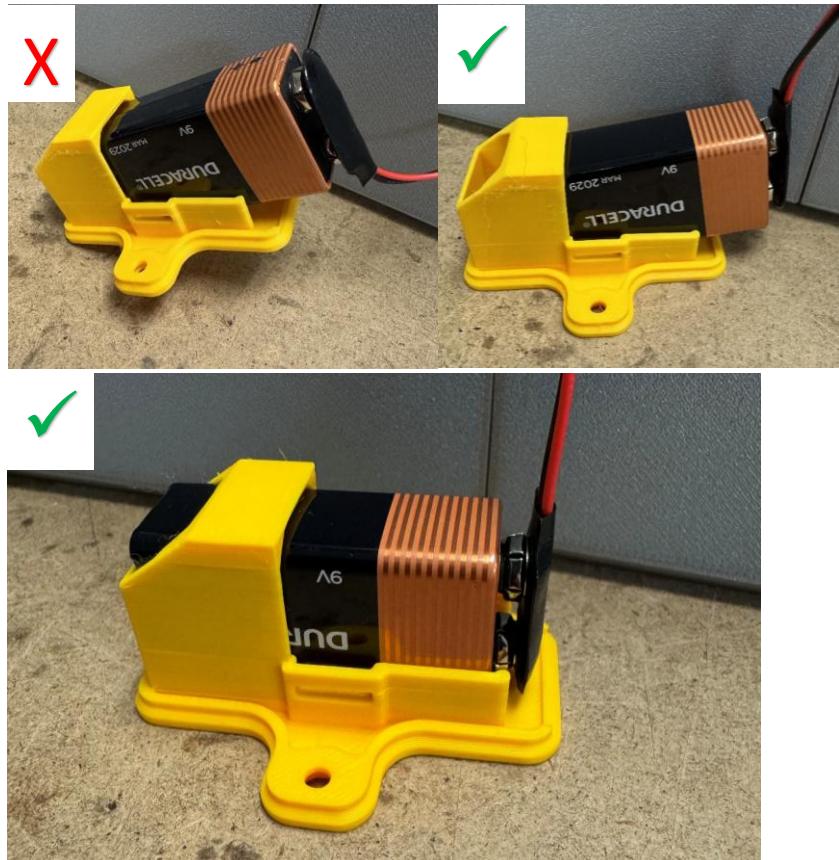
## Chatterbox MAKER GUIDE



### *Step D -22: Insert battery into battery cover*

Slide the battery into the battery cover (D16). Make sure the wires from the battery cap face toward the open section.

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### Step D -23: Connect battery cover to enclosure

Use the remaining #4 screw to connect the battery cover to the enclosure. The screw head should not stick past the bottom of the battery cover.

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### Step D -24: Put button inserts into button caps

Insert the Button Inserts (D12) into the Button Caps (D13). Line the tabs on the inserts up with the slots on the inside edge of the cap. Press firmly to snap the inserts into place. The insert should slide up and down easily within the cap, but no fall out or rotate.

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Repeat this step for the remaining three inserts and caps.

### ***Step D -25: Screw button caps onto bases***

Screw the button caps onto the button bases. The caps should stay flat while screwing on (i.e. not tilt to the side) and should screw on smoothly without a lot of resistance. If the cap is going on at a tilt or out encounter a lot of resistance, reposition the cap and try again.

The caps are designed to be able to rotate freely on the bases, so they will continue to spin, even when completely screwed down. To check the cap is fully attached to the base, try pressing on the cap. You

## Chatterbox MAKER GUIDE



should be able to feel and/or hear the tactile switch being pushed. If that is not the case, try unscrewing the cap and screwing it back on.



Repeat this step for the remaining three caps.



### *Step D -26: Connect label holders (If the requestor asked for them to come connected)*

If the requestor asked for the label holders (D14) to be connected, connect the label holders. Line up the holders with the slots in the enclosure. Keeping your fingers out of the way, push firmly to snap the holders in place. It may help to angle the holders when pushing them in.

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Repeat this step for the remaining three label holders.

The Chatterbox is now fully assembled.



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### Part E: Flashing Firmware to the Chatterbox

#### Part E: Required Components

- Assembled Chatterbox
- USB-C cable
- Computer that can install and run Arduino IDE

#### Part E: Required Tools and Supplies

- Computer that is able to install Arduino IDE and other Arduino libraries to flash firmware
- USB C cable to plug into the Chatterbox

#### Step E-01: Connect the Chatterbox to the Computer

Make sure the power switch on the Chatterbox is in the “OFF” position. Plug the USB C cable into the port labeled “USB” on the side of the Chatterbox, and plug the other end of the cable into your computer. The computer will provide power to the Chatterbox, so you can leave the power switch set to “OFF”.

#### Step E-02: Setup Arduino IDE on Computer

1. Download Arduino IDE for your operating system at <https://www.arduino.cc/en/software>.
2. Install the Arduino IDE.

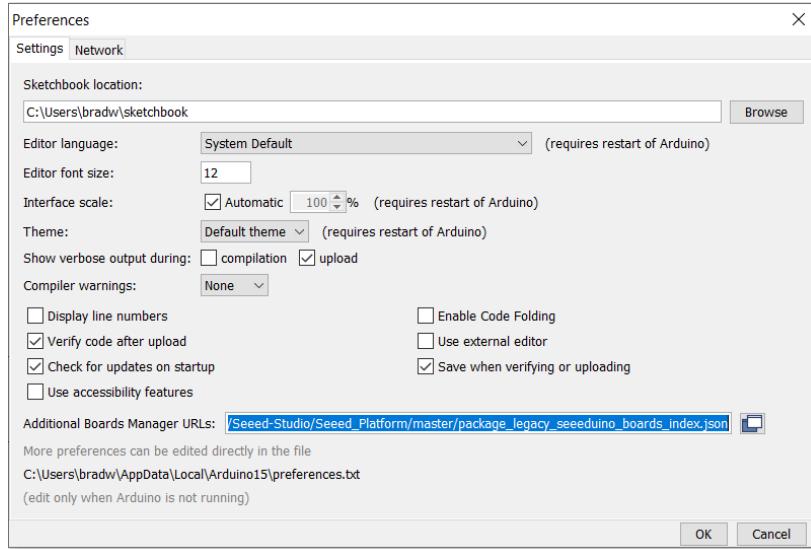
#### Step E-03: Setup Arduino IDE for the Seeeduino Nano

1. Open Arduino IDE.
2. Click on **File -> Preferences**
3. Locate the text field that reads **Additional Boards Manager URLs** beside it.
4. Copy and paste the following link into the field as a new line:

[raw.githubusercontent.com/Seeed-Studio/Seeed\\_Platform/master/package\\_legacy\\_seeeduino\\_boards\\_index.json](https://raw.githubusercontent.com/Seeed-Studio/Seeed_Platform/master/package_legacy_seeeduino_boards_index.json)

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5. Click on **OK**.
6. Restart the Arduino IDE by closing and opening the program.
7. Open the **Boards Manager** option from the **Tools -> Board -> Boards Manager...** menu.
8. Search for “Seeeduino AVR” and select “Seeeduino AVR” by Seeed Studio. Make sure you select the exact board manager name stated as there may be some with similar names that will not work.
9. Click **Install** to install the board.

### Step E-04: Install Libraries

1. Go to the **Tools -> Manage Libraries...** menu.
2. For each library in the table below, search for the name. Ensure the Author and Version is correct, then install the library. If prompted to install any dependent libraries, click **OK**.

Library Name	Author	Version
TMRpcm	TMRh20	1.3.6
StateMachine	Jose Rullan	1.0.13
Neotimer	Jose Rullan	1.1.6

### Step E-05: Enable Recording

Find the folder where the TMRpcm library was installed. This is usually in C:\Users\[NAME]\sketchbook\libraries\TMRpcm. Open the file pcmConfig.h in notepad or a similar text editor.

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Uncomment the line "#define bufferSize 128" by removing the "://" before #define bufferSize128

```
***** GENERAL USER DEFINES *****
See https://github.com/TMRh20/TMRpcm/wiki for info on usage

Override the default size of the buffers (MAX 254). There are 2 buffers, so memory usage will be double this number
Defaults to 64bytes for Uno etc. 254 for Mega etc. note: In multi mode there are 4 buffers*/
#define bufferSize 128 //must be an even number
```

Uncomment the line "#define ENABLE\_RECORDING" by removing the "://" before #define  
ENABLE\_RECORDING

```
/* Initial implementation for recording of WAV files to SD card via a microphone or input connected to an analog pin
SdFat library is recommended
Requires a class 4 card minimum, bufferSize may need to be increased to 254 if audio is skipping etc.
Depending on the card, can take a few seconds for recording to start

#define ENABLE_RECORDING
```

Save the file and close it.

### Step E-06: Setup Local Code Directory

- Download the Firmware\_Files from the GitHub Repository

<Insert link to GitHub firmware files zip file>

- Extract / unzip the folder to a known location on your computer.
- Confirm you have the following folder structure:
  - Chatterbox\_Firmware (folder)
    - o Chatterbox\_Firmware.ino

### Step E-07: Flash Firmware to the Chatterbox

- Open the Chatterbox\_Firmware.ino with Arduino IDE.
- Select Seeeduino Nano from the **Tools -> Board -> <Boards Type>** menu
- Connect the Chatterbox to the computer using the USB-C cable.
- Select the correct port from the **Tools -> Port** menu.
- Verify and upload to code by clicking the arrow in the top-left corner of the Arduino program.

## Testing

It is important to test the following functions of the Chatterbox before it is sent to the requestor. If you encounter any issues while testing, refer to the Troubleshooting section for help solving the problem. The tests are summarized in the table below to make it easy to check if all tests have been completed. Each test is described in detail following the table.

Test	Description	Passed or Failed
Battery power	Check the device powers on from the battery	

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<b>Mode switch</b>	<ul style="list-style-type: none"> <li>- Check the mode switch changes modes</li> <li>- Check all LEDs blink while in Record Mode</li> </ul>	
<b>Record Messages</b>	<ul style="list-style-type: none"> <li>- Record a message on each button on one level</li> <li>- Check that only the one LED blinks while recording on a switch</li> <li>- Check that the messages play back in Record Mode</li> <li>- Check that playback is audible/clear</li> </ul>	
<b>Level switch</b>	<ul style="list-style-type: none"> <li>- Check that moving the Level switch changes the recording/playback level</li> <li>- Record new messages for each button at each level</li> <li>- Check that message play back in Record Mode</li> </ul>	
<b>Message Playback</b>	<ul style="list-style-type: none"> <li>- Check that messages play back in Playback mode</li> <li>- Check that only the LED for the message being played lights up</li> </ul>	
<b>Switch Scanning</b>	<ul style="list-style-type: none"> <li>- Check that pressing the Select switch once starts switch scanning</li> <li>- Check that the LED for a message stays lit during the delay before playing the next message</li> <li>- Check that only the playing message LED stays lit</li> <li>- Check that switch scanning stops if the last message times out</li> <li>- Check that pressing the Select switch again while switch scanning replays the current message</li> </ul>	
<b>Next switch</b>	<ul style="list-style-type: none"> <li>- Check that pressing the Next switch when not switch scanning does nothing</li> <li>- Check that pressing the Next switch while switch scanning moves to the next message</li> </ul>	
<b>Speed switch</b>	<ul style="list-style-type: none"> <li>- Check that moving the Speed switch changes the length of the delay between messages being automatically played while switch scanning</li> <li>- Check all three speeds</li> </ul>	
<b>Volume</b>	<ul style="list-style-type: none"> <li>- Check that the volume knob changes the volume of the messages</li> </ul>	

### Battery Power

Slide the Level and Speed switches to the first positions (left-most when looking at them, labeled “1” on the enclosure). Slide the Mode switch to the position closest to the USB port (this is the Record mode position).

With the Chatterbox unplugged from any other power source, turn the power switch to the “On” position. The Chatterbox should turn on. If it’s in Record mode, all four lights will start blinking. If it is in Playback mode, no lights will turn on, but starting switch scanning or pressing a message button should like the LEDs as messages play. Note, no messages will play if they have not been recorded yet.

# Chatterbox

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Passing this test means the device powers on with the battery.

### Mode Switch

With the Chatterbox on, slide the Mode switch to its different positions (only two positions). As you change the mode, the LEDs should either all blink (Recording mode), or no LEDs should light up unless a message is being played.

Passing this test means the Mode switch changes mode consistently.

### Record Messages

With the Chatterbox on and in Recording mode, press and hold one of the message buttons. Once the other LEDs stop blinking and only the LED for the button being held is bringing, start recording the message you would like on that button (ex: say “Level 1, Message 1” for the first button on the first level). Once you have finished the message, release the button. All LEDs should start blinking again after you release the button. Press the button to preview the message; the Chatterbox should play that message back to you.

Record and preview a message on each of the buttons for that message level.

Passing this test means that you can record and preview messages on each of the buttons.

### Level Switch

Move the Level switch to position 2 (the centre position) to switch to Level 2. Repeat the Record Messages test on this level. Move the Level switch to position 3 (right-most position when looking at the switch) and repeat the Record Messages test a third time.

Passing this test means that the Level switch consistently switches between levels, and allows you to record and preview messages on the different levels.

### Message Playback

Slide the Mode switch so it is closest to the assistive switch jacks (Next and Select), and slide the Level switch to the first position. One at a time, press each message button and listen to the playback. Once the message has played back, move on to the next button. Repeat this with all message buttons and on all three levels.

Passing this test means:

- The correct LED lights up and stays on while a message is playing
- Each message plays back when the button is pressed

## Chatterbox MAKER GUIDE



### Switch Scanning

Plug an assistive switch into each of the assistive switch ports. Press the switch connected to the Select port to start switch scanning and complete each of the following:

1. Allow the Chatterbox to go through all messages.
2. Select a message to playback by pressing the Select switch again
  - a. While a message is playing.
  - b. During the delay between messages.
3. Advance through the messages by pressing the switch connected to the Next port
  - a. While a message is playing.
  - b. During the delay between messages.

Passing this test means that while a message is playing and during the delay between messages, only the corresponding LED is lit, and it turns off when the next message is played. Additionally:

1. The Chatterbox stops cycling through messages if it advances past the fourth message on the level (whether from pressing the Next switch or going past the delay).
2. The Chatterbox replays the current message when the Select switch is pressed again.
  - a. The message playing stops and restarts.
  - b. The message replays.
3. The Chatterbox advances one message when the switch connected to the Next port is pressed.
  - a. The message stops playing and advances to the next.
  - b. The next message starts playing.

### Next Switch

While not actively switch scanning, the Next switch has no function. Press the assistive switch connected to the Next port while not switch scanning.

Passing this test means nothing happens when the Next switch is activated if the Chatterbox is not currently switch scanning.

### Speed Switch

Check that changing the position of the Speed switch changes the delay between messages when switch scanning. Move the Speed switch to the middle position (2) and press the Select switch. Let the messages advance automatically, comparing the delay between a message finishing playing and the next starting. Repeat this after changing the Speed switch to the last position (right-most when looking at it).

Passing this test means the length of the delay between messages increases with increasing Speed position. At the time of writing, the default delay times are 3, 5, and 7 seconds for Speeds 1, 2, and 3, respectively.

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### Volume

Test that turning the volume knob changes the volume of the messages. Play a message, and while it is playing, turn the volume knob clockwise, then counterclockwise.

Passing this test means the volume increases when turning the knob clockwise, and decreases when turning it counterclockwise.

### Troubleshooting

Below are some potential common issues and how to solve them. If you have any issues with the Chatterbox that are not solved through this troubleshooting, please add them as an Issue to the Chatterbox GitHub repository.

#### When powered, the first two lights start blinking and nothing else will happen

This is an error state from the micro-SD card reader not finding a micro-SD card.

1. Double check that the micro-SD card has been inserted properly into the micro-SD card reader.
2. Double check the format of the micro-SD card. The micro-SD card reader requires the card to be formatted in FAT16 or FAT32. The [Adafruit website for the micro-SD reader](#) has detailed instructions on how to reformat the micro-SD card, if needed.
3. If you used/purchased a different micro-SD card than in the Bill of Materials, double check the size of the card. Windows sets an artificial limit on the size of memory it will format as FAT32 to 32GB. While FAT32 can work on data storage up to 2TB, a Windows system will not allow you to format anything above 32GB as FAT32 without bypassing this artificial limit.

#### Chatterbox does not turn on with battery, but did on USB-C power

This is likely due to a dead battery, or bad solder connections for the battery or power

1. Double check if messages play back when a button is pressed, or if LEDs blink when in Record mode. No visible lights turn on while in Playback mode.
2. Replace the battery.
3. Double check solder connections for the battery cap and power switch on the Secondary PCB.

#### An LED does not turn on

This is likely due to a bad connection between the LED PCB and Secondary PCB.

1. Check the solder connections on each PCB.
2. Check that the LED was connected in the correct orientation.
3. Check that the LED has not broken.

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**When a button is pressed, the corresponding LED turns on very briefly but nothing else happens**

This is likely due to there not being a message recorded for that button.

1. Put the Chatterbox in Record mode and record a message on the corresponding button.

**The Chatterbox seems to skip playing a message while switch scanning, and goes right to the delay between messages**

This is likely due to there not being a message recorded for that button.

1. Put the Chatterbox in Record mode and record a message on the corresponding button.

**Nothing happens when I press a message button**

This may be due to the button cap not being seated correctly, or issues with the connection between the tactile switch and Main PCB.

1. Remove the button cap and try pressing the switch. If the switch works without the button cap, reposition the button cap and screw it back on.
2. Check the solder joints on the Main PCB and the tactile switch for that button.
3. Check the tactile switch is working.

**Nothing happens when I press the assistive switch attached to the Select jack**

This may be due to the switch not working, a bad connection on the Main PCB, or being in the wrong mode.

1. Check that the Chatterbox is powered on and in Playback mode.
2. Check that the assistive switch is working properly.
3. Check the solder connections on the Main PCB.

**Nothing happens when I press the assistive switch attached to the Next jack**

The Next jack only works while switch scanning, so if it does not do anything when pressed and you are not switch scanning, that is fine. If you are switch scanning and pressing the Next button does nothing, it may be due to the assistive switch not working, or a bad connection on the Main PCB.

1. Start switch scanning by pressing the switch connected to the Select jack, then press the switch connected to Next again.
2. Check that the assistive switch is working properly.
3. Check the solder connections on the Main PCB.